



UniversalSeal
REVOLVING IN A GLOBAL MARKET



UNIVERSAL SEAL INC.

Revolving In A Global Market

GENERAL INFORMATION

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TUBES (INCH & METRIC SIZES)

INCH SIZES PRODUCTS

**MATERIAL SPECIFICATIONS & COMPATIBILITY CHARTS
(INCH SIZES)**

METRIC SIZES PRODUCTS

**MATERIAL SPECIFICATIONS & COMPATIBILITY CHARTS
(METRIC SIZES)**

SPECIAL PRODUCTS (INCH & METRIC SIZES)



TUBES

Thermoset Tubes

1




SIZES :

- 1/4 inch inside Diameter upto 16 inch Outside Diameter
- 7mm inside Diameter upto 405 mm Outside Diameter
- Length 7 inches or 178 mm
- Larger sizes on request.

MATERIAL:

- 92A Liquid Cast Polyurethane
- 95A Liquid Cast Polyurethane
- 70A Liquid Cast Polyurethane
- 82A Liquid Cast Polyurethane
- 60D Liquid Cast Polyurethane
- 70D Liquid Cast Polyurethane

We can mould a combination of ANY TWO MATERIALS above to make a dual material tube.

COLOUR :

A wide variety, Just Ask

ORDERING INFORMATION :

Need Inside Diameter or Outside Diameter either in Inches or Millimeters

ADVANTAGES :

- No air bubbles
- High abrasive resistant
- High extrusion resistance for high pressure application
- Compatible with most mineral based hydraulic fluids
- 100 % Virgin Thermoset material.

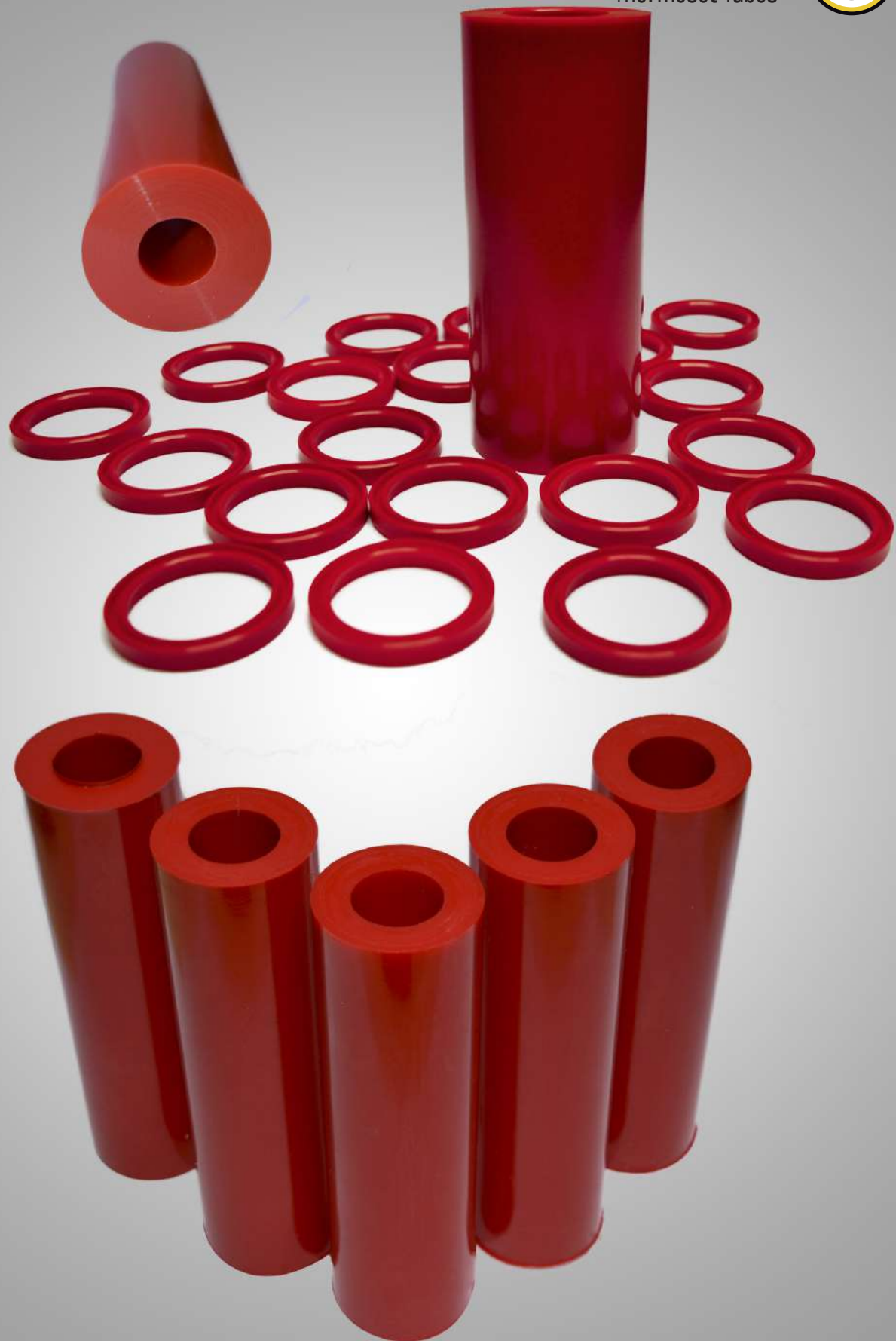


Part Number	Size (mm)
TU-000.0025.0-178	0 x 25 x 178
TU-000.0031.0-178	0 x 3 x 178
TU-000.0042.0-178	0 x 42 x 178
TU-000.0046.0-178	0 x 46 x 178
TU-000.0054.0-178	0 x 54 x 178
TU-000.0062.0-178	0 x 62 x 178
TU-013.0046.0-178	13 x 46 x 178
TU-022.0046.0-178	22 x 46 x 178
TU-022.0054.0-178	22 x 54 x 178
TU-022.0062.0-178	22 x 62 x 178
TU-025.0046.0-178	25 x 46 x 178
TU-027.0046.0-178	27 x 46 x 178
TU-027.0054.0-178	27 x 54 x 178
TU-027.0062.0-178	27 x 62 x 178
TU-027.0072.0-178	27 x 72 x 178
TU-037.0062.0-178	37 x 62 x 178
TU-037.0072.0-178	37 x 72 x 178
TU-037.0079.0-178	37 x 79 x 178
TU-037.0087.0-178	37 x 87 x 178
TU-044.0065.0-178	44 x 65 x 178
TU-047.0072.0-178	47 x 72 x 178
TU-047.0079.0-178	47 x 79 x 178
TU-047.0087.0-178	47 x 87 x 178
TU-056-0079.0-178	56 x 79 x178
TU-056.0087.0-178	56 x 87 x 178
TU-056.0094.0-178	56 x 94 x 178
TU-066.0087.0-178	66 x 87 178
TU-066.0094.0-178	66 x 94 x 178
TU-066.0103.0-178	66 x 103 x 178
TU-074.0094.0-178	74 x 94 x 178

Part Number	Size (mm)
TU-074.0103.0-178	74 x 103 x 178
TU-074.0110.0-178	74 x 110 x 178
TU-075.0114.0-178	75 x 114 x 178
TU-076.0122.0-178	76 x 122 178
TU-082.0103.0-178	82 x 103 x 178
TU-082.0110.0-178	82 x 110 x 178
TU-082.0118.0-178	82 x 118 x 178
TU-082.0126.0-178	82 x 126 x 178
TU-090.0110.0-178	90 x 110 x 178
TU-090.0118.0-178	90 x 118 x 178
TU-090.0126.0-178	90 x 126 x 178
TU-094.0114.0-178	94 x 114 x 178
TU-096.0126.0-178	96 x 126 x 178
TU-096.0134.0-178	96 x 134 x 178
TU-106.0126.0-178	106 x 126 x 178
TU-106.0134.0-178	106 x 134 x 178
TU-106.0142.0-178	106 x 142 x 178
TU-114.0134.0-178	114 x 134 x 178
TU-114.0142.0-178	114 x 142 x 178
TU-114.0150.0-178	114 x 150 x 178
TU-114.0158.0-178	114 x 158 x 178
TU-122.0142.0-178	122 x 142 x 178
TU-122.0150.0-178	122 x 150 x 178
TU-122.0158.0-178	122 x 158 x 178
TU-122.0166.0-178	122 x 166 x 178
TU-128.0150.0-178	128 x 150 x 178
TU-128.0158.0-178	128 x 158 x 178
TU-128.0166.0-178	128 x 166 x 178
TU-136.0158.0-178	136 x 158 x 178
TU-136.0166.0-178	136 x 166 x 178

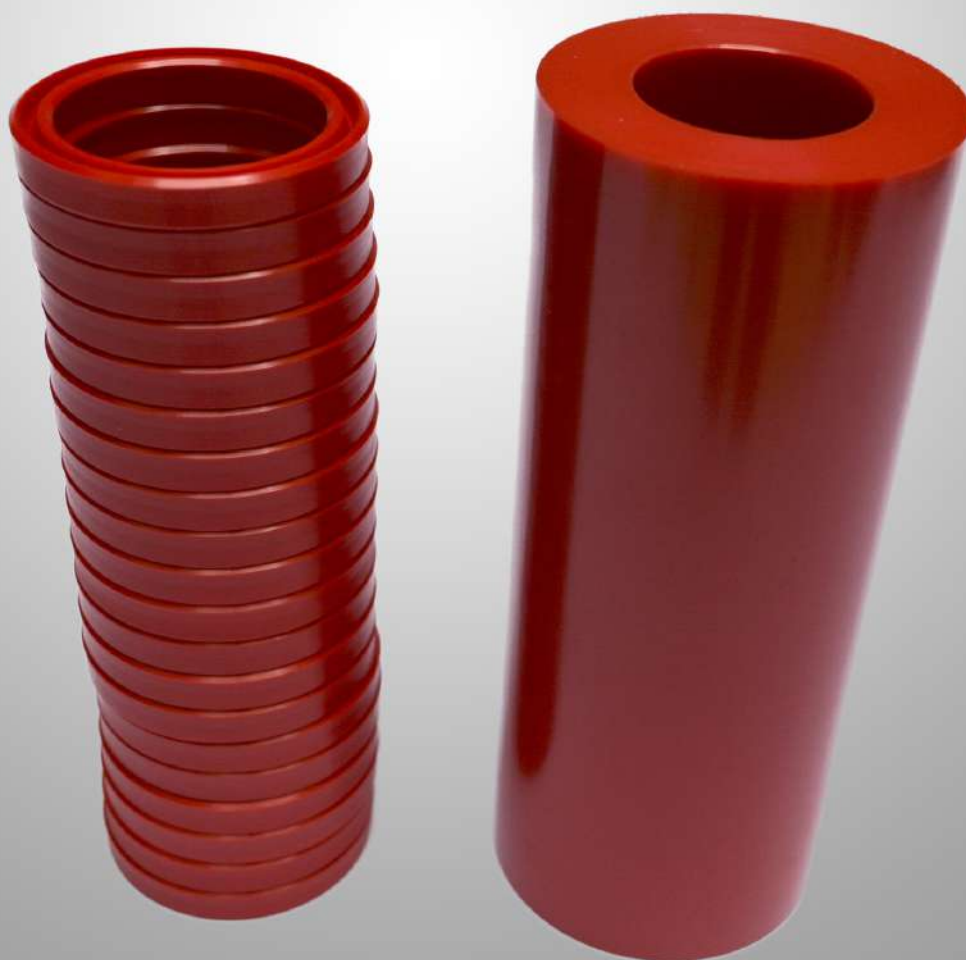
Part Number	Size (mm)
TU-136.0174.0-178	136 x 174 x 178
TU-146.0174.0-178	146 x 174 x 178
TU-146.0182.0-178	146 x 182 x 178
TU-136.0182.0-178	136 x 182 x 178
TU-153.0182.0-178	153 x 182 x 178
TU-153.0190.0-178	153 x 190 x 178
TU-153.0198.0-178	153 x 198 x 178
TU-153.0206.0-178	153 x 206 x 178
TU-162.0198.0-178	162 x 198 x 178
TU-162.0206.0-178	162 x 206 x 178
TU-178.0214.0-178	178 x 214 x 178
TU-186.0214.0-178	186 x 214 x 178
TU-186.0222.0-178	186 x 220 x 178
TU-186.0230.0-178	186 x 230 x 178
TU-194.0246.0-178	194 x 246 x 178
TU-202.0230.0-178	202 x 230 x 178
TU-207.0245.0-178	207 x 245 x 178
TU-210.0254.0-178	210 x 254 x 178
TU-218.0254.0-178	218 x 254 x 178
TU-218.0265.0-178	218 x 265 x 178
TU-218.0275.0-178	218 x 275 x 178
TU-225.0285.0-178	225 x 285 x 178
TU-230.0290.0-178	230 x 290 x 178
TU-250.0310.0-178	250 x 310 x 178
TU-260.0320.0-178	260 x 320 x 178
TU-270.0330.0-178	270 x 330 x 178
TU-280.0340.0-178	280 x 340 x 178
TU-290.0350.0-178	290 x 350 x 178
TU-300.0370.0-178	300 x 370 x 178
TU-340.0410.0-178	340 x 410 x 178
TU-365.0405.0-178	365 x 405 x 178

TUBES
Thermoset Tubes





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Thermoset Tubes



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TUBES

Thermoset Tubes

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INCHES

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2.

PISTON UNIRINGS

Series 12 (Inch Sizes)

3.

FLANGE SEALS

Series 11 (Inch Sizes)

4. RO. U-CUPS

Series 13 (Inch Sizes)

5. PI. U-CUPS

Series 14 (Inch Sizes)

6. SYMMETRICAL U-CUPS

Series 15 (Inch Sizes)

7. A.N. TYPE U-CUPS

Series 16 (Inch Sizes)

8. U-PACKS

Series 30 (Inch Sizes)

9. TRIPLE LIP RO. U-CUPS

Series 33 (Inch Sizes)

10. O-PACK

Series 35 (Inch Sizes)

11. PART NUMBER LIST

(Inch Sizes)

12.

PISTON CUPS

Series 17 (Inch Sizes)

13.

BACK UP WASHERS

Series 19 (Inch Sizes)

14.

'O'RINGS

Series 20 (Inch Sizes)

15. MEDIUM DUTY ROD WIPERS

Series 50 (Inch Sizes)

16. HEAVY DUTY ROD WIPERS

Series 52 (Inch Sizes)

17.

PISTON RINGS

Series 77 (Inch Sizes)

18.

PISTON GLIDE RINGS

Series 90 (Inch Sizes)

19.

PIP SEAL

(Inch Sizes)

20.

MATERIAL SPECIFICATIONS & COMPATIBILITY CHART

(Inch Sizes)

INCH SIZES U-CUPS & U-PACKS (Series 13, 14, 15, 16, 30, 33, 35)

INCH SIZES
ROD WIPERS
(Series 50 & 52)



UNIVERSAL SEAL INC.

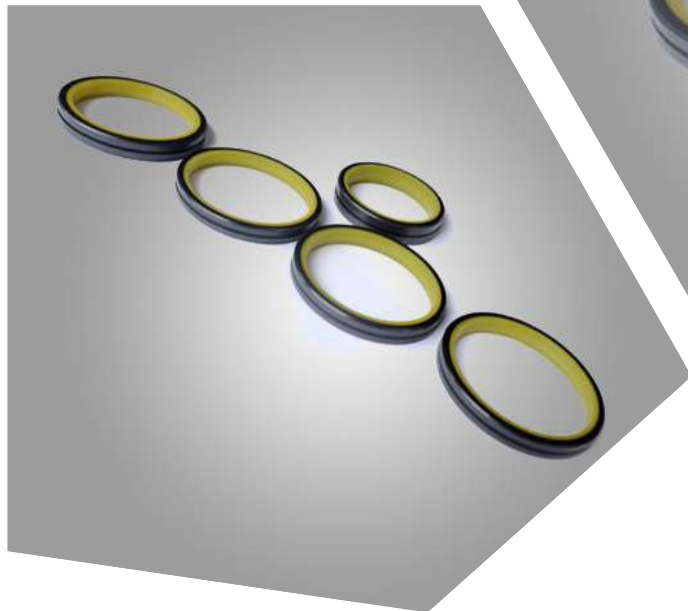
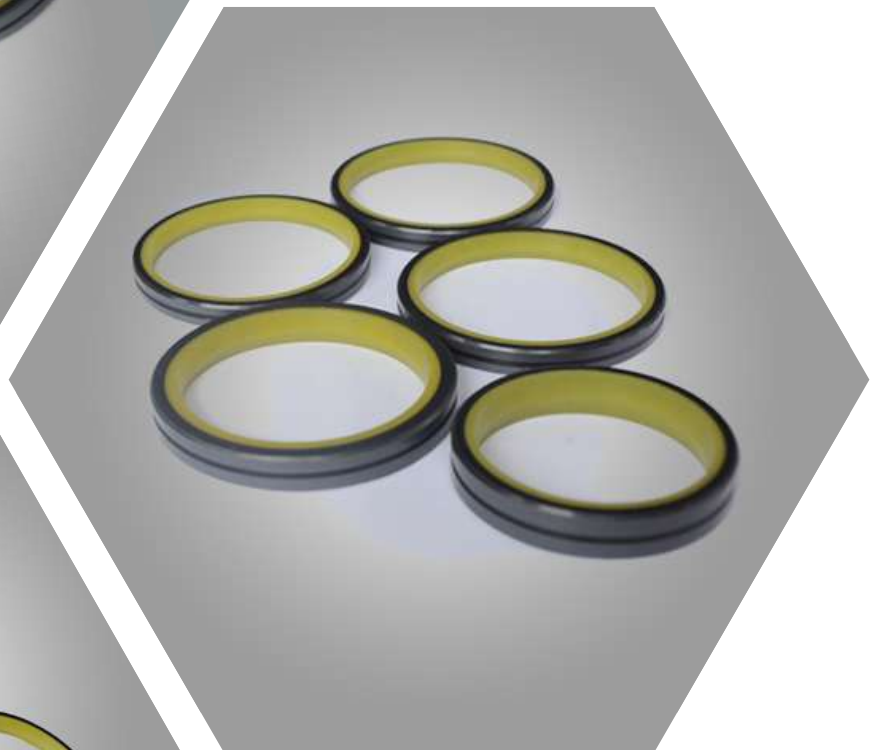
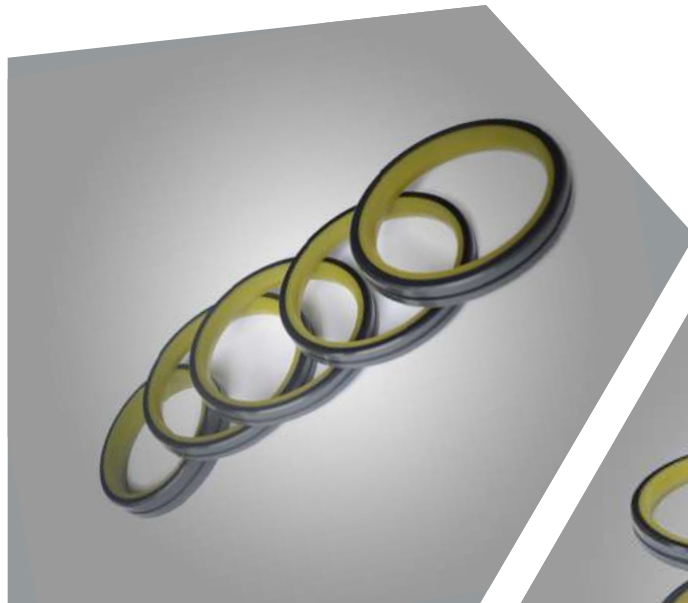
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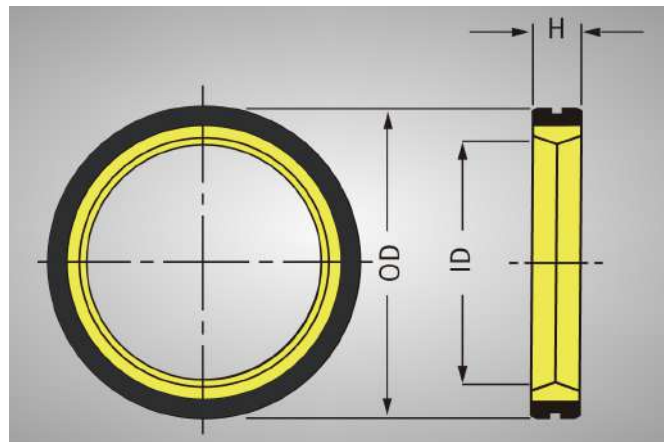
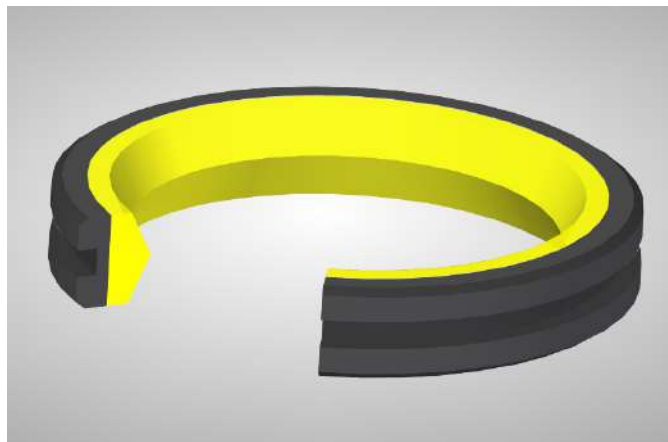
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PISTON UNIRINGS

Series 12 (Inch Sizes)

2





CHARACTERISTICS

The Piston Uniring is a Dual Durometer, one piece double acting piston seal. It consists of a (Duro 60 D) dynamic sealing and wear lamina bonded to a (Duro 57 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 energizing 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.

Piston Unirings can readily be substituted in existing cavities to replace other types of double acting seals, such as TFE Piston rings and the T Cross Section seals, and many more piston type seals.

Unirings can easily be installed on one piece pistons without costly and time consuming assembly fixtures. They simplify the task of eventual field replacement.

Piston Unirings permit substantial cost savings in cylinder design by allowing larger tolerances and poorer surface finishes.

MATERIAL

- Sealing Lamina: Unithane 460 D, Liquid Cast Polyurethane, Duro 60 D.
- Activation Lamina: Unithane 157 A, Liquid Cast Polyurethane, Duro 57 A.
- Fluid Compatability: See Material Specifications: Technical Bulletin US- 96

SEAL SELECTION

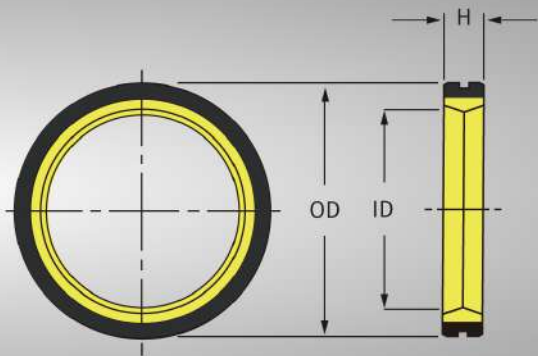
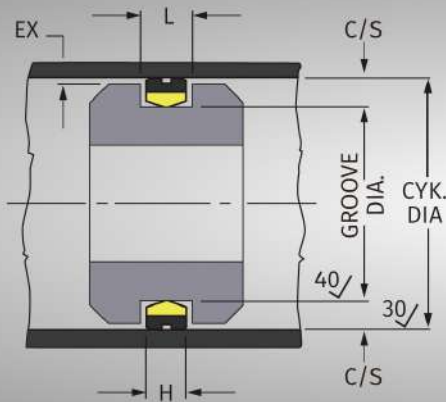
- Find appropriate nominal outside diameter (OD) in size listings, Pages 2(3) & 2(4).
- Select the largest practical cross-section (C/S) for longest wear life and maximum allowable tolerances.
- Identify the according inside diameter (ID) and seal width (H).
- Refer to charts on page 2(2) for recommended groove and cylinder tolerances, surface finishes, and the maximum extrusion gap (EX) for your system pressure.

PISTON UNIRINGS

SERIES 12 (Inch Sizes)



PISTON UNIRINGS



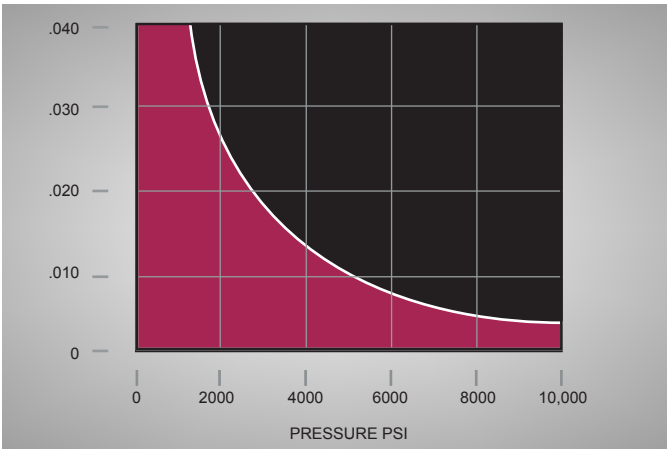
GROOVE WIDTH

H Nominal Seal	3/16	1/4	5/16	3/8	1/2	9/16	5/8	3/4
L Actual Groove Width	.196	.263	.328	.394	.526	.591	.657	.789
Groove Width Tolerance	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000

GROOVE DEPTH

C/S (Groove Depth)		Diametrical Tolerances	
Frac.	Dec.	Cyl. Dia.	Groove Dia.
1/8	.125	+.003 -.000	+.003 -.000
3/16	.187	+.004 -.000	+.004 -.000
1/4	.250	+.006 -.000	+.005 -.000
5/16	.312	+.006 -.000	+.006 -.000
3/8	.375	+.008 -.000	+.007 -.000
1/2	.500	+.010 -.000	+.008 -.000

SUGGESTED MAXIMUM EXTRUSION GAPS (EX)



The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges. Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

Part N°. 12-	Nominal Size, Inches		
	Od	Id	H
-024012-250	3/4	3/8	1/4
-024016-187	3/4	1/2	3/16
-028016-250	7/8	1/2	1/4
-028020-187	7/8	5/8	3/16
-100020-250	1	5/8	1/4
-100024-187	1	3/4	3/16
-104024-250	1-1/8	3/4	1/4
-104028-187	1-1/8	7/8	3/16
-108024-312	1-1/4	3/4	5/16
-108028-250	1-1/4	7/8	1/4
-108100-187	1-1/4	1	3/16
-112028-312	1-3/8	7/8	5/16
-112100-250	1-3/8	1	1/4
-112104-187	1-3/8	1-1/8	3/16
-116100-375	1-1/2	1	3/8
-116104-250	1-1/2	1-1/8	1/4
-116108-187	1-1/2	1-1/4	3/16
-120100-375	1-5/8	1	3/8
-120104-375	1-5/8	1-1/8	3/8
-120108-250	1-5/8	1-1/4	1/4
-124104-375	1-3/4	1-1/8	3/8
-124108-375	1-3/4	1-1/4	3/8
-124112-250	1-3/4	1-3/8	1/4
-128108-375	1-7/8	1-1/4	3/8
-128112-375	1-7/8	1-3/8	3/8
-128116-312	1-7/8	1-1/2	5/16
-200112-375	2	1-3/8	3/8
-200116-375	2	1-1/2	3/8
-200120-312	2	1-5/8	5/16
-204116-500	2-1/8	1-1/2	1/2

Part N°. 12-	Nominal Size, Inches		
	Od	Id	H
-204120-375	2-1/8	1-5/8	3/8
-204128-312	2-1/8	1-7/8	5/16
-208120-500	2-1/4	1-5/8	1/2
-208124-375	2-1/4	1-3/4	3/8
-208128-312	2-1/4	1-7/8	5/16
-212124-500	2-3/8	1-3/4	1/2
-212128-375	2-3/8	1-7/8	3/8
-212200-312	2-3/8	2	5/16
-216128-500	2-1/2	1-7/8	1/2
-216200-375	2-1/2	2	3/8
-216204-312	2-1/2	2-1/8	5/16
-220200-500	2-5/8	2	1/2
-220204-375	2-5/8	2-1/8	3/8
-220208-312	2-5/8	2-1/4	5/16
-224204-500	2-3/4	2-1/8	1/2
-224208-375	2-3/4	2-1/4	3/8
-224212-312	2-3/4	2-3/8	5/16
-228208-500	2-7/8	2-1/4	1/2
-228212-375	2-7/8	2-3/8	3/8
-228216-312	2-7/8	2-1/2	5/16
-300212-500	3	2-3/8	1/2
-300216-375	3	2-1/2	3/8
-300220-312	3	2-5/8	5/16
-308220-500	3-1/4	2-5/8	1/2
-308224-375	3-1/4	2-3/4	3/8
-308228-312	3-1/4	2-7/8	5/16
-316228-500	3-1/2	2-7/8	1/2
-316300-375	3-1/2	3	3/8
-316304-312	3-1/2	3-1/8	5/16
-324304-500	3-3/4	3-1/8	1/2

PISTON UNIRINGS

SERIES 12 (Inch Sizes)



Part N°. 12-	Nominal Size, Inches		
	Od	Id	H
-324308-375	3-3/4	3-1/4	3/8
-324312-312	3-3/4	3-3/8	5/16
-400308-625	4	3-1/4	5/8
-400312-500	4	3-3/8	1/2
-400316-375	4	3-1/2	3/8
-408316-625	4-1/4	3-1/2	5/8
-408320-500	4-1/4	3-5/8	1/2
-408324-375	4-1/4	3-3/4	3/8
-416324-625	4-1/2	3-3/4	5/8
-416328-500	4-1/2	3-7/8	1/2
-416400-375	4-1/2	4	3/8
-416400-562	4-1/2	4	9/16
-424400-625	4-3/4	4	5/8
-424404-500	4-3/4	4-1/8	1/2
-424408-375	4-3/4	4-1/4	3/8
-424408-562	4-3/4	4-1/4	9/16
-500408-625	5	4-1/4	5/8
-500412-500	5	4-3/8	1/2
-500416-375	5	4-1/2	3/8
-500416-562	5	4-1/2	9/16
-508416-625	5-1/4	4-1/2	5/8
-508420-500	5-1/4	4-5/8	1/2
-508424-375	5-1/4	4-3/4	3/8
-508424-562	5-1/4	4-3/4	9/16
-516424-625	5-1/2	4-3/4	5/8
-516428-500	5-1/2	4-7/8	1/2
-516500-375	5-1/2	5	3/8
-516500-562	5-1/2	5	9/16
-524500-625	5-3/4	5	5/8
-524504-500	5-3/4	5-1/8	1/2
-524508-375	5-3/4	5-1/4	3/8
-524508-562	5-3/4	5-1/4	9/16
-600500-750	6	5	3/4
-600508-625	6	5-1/4	5/8
-600512-500	6	5-3/8	1/2

Part N°. 12-	Nominal Size, Inches		
	Od	Id	H
-600516-375	6	5-1/2	3/8
-600516-562	6	5-1/2	9/16
-616516-750	6-1/2	5-1/2	3/4
-616524-625	6-1/2	5-3/4	5/8
-616528-500	6-1/2	5-7/8	1/2
-616600-562	6-1/2	6	9/16
-700600-750	7	6	3/4
-700608-625	7	6-1/4	5/8
-700612-500	7	6-3/8	1/2
-700616-562	7	6-1/2	9/16
-716616-750	7-1/2	6-1/2	3/4
-716624-625	7-1/2	6-3/4	5/8
-716628-500	7-1/2	6-7/8	1/2
-716700-562	7-1/2	7	9/16
-800700-750	8	7	3/4
-800708-625	8	7-1/4	5/8
-800712-500	8	7-3/8	1/2
-800716-562	8	7-1/2	9/16
-816716-750	8-1/2	7-1/2	3/4
-816724-625	8-1/2	7-3/4	5/8
-816728-500	8 1/2	7-7/8	1/2
-816800-562	8 1/2	8	9/16
-900800-750	9	8	3/4
-900808-625	9	8-1/4	5/8
-900812-500	9	8-3/8	1/2
-900816-562	9	8-1/2	9/16
-916816-750	9-1/2	8-1/2	3/4
-916824-625	9-1/2	8-3/4	5/8
-916828-500	9-1/2	8-7/8	1/2
-916900-562	9-1/2	9	9/16
-1000900-750	10	9	3/4
-1000908-625	10	9-1/4	5/8
-1000912-500	10	9-3/8	1/2
-1000916-562	10	9-1/2	9/16

Many more size call or Email.

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PISTON UNIRING

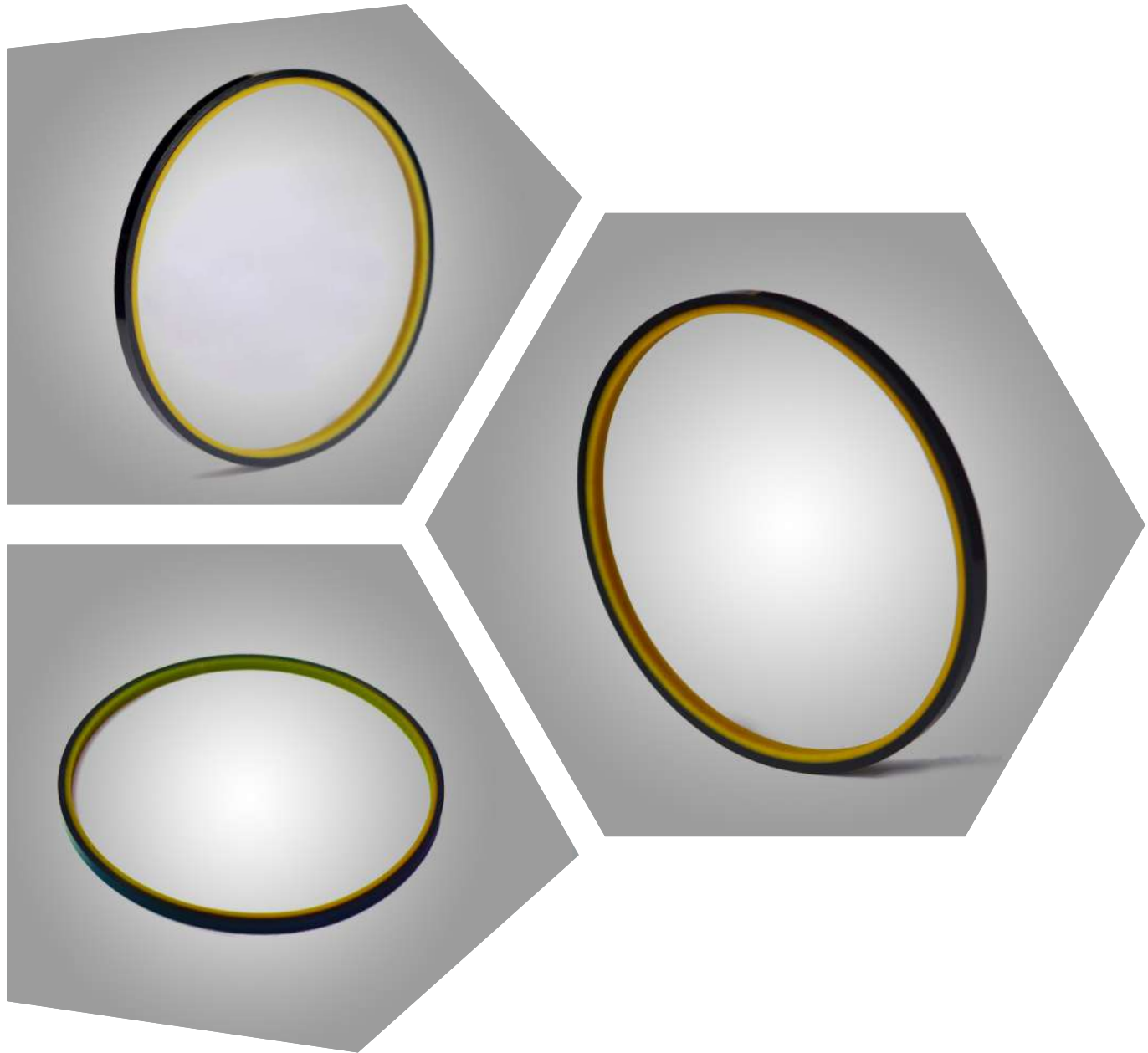
SERIES 12 (Inch Sizes)

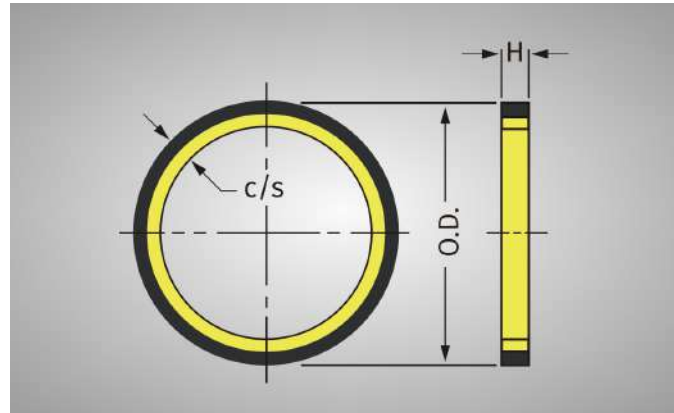
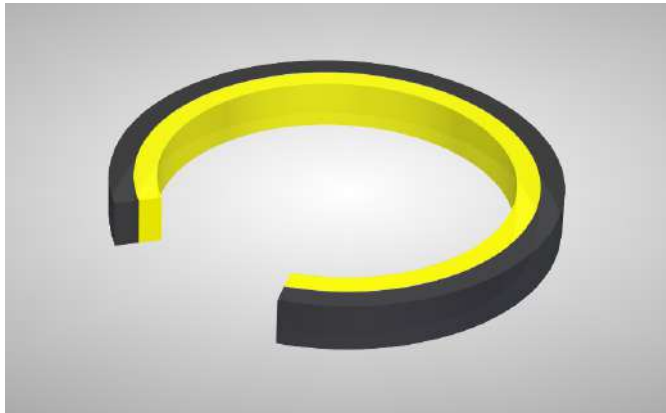


FLANGE SEALS

Series 11 (Inch Sizes)

3





CHARACTERISTICS

Series 11 Flange Seals are designed for use on all Hydraulic Flanged Tube, Pipe and Hose Connections, 4 Bolt Split Flange Type, as detailed in SAE Standard J518c. They provide a direct replacement for the O-rings without any modifications Of the existing grooves.

Special sizes of Flange Seals may be economically produced for a variety of Other applications, including manifold mounted pumps, stack valves and similar static hydraulic applications.

Flange Seals are a one piece, dual durometer static seal that consists of an outer lamina of Unithane 395A urethane. This material provides maximum extrusion resistance for the inner sealing lamina of Unithane 157A Polyurethane which exhibits extremely low compression set and has excellent sealing characteristics. Refer to Technical Bulletin US.96 for specific details on all Unithane materials.

Flange Seals are suitable for use in standard hydraulic fluids in a temperature range of -40 degrees F to +195 degrees F and 0 to 3000 P.S.I

This unique combination of an outer extrusion resistant lamina bonded to an inner pressure responsive sealing lamina provides improved sealing performance and longer service life than normally can be obtained by O-rings or other more expensive sealing devices.

MATERIAL

- Outer lamina: Unithane 395A liquid Cast Polyurethane, Duro 95A.
- Inner lamina: Unithane 157A liquid cast Polyurethane, Duro 57A.
- Fluid compatability: See Material Specifications: Technical Bulletin US- 96

ORDERING INFORMATION

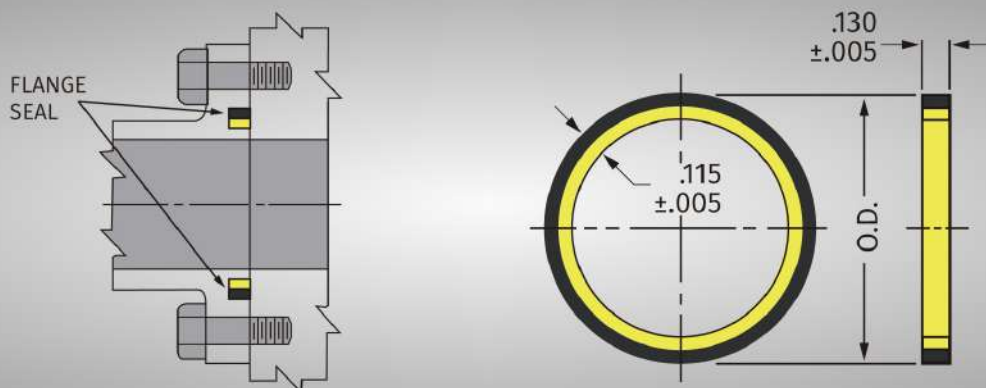
- For SAE J 518c 4 Bolt Split Flange Type Connections: refer to part number table on next page.
- For other sizes state either:
—equivalent 'O'-Ring size or,
—OD, cross section (C/S) and height (H) of the seal required.
- We have tooling available for a large range of inch sizes and some millimeter sizes.

FLANGE SEALS

SERIES 11 (Inch Sizes)



FLANGE SEALS



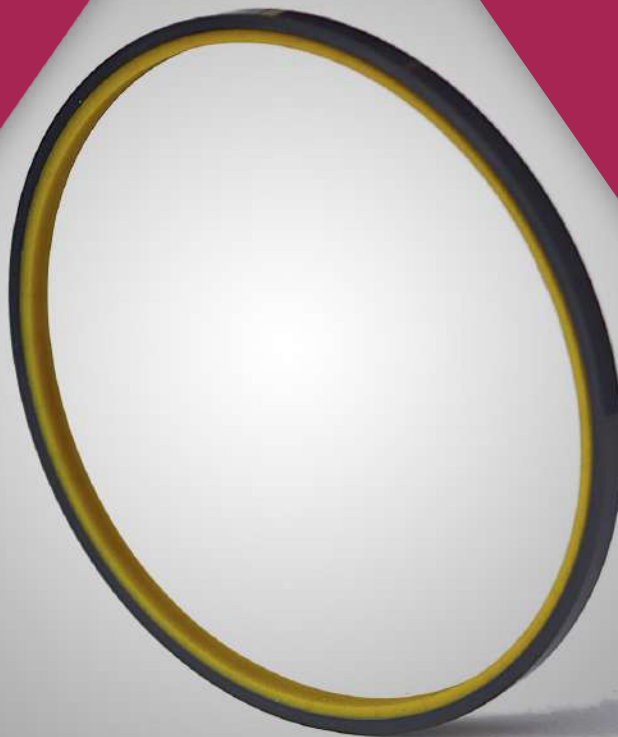
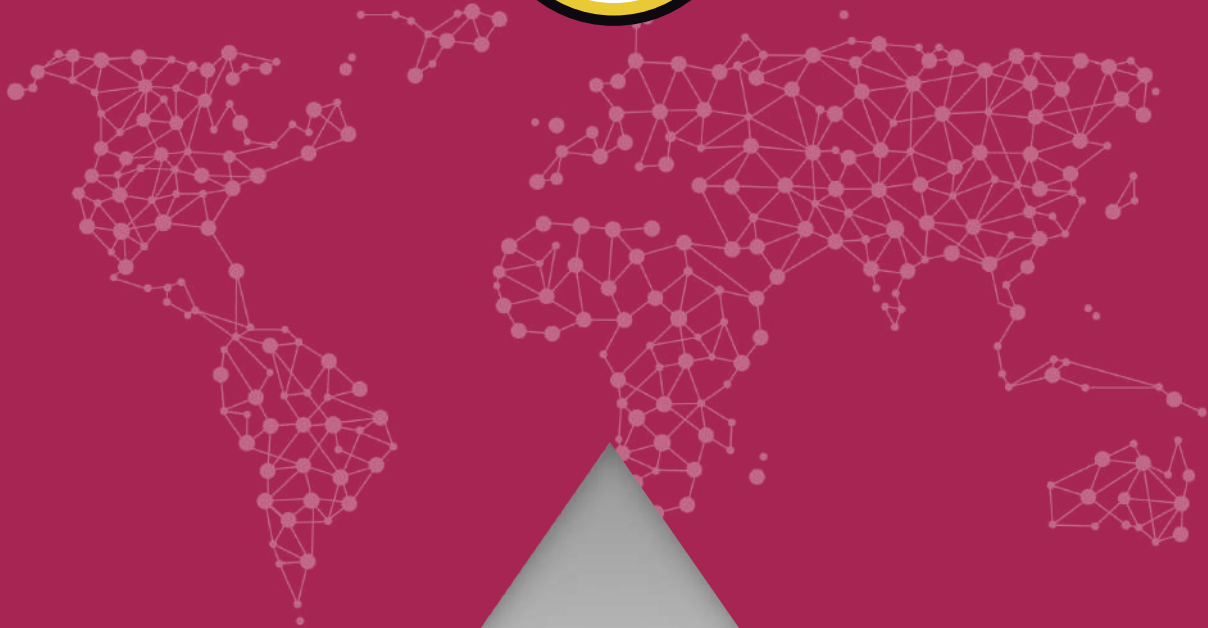
SIZES FOR SAE J518C 4 BOLT SPLIT FLANGE TYPE CONNECTIONS

Part Number 11-	Nominal Flange Size, In	Flange Dash Size	Replaces O-Ring Size No.	Outside Diameter +.008 -.000
-08	1/2	-08	-210	1.005
-12	3/4	-12	-214	1.255
-16	1	-16	-219	1.565
-20	1-1/4	-20	-222	1.755
-24	1-1/2	-24	-225	2.125
-32	2	-32	-228	2.500
-40	2-1/2	-40	-232	3.005
-48	3	-48	-237	3.625
-56	3-1/2	-56	-241	4.115
-64	4	-64	-245	4.615
-80	5	-80	-253	5.615

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FLANGE SEALS

SERIES 11 (Inch Sizes)



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INCHES U-CUPS & U-PACKS

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4. RO. U-CUPS

Series 13 (Inch Sizes)

5. PI. U-CUPS

Series 14 (Inch Sizes)

6. SYMMETRICAL U-CUPS

Series 15 (Inch Sizes)

7. A.N. TYPE U-CUPS

Series 16 (Inch Sizes)

8. U-PACKS

Series 30 (Inch Sizes)

9. TRIPLE LIP RO. U-CUPS

Series 33 (Inch Sizes)

10. O-PACK

Series 35 (Inch Sizes)

11. PART NUMBER LIST

(Inch Sizes)





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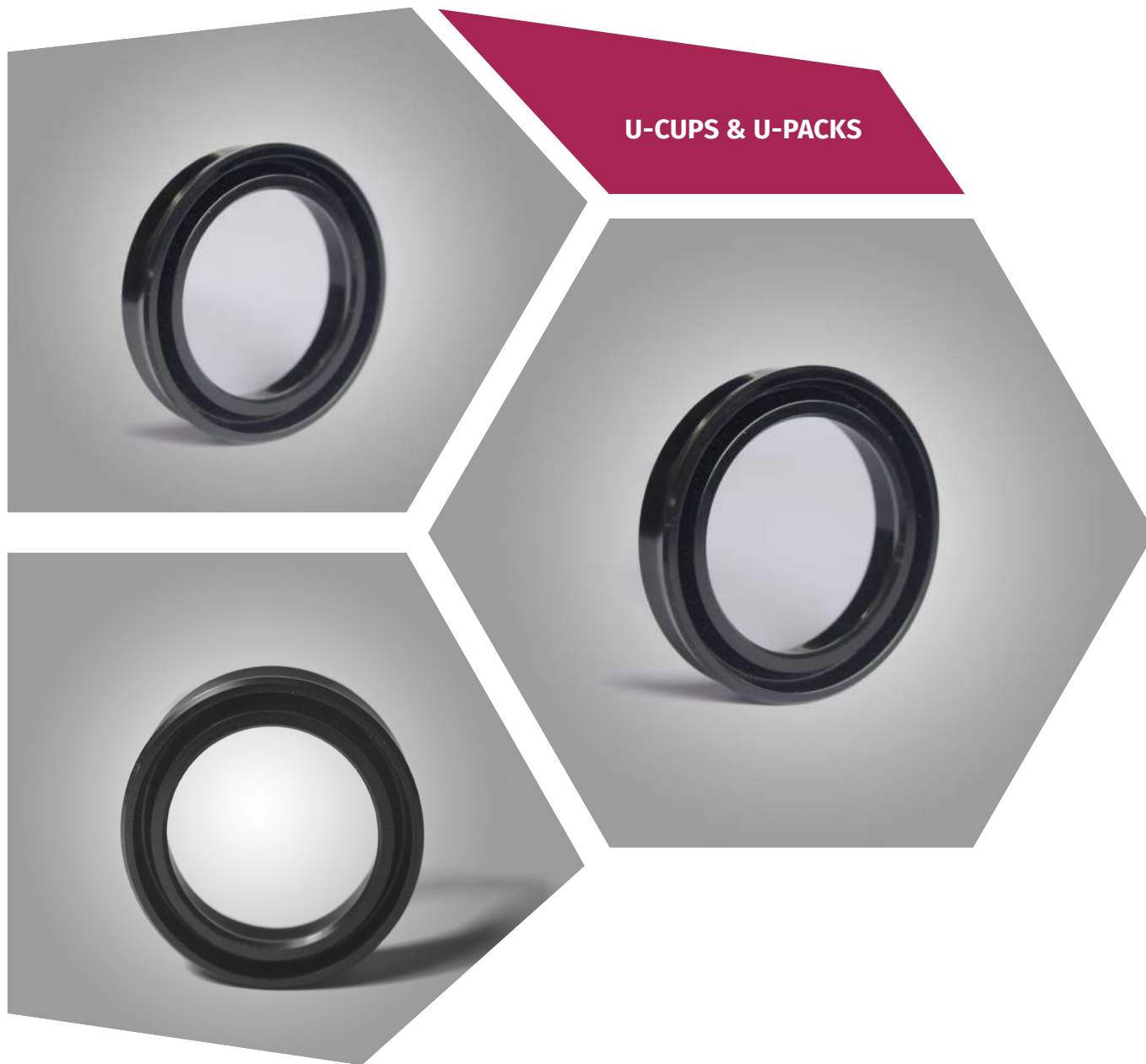
www.universal-seal.ca

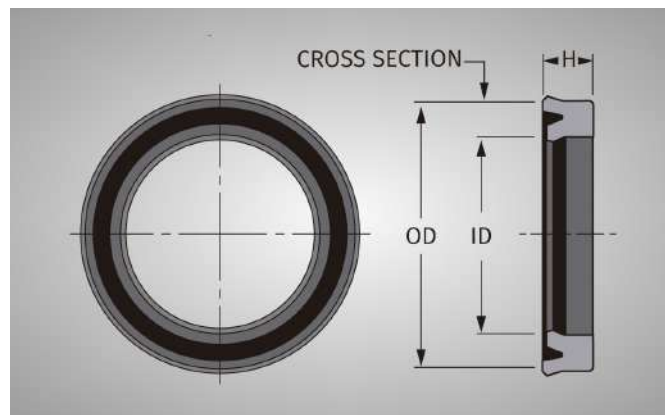
R0. U-CUPS

Series 13 (Inch Sizes)

4

U-CUPS & U-PACKS





CHARACTERISTICS

The RO. U-cup is a specialized rod seal design, developed from the standard Symmetrical U-cup. It assures improved sealing performance due to the following features:

- **Interference Fit in the Groove.** The RO. U-cup has an OD. larger than the groove for which it is intended. This insures a tight fit in the groove to prevent movement of the seal during cylinder operation. It also overcomes any problems with shrinkage and low temperature leakage.
- **Improved Lip Design.** The static lip, being supported by full surface contact with the groove wall, has a comparatively thin cross section. This permits the dynamic sealing lip to have a heavier cross section for an improved high pressure capability. Also, the outer lip is longer, to give better stability during installation and protect the dynamic sealing lip. Both lips have precision knife trimmed chamfers to provide complete circumferential lip contact.

MATERIAL

- **TYPE:** Unithane **292A**, Liquid Cast Polyurethane.
- **HARDNESS:** Durometer **92A**
- **FLUID COMPATABILITY:** See 'Material Specifications', Technical Bulletin US 96

ORDERING INFORMATION

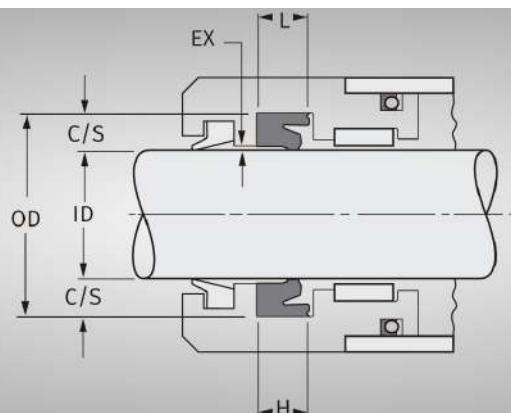
Please enquire about tooling availability before ordering. Nominal tooling charges may be made for some sizes.

Refer to the Part Number List (Technical Bulletin UN 96) and find the 'Dash Number' corresponding to the nominal dimensions (shown at right) of the seal required.

Add Prefix Number '13' to signify an RO. U-cup.

e.g. An **RO. U-Cup** 2" ID × 2½" OD × 3/8" H is **Part N° 13-200216-375**.

RO. U-CUPS



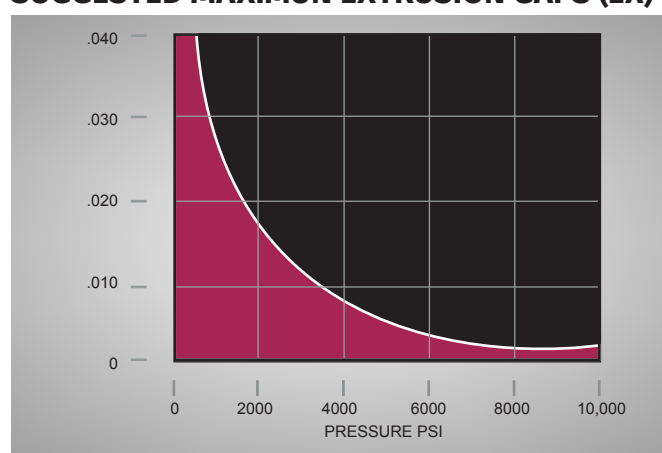
GROOVE WIDTH

H	1/8	3/16	1/4	5/16	3/8	1/2	9/16	5/8	3/4
L	.138	.207	.275	.344	.413	.550	.619	.688	.825
Tolerance	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000

GROOVE DEPTH

C/S (Groove Depth)		Diametrical Tolerances	
Frac.	Dec.	Cyl. Dia.	Groove Dia.
1/8	.125	+0.000 -0.001	+0.002 -0.000
3/16	.187	+0.000 -0.002	+0.002 -0.000
1/4	.250	+0.000 -0.002	+0.003 -0.000
5/16	.312	+0.000 -0.002	+0.004 -0.000
3/8	.375	+0.000 -0.002	+0.005 -0.000
1/2	.500	+0.000 -0.003	+0.007 -0.000
5/8	.625	+0.000 -0.003	+0.009 -0.000

SUGGESTED MAXIMUM EXTRUSION GAPS (EX)



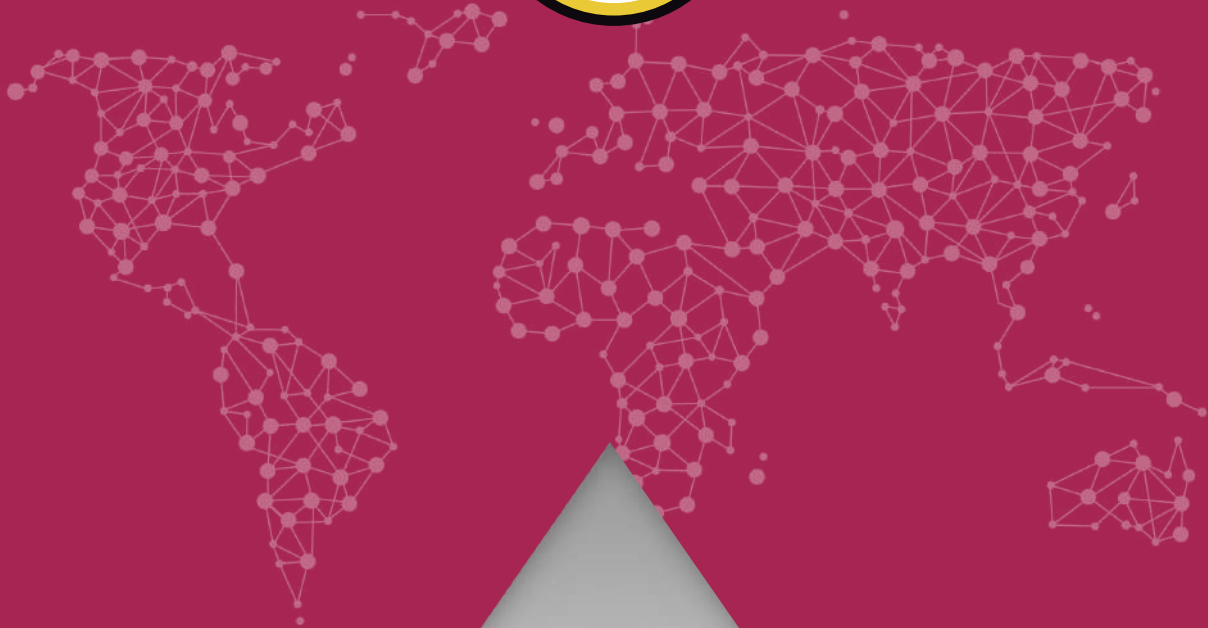
The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges.

Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

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RO. U-CUPS

SERIES 13 (Inch Sizes)



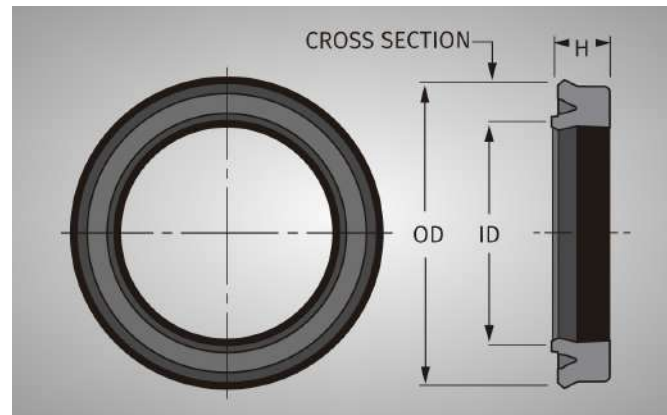
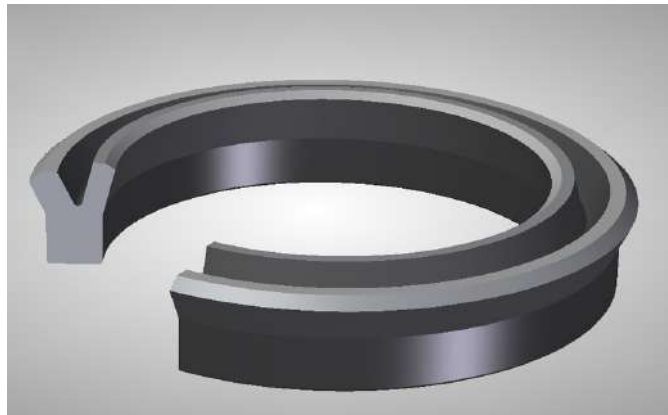
PI. U-CUPS

Series 14 (Inch Sizes)

5



U-CUPS & U-PACKS



CHARACTERISTICS

The PI. U-Cup is a specialized piston seal design. Developed from the standard Symmetrical U-cup. It assures improved sealing performance due to the following features:

- Interference fit in the groove. The PI. U-cup has an ID smaller than the groove for which it is intended. This insures a tight fit in the groove to prevent movement of the seal during cylinder operation. It also provides a sufficient preload condition to prevent interference with the cylinder wall due to thermal expansion of the seal at high operating temperatures.
- Improved lip design. The static lip, being supported by full surface contact with the groove wall, has a comparatively thin cross section. This permits the dynamic sealing lip to have a heavier cross section for an improved high pressure capability. Also, the inner lip is longer, to give better stability during installation on a one piece piston and to protect the dynamic sealing lip. Both lips have precision knife trimmed chambers to provide complete circumferential lip contact.

MATERIAL

- TYPE: Unithane 292A, Liquid Cast Polyurethane.
- HARDNESS: Durometer 92A
- FLUID COMPATABILITY: see 'Material Specifications', Technical Bulletin US- 96

ORDERING INFORMATION

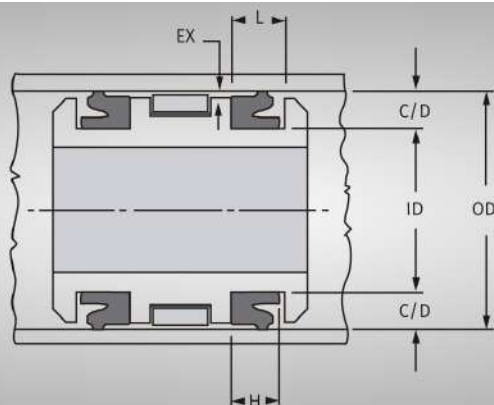
Please enquire about tooling availability before ordering. Nominal tooling charges may be made for some sizes.

Refer to the Part Number List (Technical Bulletin UN 96) and find the 'Dash number' corresponding to the nominal dimensions (shown at right) of the seal required.

Add Prefix Number '**14**' to signify a **PI. U-cup**.

e.g. **PI. U-Cup** 2" ID × 2½" OD × 3/8" H is **Part N° 14-200216-375**.

PI. U-CUPS



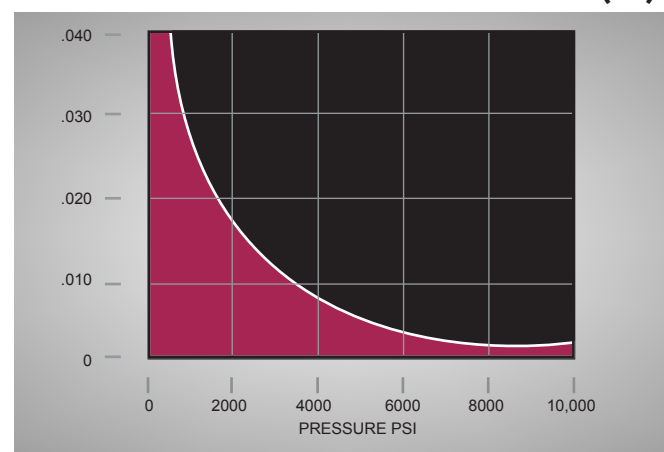
GROOVE WIDTH

H	1/8	3/16	1/4	5/16	3/8	1/2	9/16	5/8	3/4
L	.138	.207	.275	.344	.413	.550	.619	.688	.825
Tolerance	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000

GROOVE DEPTH

C/S (Groove Depth)		Diametrical Tolerances	
Frac.	Dec.	Cyl. Dia.	Groove Dia.
1/8	.125	+0.002 -0.000	+0.000 -0.002
5/32	.156	+0.002 -0.000	+0.000 -0.002
3/16	.187	+0.002 -0.000	+0.000 -0.002
1/4	.250	+0.003 -0.000	+0.000 -0.003
5/16	.312	+0.003 -0.000	+0.000 -0.004
3/8	.375	+0.004 -0.000	+0.000 -0.005
1/2	.500	+0.005 -0.000	+0.000 -0.007
5/8	.625	+0.006 -0.000	+0.000 -0.009

SUGGESTED MAXIMUM EXTRUSION GAPS (EX)



The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges. Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

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PI. U-CUPS

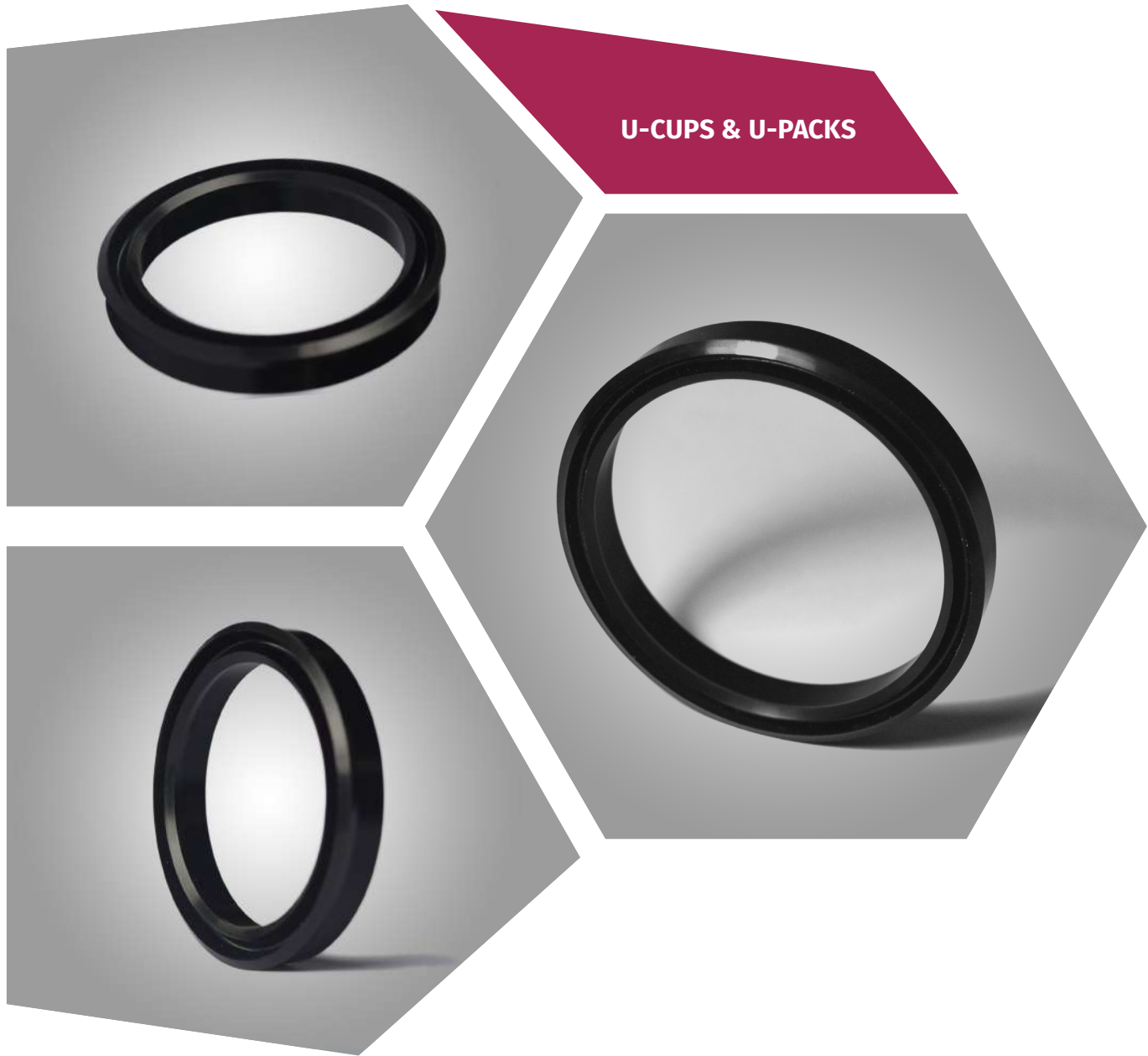
SERIES 14 (Inch Sizes)

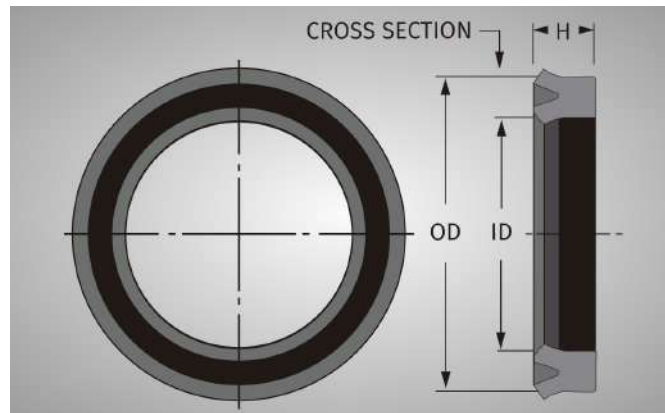
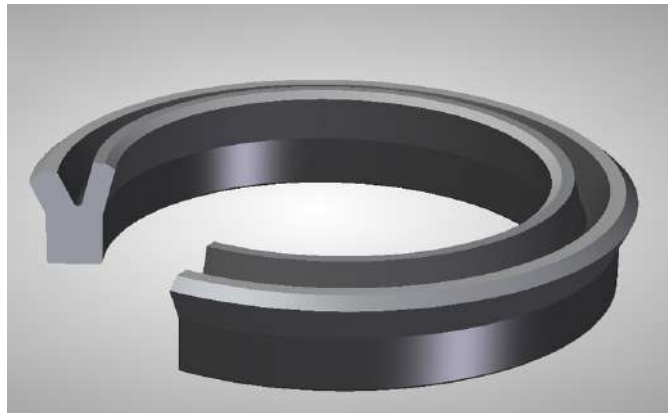
SYMMETRICAL U-CUPS

Series 15 (Inch Sizes)

6

U-CUPS & U-PACKS





CHARACTERISTICS

The Symmetrical U-Cup is a double Chamfered U-Ring seal manufactured from Unithane 292A liquid cast polyurethane. This material, which is used for many of our other products, is well known for 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 rod and piston sealing applications. The sealing lips are knife trimmed to eliminate all moulding flash and to provide superior low pressure sealing performance.

These seals are available in a full range of standard sizes to fit most piston grooves and packing glands. Tooling is also available for a large range of special sizes.

Series 15 U-cups can be easily snapped into a groove or stretched over a one piece piston. Once installed they will immediately return to their original dimensions.

MATERIAL

- TYPE: Unithane 292A, Liquid Cast Polyurethane.
- HARDNESS: Durometer 92A
- FLUID COMPATABILITY: see 'Material Specifications', Technical Bulletin US .96

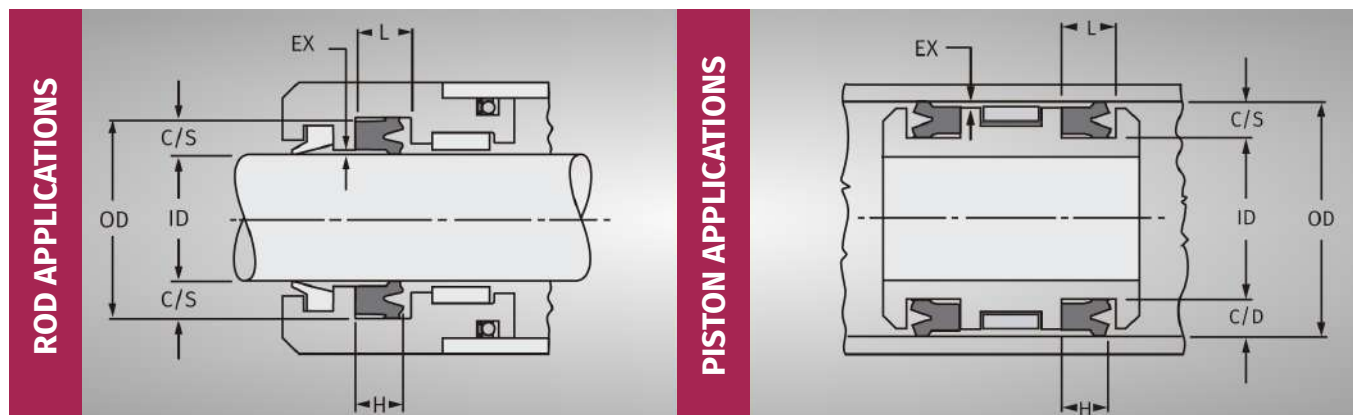
ORDERING INFORMATION

Refer to the Part Number List (Technical Bulletin UN 96) and find the 'Dash Number' corresponding to the nominal dimensions (shown at right) of the seal required.

Add Prefix Number '15' to signify a Symmetrical U.cup.
e.g. A **Symmetrical U-Cup** 2" ID × OD × 3/8" H is **Part N° 15-200216-375**.

SYMMETRICAL U-CUPS

SERIES 15 (Inch Sizes)



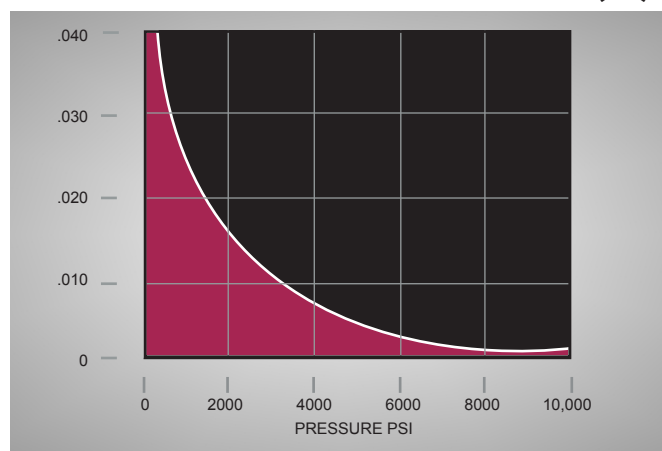
GROOVE WIDTH

H	1/8	3/16	1/4	5/16	3/8	1/2	9/16	5/8	3/4
L	.138	.207	.275	.344	.413	.550	.619	.688	.825
Tolerance	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000

GROOVE DEPTH

C/S		Dia. Tolerances			
		Rod Applications		Piston Applications	
Frac.	Dec.	Rod Dia.	Groove Dia.	Cyl. Dia.	Groove Dia.
1/8	.125	+.000 -.001	+.002 -.000	+.002 -.000	+.000 -.002
3/16	.187	+.000 -.002	+.002 -.000	+.002 -.000	+.000 -.002
1/4	.250	+.000 -.002	+.003 -.000	+.003 -.000	+.000 -.003
5/16	.312	+.000 -.002	+.004 -.000	+.003 -.000	+.000 -.004
3/8	.375	+.000 -.002	+.005 -.000	+.004 -.000	+.000 -.005
1/2	.500	+.000 -.003	+.007 -.000	+.005 -.000	+.000 -.007
5/8	.625	+.000 -.003	+.009 -.000	+.006 -.000	+.000 -.009

SUGGESTED MAXIMUM EXTRUSION GAPS (EX)



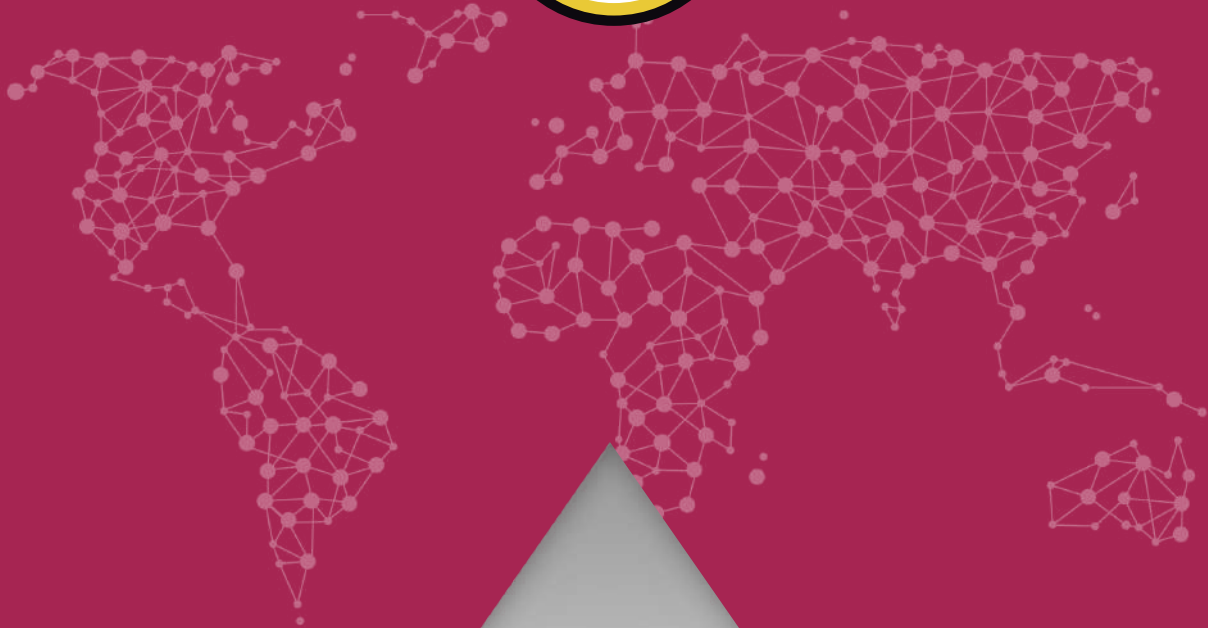
The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges.

Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

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SYMMETRICAL U-CUPS

SERIES 15 (Inch Sizes)



A.N. TYPE U-CUPS

Series 16 (Inch Sizes)

7

U-CUPS & U-PACKS



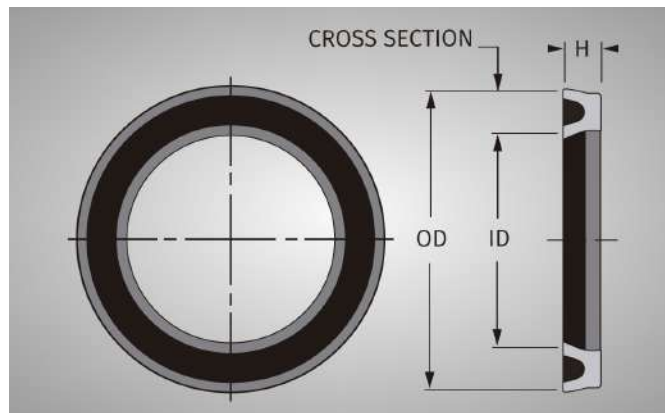


CHARACTERISTICS

The A. N. Type U-cup is the original U-cup design and was previously manufactured from rubber. Our Series 16 seals are made from thermosetting liquid cast polyurethane, which delivers up to ten times the service life of neoprene rubber.

The cross section of the A.N. Type seal has a symmetrical profile with considerably flexible lips. The lips are knife trimmed at 90° to the seal axis. The lip design insures a lighter preload condition when the seal is installed. This in turn, reduces friction and break out force.

A.N. Type U-Cups are most suited to pneumatic and low pressure hydraulic use, in both rod and piston applications.



MATERIAL

- TYPE: Unithane 292A, Liquid Cast Polyurethane.
- HARDNESS: Durometer 92A
- FLUID COMPATABILITY: see 'Material Specifications', Technical Bulletin US -96

ORDERING INFORMATION

Please enquire about tooling availability before ordering.

Nominal tooling charges may be made for some sizes.

Refer to the Part Number List (Technical Bulletin UN 96) and find the 'Dash Number' corresponding to the nominal dimensions (shown at right) of the seal required.

Add Prefix Number to signify an A.R. Type U-Cup.

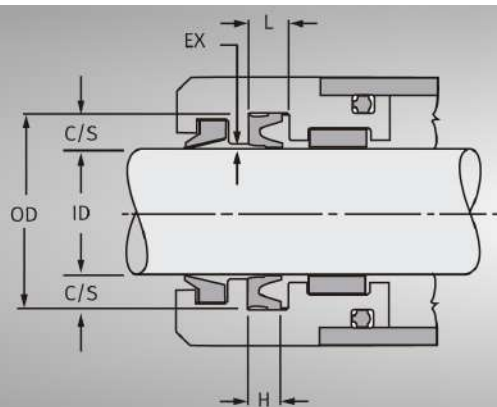
e.g. An **A.N. Type U-Cup** 2" ID × OD × 3/8" H is **Part N° 16-200216-375**.

A.N. TYPE U-CUPS

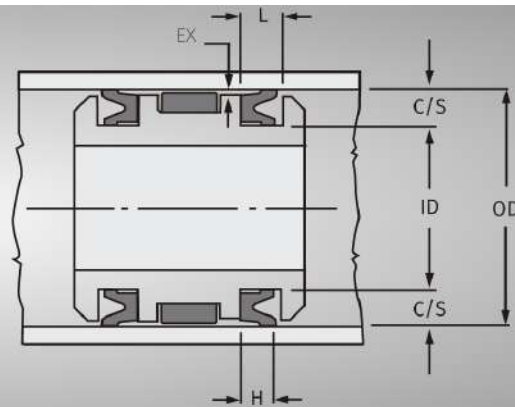
SERIES 16 (Inch Sizes)



ROD APPLICATIONS



PISTON APPLICATIONS



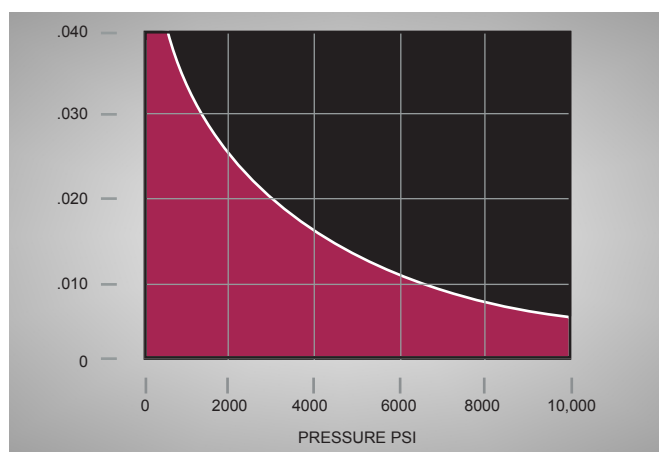
GROOVE WIDTH

H	1/8	3/16	1/4	5/16	3/8	1/2	9/16	5/8	3/4
L	.138	.207	.275	.344	.413	.550	.619	.688	.825
Tolerance	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000

GROOVE DEPTH

C/S		Dia. Tolerances			
		Rod Applications		Piston Applications	
		Rod Dia.	Groove Dia.	Cyl. Dia.	Groove Dia.
1/8	.125	+0.000 -0.001	+0.002 -0.000	+0.002 -0.000	+0.000 -0.002
3/16	.187	+0.000 -0.002	+0.002 -0.000	+0.002 -0.000	+0.000 -0.002
1/4	.250	+0.000 -0.002	+0.003 -0.000	+0.003 -0.000	+0.000 -0.003
5/16	.312	+0.000 -0.002	+0.004 -0.000	+0.003 -0.000	+0.000 -0.004
3/8	.375	+0.000 -0.002	+0.005 -0.000	+0.004 -0.000	+0.000 -0.005
1/2	.500	+0.000 -0.003	+0.007 -0.000	+0.005 -0.000	+0.000 -0.007
5/8	.625	+0.000 -0.003	+0.009 -0.000	+0.006 -0.000	+0.000 -0.009

SUGGESTED MAXIMUM EXTRUSION GAPS (EX)



The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges. Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

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A.N. TYPE U-CUPS

SERIES 16 (Inch Sizes)

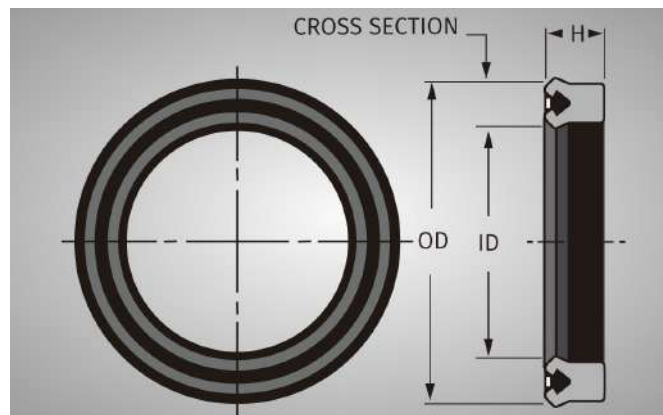
U-PACKS

Series 30 (Inch Sizes)

8

U-CUPS & U-PACKS





CHARACTERISTICS

The U-PACK loaded lip style U Cup combines the latest design technology together with the superior field tested physical characteristics of a liquid cast polyurethane to produce the best all purpose seal for use in standard hydraulic fluids. Thermosetting Unithane 292A is a Moca cured liquid cast polyurethane which outperforms injection molded grades of polyurethane in all aspects including cut strength, abrasion resistance, compression set and temperature range.

The inner elastomeric Spring element of nitrile rubber is designed and strategically positioned to create the necessary lip interference without excessive friction. This energizer is securely held inside the Unithane outer shell so that it will not become disengaged when severely distorted as is sometimes necessary when installing U-Packs on rod seal applications. The nitrile Spring element is Split prior to assembly to avoid trapped pressure from forcing the spring element outward into the seal cavity during rapid or severe fluctuations of system pressure.

The nitrile spring also enhances low temperature sealing characteristics down to -40 degrees F, insures superior low pressure sealing performance and compensates for the gradual wear associated with normal cylinder cycling thereby providing longer Service life.

The sealing lips of Series N°. 30 U-Packs are knife trimmed to eliminate all molding flash and to provide complete circumferential lip contact which also helps to insure maximum low pressure sealing performance.

MATERIAL

- SEAL: Unithane 292A, Liquid Cast Polyurethane, Duro 92A
- ENERGIZER: Nitrile Rubber, Duro IOA
- FLUID COMPATABILITY: See 'Material Specifications', Technical Bulletin US -96

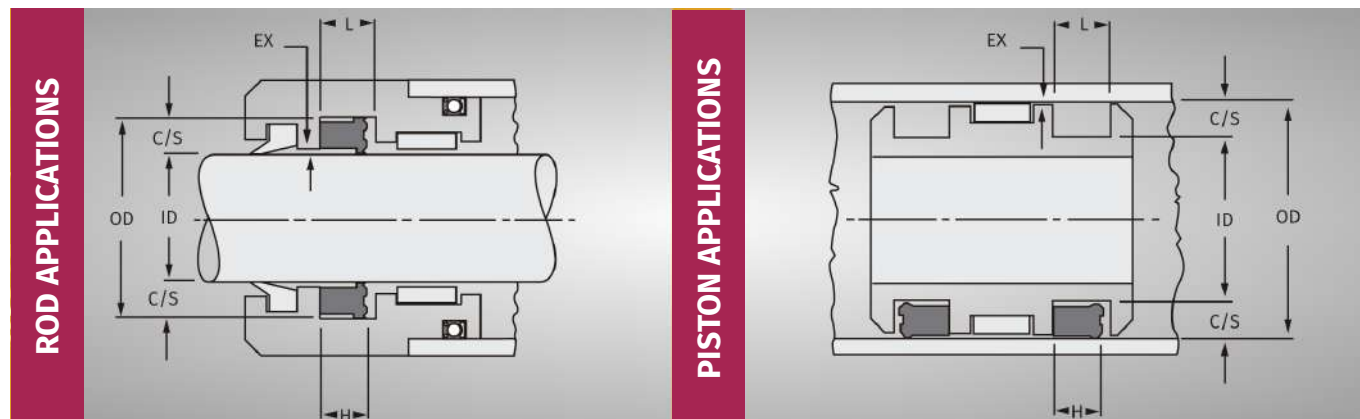
ORDERING INFORMATION

Refer to the Part Number List (Technical Bulletin UN 96) and find the 'Dash Number' corresponding to the nominal dimension (shown at right) of the seal required.

Add Prefix Number '**30**' to signify a '**U-Pack**'.

e.g. A '**U-Pack**' 2" ID × 2½" OD × 3/8" H, is **Part N°.**

30-200216-375.



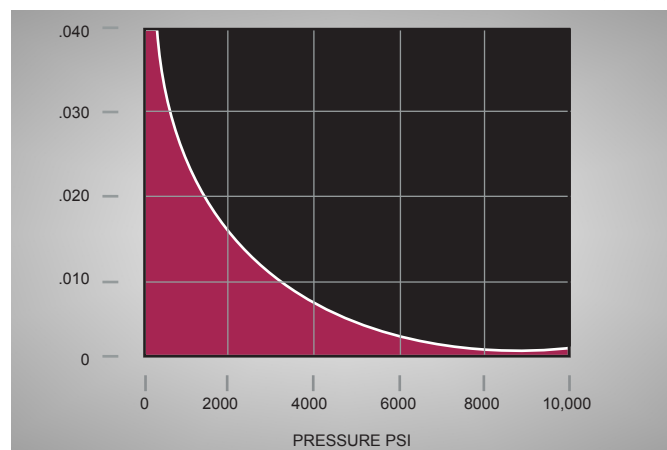
GROOVE WIDTH

H	1/8	3/16	1/4	5/16	3/8	1/2	9/16	5/8	3/4
L	.138	.207	.275	.344	.413	.550	.619	.688	.825
Tolerance	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000	+.015 -.000

GROOVE DEPTH

C/S		Dia. Tolerances			
		Rod Applications		Piston Applications	
Frac.	Dec.	Rod Dia.	Groove Dia.	Cyl. Dia.	Groove Dia.
1/8	.125	+.000 -.001	+.002 -.000	+.002 -.000	+.000 -.002
3/16	.187	+.000 -.002	+.002 -.000	+.002 -.000	+.000 -.002
1/4	.250	+.000 -.002	+.003 -.000	+.003 -.000	+.000 -.003
5/16	.312	+.000 -.002	+.004 -.000	+.003 -.000	+.000 -.004
3/8	.375	+.000 -.002	+.005 -.000	+.004 -.000	+.000 -.005
1/2	.500	+.000 -.003	+.007 -.000	+.005 -.000	+.000 -.007
5/8	.625	+.000 -.003	+.009 -.000	+.006 -.000	+.000 -.009

SUGGESTED MAXIMUM EXTRUSION GAPS (EX)



The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges. Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

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U-PACKS

SERIES 30 (Inch Sizes)



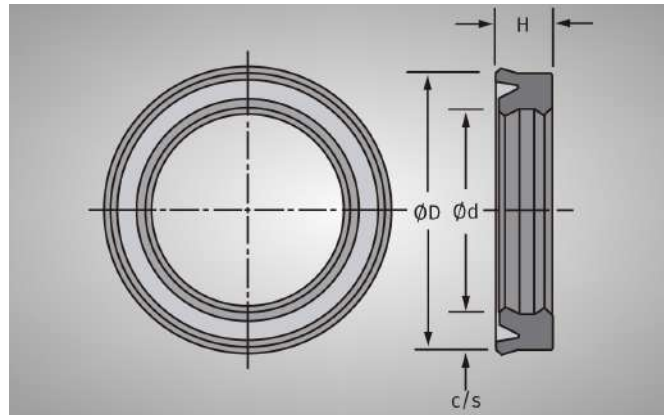
TRIPLE LIP RO. U-CUPS

Series 33 (Inch Sizes)

9

U-CUPS & U-PACKS





CHARACTERISTICS

The Triple Lip RO. U-Cup is a development of the series 13 RO. U-Cup. Like the series 13 it has an asymmetrical section and an interference fit on the outside diameter.

It also has the additional feature of a third lip on the inside heel. This extra lip offers the following benefits:

- Improved stability of the seal within the groove.
- Secondary sealing capability and protection of the primary lip.
- Improved lubrication due to the lubrication pocket created between the primary and secondary lips.
- The secondary lip's profile maintains boundary lubrication, allowing it to return to the system.

MATERIAL

- Type: Unithane 292 A, Liquid Cast Polyurethane
- Hardness: Durometer 92 A
- Fluid Compatibility: See Material Specifications: Technical Bulletin USM-03

ORDERING INFORMATION

Please enquire about tooling availability before ordering.

Nominal tooling charges may apply for some sizes.

Refer to the Part Number List (Technical Bulletin UNM-03) and find the 'Dash Number' corresponding to the nominal dimensions (shown at right) of the seal required.

Add Prefix Number '33M' to signify, an Triple Lip RO. U-Cup in a Metric size.

e.g. An **Triple Lip RO. U-Cup** 100mm ϕd x 120mm ϕD x 15mm H is **Part N°. 33M-100120-15**.

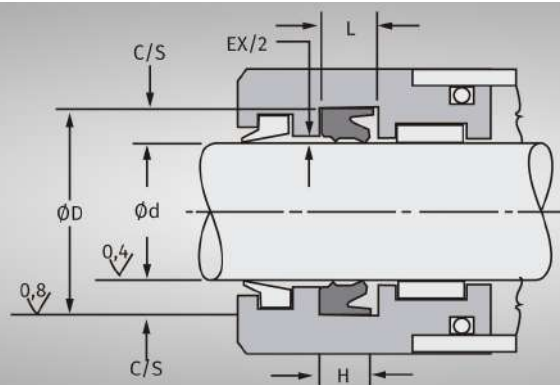


TRIPLE LIP RO. U-CUPS

Series 33 (Inch Sizes)



TRIPLE LIP RO. U-CUPS



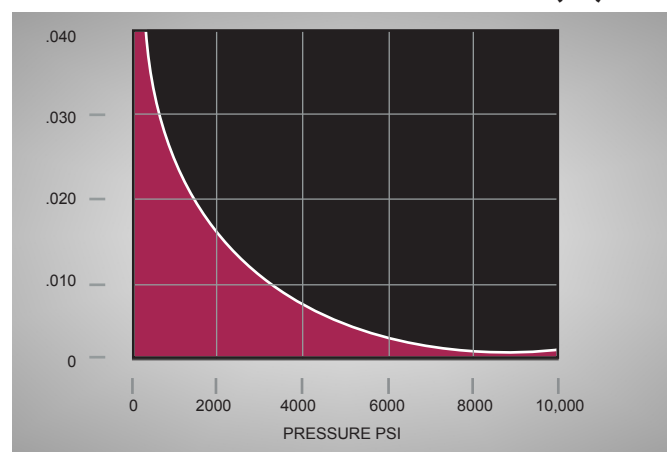
GROOVE WIDTH

H	1/8	3/16	1/4	5/16	3/8	1/2	9/16	5/8	3/4
L	.138	.207	.275	.344	.413	.550	.619	.688	.825
Tolerance	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000	+0.015 -0.000

GROOVE DEPTH

C/S		Diametrical Tolerances	
Frac.	Dec.	Rod Dia.	Groove Dia.
1/8	.125	+0.000 -0.001	+0.002 -0.000
3/16	.187	+0.000 -0.002	+0.002 -0.000
1/4	.250	+0.000 -0.002	+0.003 -0.000
5/16	.312	+0.000 -0.002	+0.004 -0.000
3/8	.375	+0.000 -0.002	+0.005 -0.000
1/2	.500	+0.000 -0.003	+0.007 -0.000
5/8	.625	+0.000 -0.003	+0.009 -0.000

SUGGESTED MAXIMUM EXTRUSION GAPS (EX)

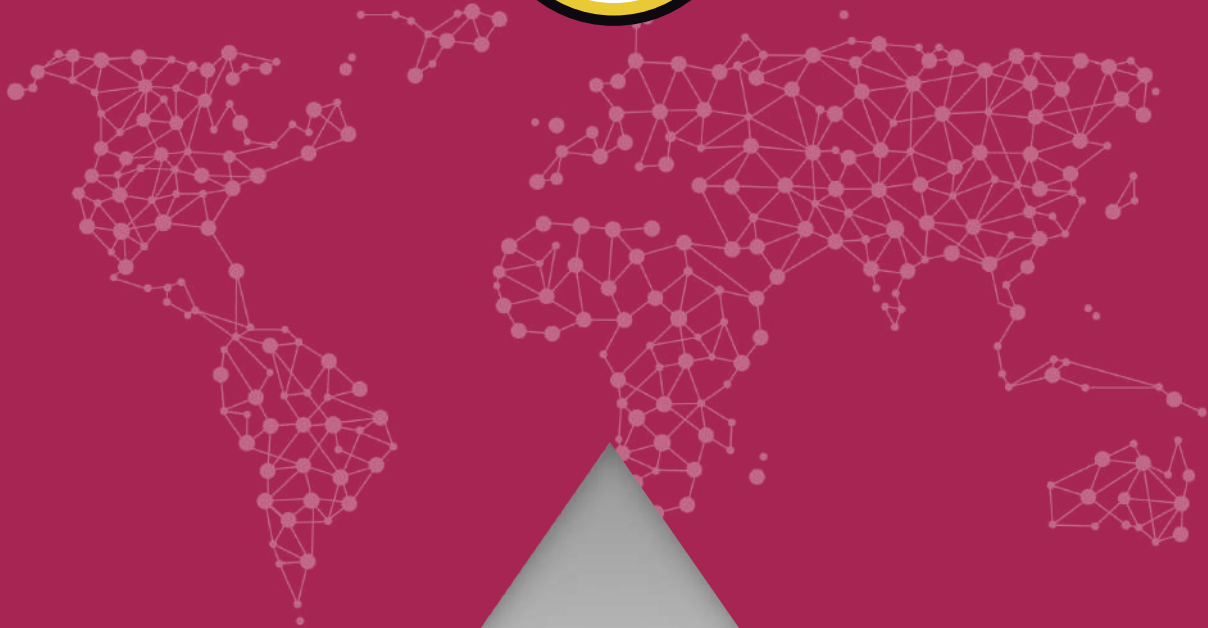


The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges. Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

UNIVERSAL SEAL INC.

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TRIPLE LIP RO. U-CUPS

SERIES 33 (Inch Sizes)



O-PACK

Series 35 (Inch Sizes)

10



CHARACTERISTICS

The O-Pack – 35 series is a U-cup with an O-ring inserted inside of it.

A nitrile rubber O-Ring is loaded into a Universal seal U-cup to create our O-pack 35 series.

The U-cup has the superior physical characteristics of a liquid cast polyurethane.

This combination produces an excellent seal for use in standard hydraulic fluids.

It is comparable to all loaded U-cups.

ADVANTAGES

1. No embedded Air Bubbles
2. Knife trimmed lips
3. No tooling on standard sizes
4. Price Competitive - Price advantage on first orders over our Loaded U-Pack





O-PACK

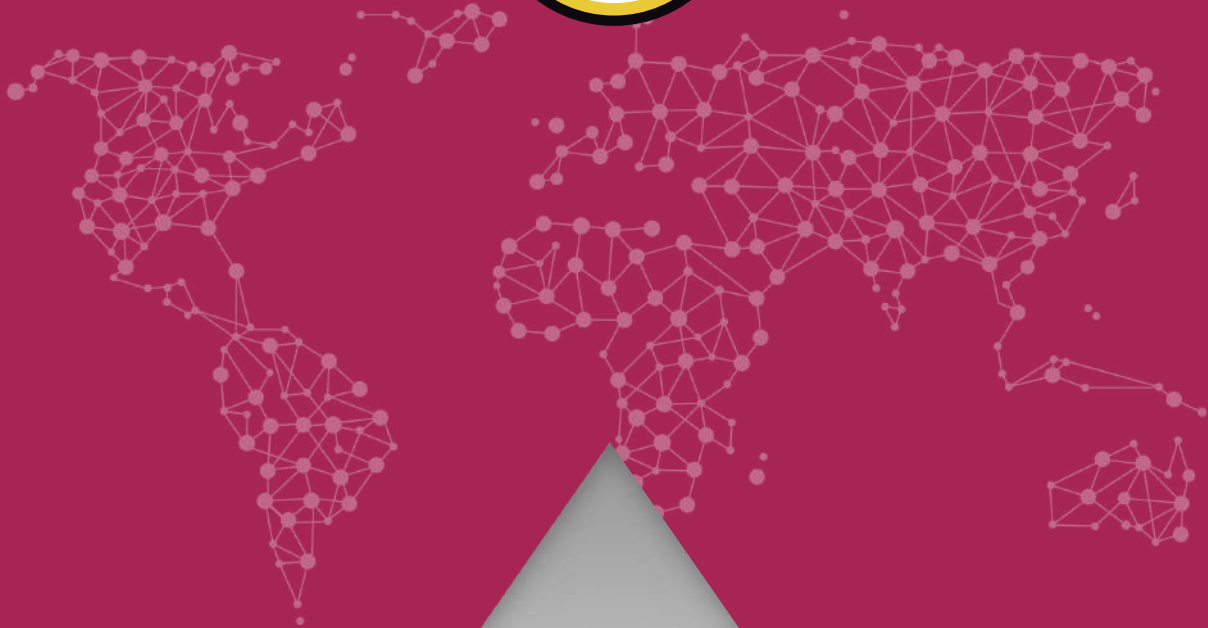
SERIES 35 (INCH SIZES)



UNIVERSAL SEAL INC.

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O-PACK

SERIES 35 (INCH SIZES)



PART NUMBER LIST

FOR SERIES 13, 14, 15, 16 , 30, 33
and 35 (INCH SIZES)

11



U-CUPS & U-PACKS

The Dash Numbers contained in this list define the nominal inside and outside diameters and height of seal, only.

When ordering, be sure to add the correct Series Number in front of the Dash Number. The Series Number designates the specific seal design.

e.g. A Symmetrical U-Cup (Series 15) 2" ID X 2½" OD X 3/8" H is **Part N°. 15-200216-375**.

1/8" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-006014-125	3/16	7/16	1/8
-006014-250	3/16	7/16	1/4
-008016-125	1/4	1/2	1/8
-008016-250	1/4	1/2	1/4
-010018-125	5/16	9/16	1/8
-010018-250	5/16	9/16	1/4
-012020-125	3/8	5/8	1/8
-012020-250	3/8	5/8	1/4
-014022-125	7/16	11/16	1/8
-014022-250	7/16	11/16	1/4
-016024-125	1/2	3/4	1/8
-016024-250	1/2	3/4	1/4
-018026-125	9/16	13/16	1/8
-018026-250	9/16	13/16	1/4
-020028-125	5/8	7/8	1/8
-020028-250	5/8	7/8	1/4
-022030-125	11/16	15/16	1/8
-022030-250	11/16	15/16	1/4
-024100-125	3/4	1	1/8
-024100-250	3/4	1	1/4
-026102-125	13/16	1-1/16	1/8
-026102-250	13/16	1-1/16	1/4
-028104-125	7/8	1-1/8	1/8
-028104-250	7/8	1-1/8	1/4
-030106-125	15/16	1-3/16	1/8
-030106-250	15/16	1-3/16	1/4
-100108-125	1	1-1/4	1/8

1/8" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-100108-250	1	1-1/4	1/4
-102110-125	1-1/16	1-5/16	1/8
-102110-250	1-1/16	1-5/16	1/4
-104112-125	1-1/8	1-3/8	1/8
-104112-250	1-1/8	1-3/8	1/4
-106114-125	1-3/16	1-7/16	1/8
-106114-250	1-3/16	1-7/16	1/4
-108116-125	1-1/4	1-1/2	1/8
-108116-250	1-1/4	1-1/2	1/4
-110118-125	1-5/16	1-9/16	1/8
-110118-250	1-5/16	1-9/16	1/4
-112120-125	1-3/8	1-5/8	1/8
-112120-250	1-3/8	1-5/8	1/4
-114122-125	1-7/16	1-11/16	1/8
-114122-250	1-7/16	1-11/16	1/4
-116124-125	1-1/2	1-3/4	1/8
-116124-250	1-1/2	1-3/4	1/4
-120128-125	1-5/8	1-7/8	1/8
-120128-250	1-5/8	1-7/8	1/4
-124200-125	1-3/4	2	1/8
-124200-250	1-3/4	2	1/4
-200208-125	2	2-1/4	1/8
-200208-250	2	2-1/4	1/4
-204212-125	2-1/8	2-3/8	1/8
-204212-250	2-1/2	2-3/8	1/4
-208216-125	2-1/4	2-1/2	1/8

PART NUMBER LIST

FOR SERIES 13, 14, 15, 16, 30, 33 and 35 (INCH SIZES)



1/8" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-208216-250	2-1/4	2-1/2	1/4
-216224-125	2-1/2	2-3/4	1/8
-216224-250	2-1/2	2-3/4	1/4
-300308-125	3	3-1/4	1/8
-300308-250	3	3-1/4	1/4
-316324-125	3-1/2	3-3/4	1/8
-316324-250	3-1/2	3-3/4	1/4
-320328-125	3-5/8	3-7/8	1/8
-320328-250	3-5/8	3-7/8	1/4
-400408-125	4	4-1/4	1/8
-400408-250	4	4-1/4	1/4

3/16" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-104116-187	1-1/8	1-1/2	3/16
-104116-312	1-1/8	1-1/2	5/16
-106118-187	1-3/16	1-9/16	3/16
-106118-312	1-3/16	1-9/16	5/16
-108120-187	1-1/4	1-5/8	3/16
-108120-312	1-1/4	1-5/8	5/16
-110122-187	1-5/16	1-11/16	3/16
-110122-312	1-5/16	1-11/16	5/16
-112124-187	1-3/8	1-3/4	3/16
-112124-312	1-3/8	1-3/4	5/16
-114126-187	1-7/16	1-13/16	3/16
-114126-312	1-7/16	1-13/16	5/16
-116128-187	1-1/2	1-7/8	3/16
-116128-375	1-1/2	1-7/8	3/8
-120200-187	1-5/8	2	3/16
-120200-375	1-5/8	2	3/8
-124204-187	1-3/4	2-1/8	3/16
-124204-375	1-3/4	2-1/8	3/8
-128208-187	1-7/8	2-1/4	3/16
-128208-375	1-7/8	2-1/4	3/8
-200212-187	2	2-3/8	3/16
-200212-375	2	2-3/8	3/8
-204216-187	2-1/8	2-1/2	3/16
-204216-375	2-1/8	2-1/2	3/8
-208220-187	2-1/4	2-5/8	3/16
-208220-375	2-1/4	2-5/8	3/8
-212224-187	2-3/8	2-3/4	3/16
-212224-375	2-3/8	2-3/4	3/8
-216228-187	2-1/2	2-7/8	3/16
-216228-375	2-1/2	2-7/8	3/8
-220300-187	2-5/8	3	3/16
-220300-375	2-5/8	3	3/8
-224304-187	2-3/4	3-1/8	3/16
-224304-375	2-3/4	3-1/8	3/8
-228308-187	2-7/8	3-1/4	3/16
-228308-375	2-7/8	3-1/4	3/8
-300312-187	3	3-3/8	3/16
-300312-375	3	2-3/8	3/8
-304316-187	3-1/8	3-1/2	3/16
-304316-375	3-1/8	3-1/2	3/8
-308320-187	3-1/4	3-5/8	3/16
-308320-375	3-1/4	3-5/8	3/8
-312324-187	3-3/8	3-3/4	3/16
-312324-375	2-3/8	3-3/4	3/8
-316328-187	3-1/2	3-7/8	3/16

3/16" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-008020-187	1/4	5/8	3/16
-008020-312	1/4	5/8	5/16
-010022-187	5/16	11/16	3/16
-010022-312	5/16	11/16	5/16
-012024-187	3/8	3/4	3/16
-012024-312	3/8	3/4	5/16
-014026-187	7/16	13/16	3/16
-014026-312	7/16	13/16	5/16
-016028-187	1/2	7/8	3/16
-016028-312	1/2	7/8	5/16
-018030-187	9/16	15/16	3/16
-018030-312	9/16	15/16	5/16
-020100-187	5/8	1	3/16
-020100-312	5/8	1	5/16
-022102-187	11/16	1-1/16	3/16
-022102-312	11/16	1-1/16	5/16
-024104-187	3/4	1-1/8	3/16
-024104-312	3/4	1-1/8	5/16
-026106-187	13/16	1-3/16	3/16
-026106-312	13/16	1-3/16	5/16
-028108-187	7/8	1-1/4	3/16
-028108-312	7/8	1-1/4	5/16
-030110-187	15/16	1-5/16	3/16
-030110-312	15/16	1-5/16	5/16
-100112-187	1	1-3/8	3/16
-100112-312	1	1-3/8	5/16
-102114-187	1-1/16	1-7/16	3/16
-102114-312	1-1/16	1-7/16	5/16

3/16" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-316328-375	3-1/2	3-7/8	3/8
-320400-187	3-5/8	4	3/16
-320400-375	3-5/8	4	3/8
-324404-187	3-3/4	4-1/8	3/16
-324404-375	3-3/4	4-1/8	3/8
-328408-187	3-7/8	4-1/4	3/16
-328408-375	3-7/8	4-1/4	3/8
-400412-187	4	4-3/8	3/16
-400412-375	4	4-3/8	3/8
-400416-187	4-1/8	4-1/2	3/16
-400416-375	4-1/8	4-1/2	3/8
-408420-187	4-1/4	4-5/8	3/16
-408420-375	4-1/4	4-5/8	3/8
-412424-187	4-3/8	4-3/4	3/16
-412424-375	4-3/8	4-3/4	3/8
-416428-187	4-1/2	4-7/8	3/16
-416428-375	4-1/2	4-7/8	3/8

1/4" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-100116-250	1	1-1/2	1/4
-100116-375	1	1-1/2	3/8
-102118-250	1-1/16	1-9/16	1/4
-102118-375	1-1/16	1-9/16	3/8
-104120-250	1-1/8	1-5/8	1/4
-104120-375	1-1/8	1-5/8	3/8
-106122-250	1-3/16	1-11/16	1/4
-106122-375	1-3/16	1-11/16	3/8
-108124-250	1-1/4	1-3/4	1/4
-108124-375	1-1/4	1-3/4	3/8
-110126-250	1-5/16	1-13/16	1/4
-110126-375	1-5/16	1-13/16	3/8
-112128-250	1-3/8	1-7/8	1/4
-112128-375	1-3/8	1-7/8	3/8
-114130-250	1-7/16	1-15/16	1/4
-114130-375	1-7/16	1-15/16	3/8
-116200-250	1-1/2	2	1/4
-116200-375	1-1/2	2	3/8
-118202-250	1-9/16	2-1/16	1/4
-118202-375	1-9/16	2-1/16	3/8
-120204-250	1-5/8	2-1/8	1/4
-120204-375	1-5/8	2-1/8	3/8
-124208-250	1-3/4	2-1/4	1/4
-124208-375	1-3/4	2-1/4	3/8
-128212-250	1-7/8	2-3/8	1/4
-128212-375	1-7/8	2-3/8	3/8
-130214-250	1-15/16	2-7/16	1/4
-130214-375	1-15/16	2-7/16	3/8
-200216-250	2	2-1/2	1/4
-200216-375	2	2-1/2	3/8
-202218-250	2-1/16	2-9/16	1/4
-202218-375	2-1/16	2-9/16	3/8
-204220-250	2-1/8	2-5/8	1/4
-204220-375	2-1/8	2-5/8	3/8
-208224-250	2-1/4	2-3/4	1/4
-208224-375	2-1/4	2-3/4	3/8
-212228-250	2-3/8	2-7/8	1/4
-212228-375	2-3/8	2-7/8	3/8
-216300-250	2-1/2	3	1/4
-216300-375	2-1/2	3	3/8
-220304-250	2-5/8	3-1/8	1/4
-220304-375	2-5/8	3-1/8	3/8
-224308-250	2-3/4	3-1/4	1/4
-224308-375	2-3/4	3-1/4	3/8
-228312-250	2-7/8	3-3/8	1/4
-228312-375	2-7/8	3-3/8	3/8
-300316-250	3	3-1/2	1/4
-300316-375	3	3-1/2	3/8

1/4" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-008024-250	1/4	3/4	1/4
-008024-375	1/4	3/4	3/8
-010026-250	5/16	13/16	1/4
-010026-375	5/16	13/16	3/8
-012028-250	3/8	7/8	1/4
-012028-375	3/8	7/8	3/8
-014030-250	7/16	15/16	1/4
-014030-375	7/16	15/16	3/8
-016100-250	1/2	1	1/4
-016100-375	1/2	1	3/8
-018102-250	9/16	1-1/16	1/4
-018102-375	9/16	1-1/16	3/8
-020104-250	5/8	1-1/8	1/4
-020104-375	5/8	1-1/8	3/8
-022106-250	11/16	1-3/16	1/4
-022106-375	11/16	1-3/16	3/8
-024108-250	3/4	1-1/4	1/4
-024108-375	3/4	1-1/4	3/8
-026110-250	13/16	1-5/16	1/4
-026110-375	13/16	1-5/16	3/8
-028112-250	7/8	1-3/8	1/4
-028112-375	7/8	1-3/8	3/8
-030114-250	15/16	1-7/16	1/4
-030114-375	15/16	1-7/16	3/8

PART NUMBER LIST

FOR SERIES 13, 14, 15, 16, 30, 33 and 35 (INCH SIZES)



1/4" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-304320-250	3-1/8	3-5/8	1/4
-304320-375	3-1/8	3-5/8	3/8
-308324-250	3-1/4	3-3/4	1/4
-308324-375	3-1/4	3-3/4	3/8
-312328-250	3-3/8	3-7/8	1/4
-312328-375	3-3/8	3-7/8	3/8
-316400-250	3-1/2	4	1/4
-316400-375	3-1/2	4	3/8
-320404-250	3-5/8	4-1/8	1/4
-320404-375	3-5/8	4-1/8	3/8
-324408-250	3-3/4	4-1/4	1/4
-324408-375	3-3/4	4-1/4	3/8
-328412-250	3-7/8	4-3/8	1/4
-328412-375	3-7/8	4-3/8	3/8
-400416-250	4	4-1/2	1/4
-400416-562	4	4-1/2	9/16
-404420-250	4-1/8	4-5/8	1/4
-404420-562	4-1/8	4-5/8	9/16
-408424-250	4-1/4	4-3/4	1/4
-408424-562	4-1/4	4-3/4	9/16
-412428-250	4-3/8	4-7/8	1/4
-412428-562	4-3/8	4-7/8	9/16
-416500-250	4-1/2	5	1/4
-416500-562	4-1/2	5	9/16
-420504-250	4-5/8	5-1/8	1/4
-420504-562	4-5/8	5-1/8	9/16
-424508-250	4-3/4	5-1/4	1/4
-424508-562	4-3/4	5-1/4	9/16
-428512-250	4-7/8	5-3/8	1/4
-428512-562	4-7/8	5-3/8	9/16
-500516-250	5	5-1/2	1/4
-500516-562	5	5-1/2	9/16
-504520-250	5-1/8	5-5/8	1/4
-504520-562	5-1/8	5-5/8	9/16
-508524-250	5-1/4	5-3/4	1/4
-508524-562	5-1/4	5-3/4	9/16
-512528-250	5-3/8	5-7/8	1/4
-512528-562	5-3/8	5-7/8	9/16
-516600-250	5-1/2	6	1/4
-516600-562	5-1/2	6	9/16
-520604-250	5-5/8	6-1/8	1/4
-520604-562	5-5/8	6-1/8	9/16
-524608-250	5-3/4	6-1/4	1/4
-524608-562	5-3/4	6-1/4	9/16
-528612-250	5-7/8	6-3/8	1/4
-528612-562	5-7/8	6-3/8	9/16

1/4" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-600616-250	6	6-1/2	1/4
-600616-562	6	6-1/2	9/16
-608624-250	6-1/4	6-3/4	1/4
-608624-562	6-1/4	6-3/4	9/16
-616700-250	6-1/2	7	1/4
-616700-562	6-1/2	7	9/16
-620704-250	6-5/8	7-1/8	1/4
-620704-562	6-5/8	7-1/8	9/16
-624708-250	6-3/4	7-1/4	1/4
-624708-562	6-3/4	7-1/4	9/16
-700716-250	7	7-1/2	1/4
-700716-562	7	7-1/2	9/16
-708724-250	7-1/4	7-3/4	1/4
-708724-562	7-1/4	7-3/4	9/16
-716800-250	7-1/2	8	1/4
-716800-562	7-1/2	8	9/16
-724808-250	7-3/4	8-1/4	1/4
-724808-562	7-3/4	8-1/4	9/16
-800816-250	8	8-1/2	1/4
-800816-562	8	8-1/2	9/16
-808824-250	8-1/4	8-3/4	1/4
-808824-562	8-1/4	8-3/4	9/16
-816900-250	8-1/2	9	1/4
-816900-562	8-1/2	9	9/16
-824908-250	8-3/4	9-1/4	1/4
-824908-562	8-3/4	9-1/4	9/16
-900916-250	9	9-1/2	1/4
-900916-562	9	9-1/2	9/16
-908924-250	9-1/4	9-3/4	1/4
-908924-562	9-1/4	9-3/4	9/16
-9161000-250	9-1/2	10	1/4
-9161000-562	9-1/2	10	9/16
-9241008-250	9-3/4	10-1/4	1/4
-9241008-562	9-3/4	10-1/4	9/16
-10001016-250	10	10-1/2	1/4
-10001016-562	10	10-1/2	9/16
-10081024-250	10-1/4	10-3/4	1/4
-10081024-562	10-1/4	10-3/4	9/16
-10161100-250	10-1/2	11	1/4
-10161100-562	10-1/2	11	9/16
-10241108-250	10-3/4	11-1/4	1/4
-10241108-562	10-3/4	11-1/4	9/16
-11081124-250	11-1/4	11-3/4	1/4
-11081124-562	11-1/4	11-3/4	9/16

5/16" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-028116-312	7/8	1-1/2	5-16
-028116-500	7/8	1-1/2	1/2
-030118-312	15/16	1-9/16	5/16
-030118-500	15/16	1-9/16	1/2
-100120-312	1	1-5/8	5-16
-100120-500	1	1-5/8	1/2
-102122-312	1-1/16	1-11/16	5/16
-102122-500	1-1/16	1-11/16	1/2
-104124-312	1-1/8	1-3/4	5-16
-104124-500	1-1/8	1-3/4	1/2
-106126-312	1-3/16	1-13/16	5/16
-106126-500	1-3/16	1-13/16	1/2
-108128-312	1-1/4	1-7/8	5-16
-108128-500	1-1/4	1-7/8	1/2
-110130-312	1-5/16	1-15/16	5/16
-110130-500	1-5/16	1-15/16	1/2
-112200-312	1-3/8	2	5-16
-112200-500	1-3/8	2	1/2
-114202-312	1-7/16	2-1/16	5/16
-114202-500	1-7/16	2-1/16	1/2
-116204-312	1-1/2	2-1/8	5-16
-116204-500	1-1/2	2-1/8	1/2
-120208-312	1-5/8	2-1/4	5/16
-120208-500	1-5/8	2-1/4	1/2
-124212-312	1-3/4	2-3/8	5-16
-124212-500	1-3/4	2-3/8	1/2
-128216-312	1-7/8	2-1/2	5/16
-128216-500	1-7/8	2-1/2	1/2
-200220-312	2	2-5/8	5-16
-200220-500	2	2-5/8	1/2
-204224-312	2-1/8	2-3/4	5/16
-204224-500	2-1/8	2-3/4	1/2
-208228-312	2-1/4	2-7/8	5-16
-208228-500	2-1/4	2-7/8	1/2
-212300-312	2-3/8	3	5/16
-212300-500	2-3/8	3	1/2
-216304-312	2-1/2	3-1/8	5-16
-216304-500	2-1/2	3-1/8	1/2
-220308-312	2-5/8	3-1/4	5/16
-220308-500	2-5/8	3-1/4	1/2
-224312-312	2-3/4	3-3/8	5-16
-224312-500	2-3/4	3-3/8	1/2
-228316-312	2-7/8	3-1/2	5/16
-228316-500	2-7/8	3-1/2	1/2
-300320-312	3	3-5/8	5-16
-300320-500	3	3-5/8	1/2

5/16" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-304324-312	3-1/8	3-3/4	5/16
-304324-500	3-1/8	3-3/4	1/2
-308328-312	3-1/4	3-7/8	5/16
-308328-500	3-1/4	3-7/8	1/2
-312400-312	3-3/8	4	5/16
-312400-500	3-3/8	4	1/2
-316404-312	3-1/2	4-1/8	5/16
-316404-500	3-1/2	4-1/8	1/2
-320408-312	3-5/8	4-1/4	5/16
-320408-500	3-5/8	4-1/4	1/2
-324412-312	3-3/4	4-3/8	5/16
-324412-500	3-3/4	4-3/8	1/2
-328416-312	3-7/8	4-1/2	5/16
-328416-500	3-7/8	4-1/2	1/2
-400420-312	4	4-5/8	5/16
-400420-562	4	4-5/8	9/16
-404424-312	4-1/8	4-3/4	5/16
-404424-562	4-1/8	4-3/4	9/16
-408428-312	4-1/4	4-7/8	5/16
-408428-562	4-1/4	4-7/8	9/16
-412500-312	4-3/8	5	5/16
-412500-562	4-3/8	5	9/16
-416504-312	4-1/2	5-1/8	5/16
-416504-625	4-1/2	5-1/8	5/8
-420508-312	4-5/8	5-1/4	5/16
-420508-625	4-5/8	5-1/4	5/8
-424512-312	4-3/4	5-3/8	5/16
-424512-625	4-3/4	5-3/8	5/8
-428516-312	4-7/8	5-1/2	5/16
-428516-625	4-7/8	5-1/2	5/8
-500520-312	5	5-5/8	5/16
-500520-625	5	5-5/8	5/8
-504524-312	5-1/8	5-3/4	5/16
-504524-625	5-1/8	5-3/4	5/8
-508528-312	5-1/4	5-7/8	5/16
-508528-625	5-1/4	5-7/8	5/8
-512600-312	5-3/8	6	5/16
-512600-625	5-3/8	6	5/8
-516604-312	5-1/2	6-1/8	5/16
-516604-625	5-1/2	6-1/8	5/8
-520608-312	5-5/8	6-1/4	5/16
-520608-625	5-5/8	6-1/4	5/8
-524612-312	5-3/4	6-3/8	5/16
-524612-625	5-3/4	6-3/8	5/8
-528616-312	5-7/8	6-1/2	5/16
-528616-625	5-7/8	6-1/2	5/8

PART NUMBER LIST

FOR SERIES 13, 14, 15, 16, 30, 33 and 35 (INCH SIZES)



5/16" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-600620-312	6	6-5/8	5/16
-600620-625	6	6-5/8	5/8
-608628-312	6-1/4	6-7/8	5/16
-608628-625	6-1/4	6-7/8	5/8
-616704-312	6-1/2	7-1/8	5/16
-616704-625	6-1/2	7-1/8	5/8
-624712-312	6-3/4	7-3/8	5/16
-624712-625	6-3/4	7-3/8	5/8
-700720-312	7	7-5/8	5/16
-700720-625	7	7-5/8	5/8
-708728-312	7-1/4	7-7/8	5/16
-708728-625	7-1/4	7-7/8	5/8
-712800-312	7-3/8	8	5/16
-712800-625	7-3/8	8	5/8
-716804-312	7-1/2	8-1/8	5/16
-716804-625	7-1/2	8-1/8	5/8
-724812-312	7-3/4	8-3/8	5/16
-724812-625	7-3/4	8-3/8	5/8
-800820-312	8	8-5/8	5/16
-800820-625	8	8-5/8	5/8
-808828-312	8-1/4	8-7/8	5/16
-808828-625	8-1/4	8-7/8	5/8
-816904-312	8-1/2	9-1/8	5/16
-816904-625	8-1/2	9-1/8	5/8
-824912-312	8-3/4	9-3/8	5/16
-824912-625	8-3/4	9-3/8	5/8
-900920-312	9	9-5/8	5/16
-900920-625	9	9-5/8	5/8
-908928-312	9-1/4	9-7/8	5/16
-908928-625	9-1/4	9-7/8	5/8
-9161004-312	9-1/2	10-1/8	5/16
-9161004-625	9-1/2	10-1/8	5/8
-9241012-312	9-3/4	10-3/8	5/16
-9241012-625	9-3/4	10-3/8	5/8

3/8" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-028120-625	7/8	1-5/8	5/8
-030122-375	15/16	1-11/16	3/8
-030122-625	15/16	1-11/16	5/8
-100124-375	1	1-3/4	3/8
-100124-625	1	1-3/4	5/8
-102126-375	1-1/16	1-13/16	3/8
-102126-625	1-1/16	1-13/16	5/8
-104128-375	1-1/8	1-7/8	3/8
-104128-625	1-1/8	1-7/8	5/8
-106130-375	1-3/16	1-15/16	3/8
-106130-625	1-3/16	1-15/16	5/8
-108200-375	1-1/4	2	3/8
-108200-625	1-1/4	2	5/8
-110202-375	1-5/16	2-1/16	3/8
-110202-625	1-5/16	2-1/16	5/8
-112204-375	1-3/8	2-1/8	3/8
-112204-625	1-3/8	2-1/8	5/8
-114206-315	1-7/16	2-3/16	3/8
-114206-625	1-7/16	2-3/16	5/8
-116208-375	1-1/2	2-1/4	3/8
-116208-625	1-1/2	2-1/4	5/8
-120212-375	1-5/8	2-3/8	3/8
-120212-625	1-5/8	2-3/8	5/8
-124216-375	1-3/4	2-1/2	3/8
-124216-675	1-3/4	2-1/2	5/8
-128220-375	1-7/8	2-5/8	3/8
-128220-625	1-7/8	2-5/8	5/8
-200224-375	2	2-3/4	3/8
-200224-625	2	2-3/4	5/8
-204228-375	2-1/8	2-7/8	3/8
-204228-625	2-1/8	2-7/8	5/8
-208300-375	2-1/4	3	3/8
-208300-625	2-1/4	3	5/8
-212304-375	2-3/8	3-1/8	3/8
-212304-625	2-3/8	3-1/8	5/8
-216308-375	2-1/2	3-1/4	3/8
-216308-625	2-1/2	3-1/4	5/8
-220312-375	2-5/8	3-3/8	3/8
-220312-625	2-5/8	3-3/8	5/8
-224316-375	2-3/4	3-1/2	3/8
-224316-625	2-3/4	3-1/2	5/8
-228320-375	2-7/8	3-5/8	3/8
-228320-625	2-7/8	3-5/8	5/8
-300324-375	3	3-3/4	3/8
-300324-625	3	3-3/4	5/8
-304328-375	3-1/8	3-7/8	3/8

3/8" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-024116-375	3/4	1-1/2	3/8
-024116-625	3/4	1-1/2	5/8
-026118-375	13/16	1-9/16	3/8
-026118-625	13/16	1-9/16	5/8
-028120-375	7/8	1-5/8	3/8

3/8" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-304328-625	3-1/8	3-7/8	5/8
-308400-375	3-1/4	4	3/8
-308400-625	3-1/4	4	5/8
-312404-375	3-3/8	4-1/8	3/8
-312404-625	3-3/8	4-1/8	5/8
-316408-375	3-1/2	4-1/4	3/8
-316408-625	3-1/2	4-1/4	5/8
-320412-375	3-5/8	4-3/8	3/8
-320412-625	3-5/8	4-3/8	5/8
-324416-375	3-3/4	4-1/2	3/8
-324416-625	3-3/4	4-1/2	5/8
-328420-375	3-7/8	4-5/8	3/8
-328420-625	3-7/8	4-5/8	5/8
-400424-375	4	4-3/4	3/8
-400424-625	4	4-3/4	5/8
-404428-375	4-1/8	4-7/8	3/8
-404428-625	4-1/8	4-7/8	5/8
-408500-375	4-1/4	5	3/8
-408500-625	4-1/4	5	5/8
-412504-375	4-3/8	5-1/8	3/8
-412504-625	4-3/8	5-1/8	5/8
-416508-375	4-1/2	5-1/4	3/8
-416508-625	4-1/2	5-1/4	5/8
-420512-375	4-5/8	5-3/8	3/8
-420512-625	4-5/8	5-3/8	5/8
-424516-375	4-3/4	5-1/2	3/8
-424516-625	4-3/4	5-1/2	5/8
-428520-375	4-7/8	5-5/8	3/8
-428520-625	4-7/8	5-5/8	5/8
-500524-375	5	5-3/4	3/8
-500524-625	5	5-3/4	5/8
-504528-375	5-1/8	5-7/8	3/8
-504528-625	5-1/8	5-7/8	5/8
-508600-375	5-1/4	6	3/8
-508600-625	5-1/4	6	5/8
-512604-375	5-3/8	6-1/8	3/8
-512604-625	5-3/8	6-1/8	5/8
-516608-375	5-1/2	6-1/4	3/8
-516608-625	5-1/2	6-1/4	5/8
-520612-375	5-5/8	6-3/8	3/8
-520612-625	5-5/8	6-3/8	5/8
-524616-375	5-3/4	6-1/2	3/8
-524616-625	5-3/4	6-1/2	5/8
-528620-375	5-7/8	6-5/8	3/8
-528620-625	5-7/8	6-5/8	5/8

3/8" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-600624-375	6	6-3/4	3/8
-600624-625	6	6-3/4	5/8
-608700-375	6-1/4	7	3/8
-608700-625	6-1/4	7	5/8
-616708-375	6-1/2	7-1/4	3/8
-616708-625	6-1/2	7-1/4	5/8
-624716-375	6-3/4	7-1/2	3/8
-624716-625	6-3/4	7-1/2	5/8
-700724-375	7	7-3/4	3/8
-700724-625	7	7-3/4	5/8
-708800-375	7-1/4	8	3/8
-708800-625	7-1/4	8	5/8
-716808-375	7-1/2	8-1/4	3/8
-716808-625	7-1/2	8-1/4	5/8
-720812-375	7-5/8	8-3/8	3/8
-720812-625	7-5/8	8-3/8	5/8
-724816-375	7-3/4	8-1/2	3/8
-724816-625	7-3/4	8-1/2	5/8
-728820-375	7-7/8	8-5/8	3/8
-728820-625	7-7/8	8-5/8	5/8
-800824-375	8	8-3/4	3/8
-800824-625	8	8-3/4	5/8
-808900-375	8-1/4	9	3/8
-808900-625	8-1/4	9	5/8
-812904-375	8-3/8	9-1/8	3/8
-812904-625	8-3/8	9-1/8	5/8
-816908-375	8-1/2	9-1/4	3/8
-816908-625	8-1/2	9-1/4	5/8
-824916-375	8-3/4	9-1/2	3/8
-824916-625	8-3/4	9-1/2	5/8
-900924-375	9	9-3/4	3/8
-900924-625	9	9-3/4	5/8
-9081000-375	9-1/4	10	3/8
-9081000-625	9-1/4	10	5/8
-9161008-375	9-1/2	10-1/4	3/8
-9161008-625	9-1/2	10-1/4	5/8
-9241016-375	9-3/4	10-1/2	3/8
-9241016-625	9-3/4	10-1/2	5/8
-10001024-375	10	10-3/4	3/8
-10001024-625	10	10-3/4	5/8
-10081100-375	10-1/4	11	3/8
-10081100-625	10-1/4	11	5/8
-10161108-375	10-1/2	11-1/4	3/8
-10161108-625	10-1/2	11-1/4	5/8
-10241116-375	10-3/4	11-1/2	3/8
-10241116-625	10-3/4	11-1/2	5/8

PART NUMBER LIST

FOR SERIES 13, 14, 15, 16, 30, 33 and 35 (INCH SIZES)



3/8" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-11001124-375	11	11-3/4	3/8
-11001124-625	11	11-3/4	5/8
-11081200-375	11-1/4	12	3/8
-11081200-625	11-1/4	12	5/8
-11161208-375	11-1/2	12-1/4	3/8
-11161208-625	11-1/2	12-1/4	5/8
-11241216-375	11-3/4	12-1/2	3/8
-11241216-625	11-3/4	12-1/2	5/8
-12001224-375	12	12-3/4	3/8
-12001224-625	12	12-3/4	5/8
-12081300-375	12-1/4	13	3/8
-12081300-625	12-1/4	13	5/8
-12161308-375	12-1/2	13-1/4	3/8
-12161308-625	12-1/2	13-1/4	5/8
-12241316-375	12-3/4	13-1/2	3/8
-12241316-625	12-3/4	13-1/2	5/8
-13001324-375	13	13-3/4	3/8
-13001324-625	13	13-3/4	5/8

1/2" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-116216-500	1-1/2	2-1/2	1/2
-116216-750	1-1/2	2-1/2	3/4
-124224-500	1-3/4	2-3/4	1/2
-124224-750	1-3/4	2-3/4	3/4
-200300-500	2	3	1/2
-200300-750	2	3	3/4
-208308-500	2-1/4	3-1/4	1/2
-208308-750	2-1/4	3-1/4	3/4
-216316-500	2-1/2	3-1/2	1/2
-216316-750	2-1/2	3-1/2	3/4
-224324-500	2-3/4	3-3/4	1/2
-224324-750	2-3/4	3-3/4	3/4
-300400-500	3	4	1/2
-300400-750	3	4	3/4
-308408-500	3-1/4	4-1/4	1/2
-308408-750	3-1/4	4-1/4	3/4
-316416-500	3-1/2	4-1/2	1/2
-316416-750	3-1/2	4-1/2	3/4
-324424-500	3-3/4	4-3/4	1/2
-324424-750	3-3/4	4-3/4	3/4
-328428-500	3-7/8	4-7/8	1/2
-328428-750	3-7/8	4-7/8	3/4

1/2" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-400500-500	4	5	1/2
-400500-750	4	5	3/4
-408508-500	4-1/4	5-1/4	1/2
-408508-750	4-1/4	5-1/4	3/4
-412512-500	4-3/8	5-3/8	1/2
-412512-750	4-3/8	5-3/8	3/4
-416516-500	4-1/2	5-1/2	1/2
-416516-750	4-1/2	5-1/2	3/4
-424524-500	4-3/4	5-3/4	1/2
-424524-750	4-3/4	5-3/4	3/4
-500600-500	5	6	1/2
-500600-750	5	6	3/4
-508608-500	5-1/4	6-1/4	1/2
-508608-750	5-1/4	6-1/4	3/4
-516616-500	5-1/2	6-1/2	1/2
-516616-750	5-1/2	6-1/2	3/4
-524624-500	5-3/4	6-3/4	1/2
-524624-750	5-3/4	6-3/4	3/4
-600700-500	6	7	1/2
-600700-750	6	7	3/4
-608708-500	6-1/4	7-1/4	1/2
-608708-750	6-1/4	7-1/4	3/4
-616716-500	6-1/2	7-1/2	1/2
-616716-750	6-1/2	7-1/2	3/4
-624724-500	6-3/4	7-3/4	1/2
-624724-750	6-3/4	7-3/4	3/4
-700800-500	7	8	1/2
-700800-750	7	8	3/4
-708808-500	7-1/4	8-1/4	1/2
-708508-750	7-1/4	8-1/4	3/4
-716816-500	7-1/2	8-1/2	1/2
-716816-750	7-1/2	8-1/2	3/4
-724824-500	7-3/4	8-3/4	1/2
-724824-750	7-3/4	8-3/4	3/4
-800900-500	8	9	1/2
-800900-750	8	9	3/4
-804904-500	8-1/8	9-1/8	1/2
-804904-750	8-1/8	9-1/8	3/4
-808908-500	8-1/4	9-1/4	1/2
-808908-750	8-1/4	9-1/4	3/4
-816916-500	8-1/2	9-1/2	1/2
-816916-750	8-1/2	9-1/2	3/4
-824924-500	8-3/4	9-3/4	1/2
-824924-750	8-3/4	9-3/4	3/4
-9001000-500	9	10	1/2
-9001000-750	9	10	3/4

1/2" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-9081008-500	9-1/4	10-1/4	1/2
-9081008-750	9-1/4	10-1/4	3/4
-9161016-500	9-1/2	10-1/2	1/2
-9161016-750	9-1/2	10-1/2	3/4
-9241024-500	9-3/4	10-3/4	1/2
-9241024-750	9-3/4	10-3/4	3/4
-10001100-500	10	11	1/2
-10001100-750	10	11	3/4
-10081108-500	10-1/4	11-1/4	1/2
-10081108-750	10-1/4	11-1/4	3/4
-10161116-500	10-1/2	11-1/2	1/2
-10161116-750	10-1/2	11-1/2	3/4
-10241124-500	10-3/4	11-3/4	1/2
-10241124-750	10-3/4	11-3/4	3/4
-11001200-500	11	12	1/2
-11001200-750	11	12	3/4
-11081208-500	11-1/4	12-1/4	1/2
-11081208-750	11-1/4	12-1/4	3/4
-11161216-500	11-1/2	12-1/2	1/2
-11161216-750	11-1/2	12-1/2	3/4
-11241224-500	11-3/4	12-3/4	1/2
-11241224-750	11-3/4	12-3/4	3/4
-12001300-500	12	13	1/2
-12001300-750	12	13	3/4
-12081308-500	12-1/4	13-1/4	1/2
-12081308-750	12-1/4	13-1/4	3/4
-12161316-500	12-1/2	13-1/2	1/2
-12161316-750	12-1/2	13-1/2	3/4
-12241324-500	12-3/4	13-3/4	1/2
-12241324-750	12-3/4	13-3/4	3/4
-13001400-500	13	14	1/2
-13001400-750	13	14	3/4
-13081408-500	13-1/4	14-1/4	1/2
-13081408-750	13-1/4	14-1/4	3/4
-13161416-500	13-1/2	14-1/2	1/2
-13161416-750	13-1/2	14-1/2	3/4
-13241424-500	13-3/4	14-3/4	1/2
-13241424-750	13-3/4	14-3/4	3/4
-14001500-500	14	15	1/2
-14001500-750	14	15	3/4
-14081508-500	14-1/4	15-1/4	1/2
-14081508-750	14-1/4	15-1/4	3/4
-14161516-500	14-1/2	15-1/2	1/2
-14161516-750	14-1/2	15-1/2	3/4
-14241524-500	14-3/4	15-3/4	1/2
-14241524-750	14-3/4	15-3/4	3/4

1/2" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-15001600-500	15	16	1/2
-15001600-750	15	16	3/4
-15081608-500	15-1/4	16-1/4	1/2
-15081608-750	15-1/4	16-1/4	3/4
-15161616-500	15-1/2	16-1/2	1/2
-15161616-750	15-1/2	16-1/2	3/4
-15241624-500	15-3/4	16-3/4	1/2
-15241624-750	15-3/4	16-3/4	3/4

5/8" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-216324-625	2-1/2	3-3/4	5/8
-216324-1000	2-1/2	3-3/4	1
-224400-625	2-3/4	4	5/8
-224400-1000	2-3/4	4	1
-300408-625	3	4-1/4	5/8
-300428-1000	3	4-1/4	1
-308416-625	3-1/4	4-1/2	5/8
-308416-1000	3-1/4	4-1/2	1
-316424-625	3-1/2	4-3/4	5/8
-316424-1000	3-1/2	4-3/4	1
-324500-625	3-3/4	5	5/8
-324500-1000	3-3/4	5	1
-400508-625	4	5-1/4	5/8
-400508-1000	4	5-1/4	1
-408516-625	4-1/4	5-1/2	5/8
-408516-1000	4-1/4	5-1/2	1
-416524-625	4-1/2	5-3/4	5/8
-416524-1000	4-1/2	5-3/4	1
-424600-625	4-3/4	6	5/8
-424600-1000	4-3/4	6	1
-500608-625	5	6-1/4	5/8
-500608-1000	5	6-1/4	1
-508616-625	5-1/4	6-1/2	5/8
-508616-1000	5-1/4	6-1/2	1
-516624-625	5-1/2	6-3/4	5/8
-516624-1000	5-1/2	6-3/4	1
-524700-625	5-3/4	7	5/8
-524700-1000	5-3/4	7	1
-600708-625	6	7-1/4	5/8
-600708-1000	6	7-1/4	1
-608716-625	6-1/4	7-1/2	5/8
-608716-1000	6-1/4	7-1/2	1

PART NUMBER LIST

FOR SERIES 13, 14, 15, 16, 30, 33 and 35 (INCH SIZES)



5/8" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-616724-625	6-1/2	7-3/4	5/8
-616724-1000	6-1/2	7-3/4	1
-624800-625	6-3/4	8	5/8
-624800-1000	6-3/4	8	1
-700808-625	7	8-1/4	5/8
-700808-1000	7	8-1/4	1
-708816-625	7-1/4	8-1/2	5/8
-708816-1000	7-1/4	8-1/2	1
-716824-625	7-1/2	8-3/4	5/8
-716824-1000	7-1/2	8-3/4	1
-724900-625	7-3/4	9	5/8
-724900-1000	7-3/4	9	1
-800908-625	8	9-1/4	5/8
-800908-1000	8	9-1/4	1
-808916-625	8-1/4	9-1/2	5/8
-808916-1000	8-1/4	9-1/2	1
-816924-625	8-1/2	9-3/4	5/8
-816924-1000	8-1/2	9-3/4	1
-8241000-625	8-3/4	10	5/8
-8241000-1000	8-3/4	10	1
-9001008-625	9	10-1/4	5/8
-9001008-1000	9	10-1/4	1
-9081016-625	9-1/4	10-1/2	5/8
-9081016-1000	9-1/4	10-1/2	1
-9161024-625	9-1/2	10-3/4	5/8
-9161024-1000	9-1/2	10-3/4	1
-9241100-625	9-3/4	11	5/8
-9241100-1000	9-3/4	11	1
-10001108-625	10	11-1/4	5/8
-10001108-1000	10	11-1/4	1
-10081116-625	10-1/4	11-1/2	5/8
-10081116-1000	10-1/4	11-1/2	1
-10161124-625	10-1/2	11-3/4	5/8
-10161124-1000	10-1/2	11-3/4	1
-10241200-625	10-3/4	12	5/8
-10241200-1000	10-3/4	12	1
-11001208-625	11	12-1/4	5/8
-11001208-1000	11	12-1/4	1
-11081216-625	11-1/4	12-1/2	5/8
-11081216-1000	11-1/4	12-1/2	1
-11161224-625	11-1/2	12-3/4	5/8
-11161224-1000	11-1/2	12-3/4	1
-11241300-625	11-3/4	13	5/8
-11241300-1000	11-3/4	13	1
-12001308-625	12	13-1/4	5/8
-12001308-1000	12	13-1/4	1

5/8" CROSS SECTION

Dash N°	Nominal Size, Inches		
	ID	OD	H
-12081316-625	12-1/4	13-1/2	5/8
-12081316-1000	12-1/4	13-1/2	1
-12161324-625	12-1/2	13-3/4	5/8
-12161324-1000	12-1/2	13-3/4	1
-12241400-625	12-3/4	14	5/8
-12241400-1000	12-3/4	14	1
-13001408-625	13	14-1/4	5/8
-1300408-1000	13	14-1/4	1
-13081416-625	13-1/4	14-1/2	5/8
-13081416-1000	13-1/4	14-1/2	1
-13161424-625	13-1/2	14-3/4	5/8
-13161424-1000	13-1/2	14-3/4	1
-13241500-625	13-3/4	15	5/8
-13241500-1000	13-3/4	15	1
-14001508-625	14	15-1/4	5/8
-14001508-1000	14	15-1/4	1
-14081516-625	14-1/4	15-1/2	5/8
-14081516-1000	14-1/4	15-1/2	1
-14161524-625	14-1/2	15-3/4	5/8
-14161524-1000	14-1/2	15-3/4	1
-14241600-625	14-3/4	16	5/8
-14241600-1000	14-3/4	16	1
-15001608-625	15	16-1/4	5/8
-15001608-1000	15	16-1/4	1
-15081616-625	15-1/4	16-1/2	5/8
-15081616-1000	15-1/4	16-1/2	1
-15161624-625	15-1/2	16-3/4	5/8
-15161624-1000	15-1/2	16-3/4	1
-15241700-625	15-3/4	17	5/8
-15241700-1000	15-3/4	17	1

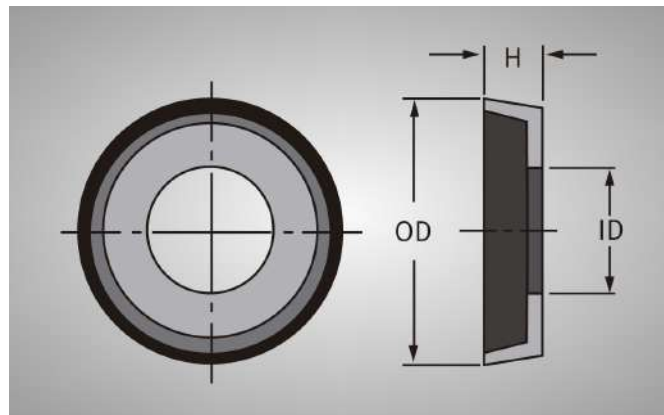
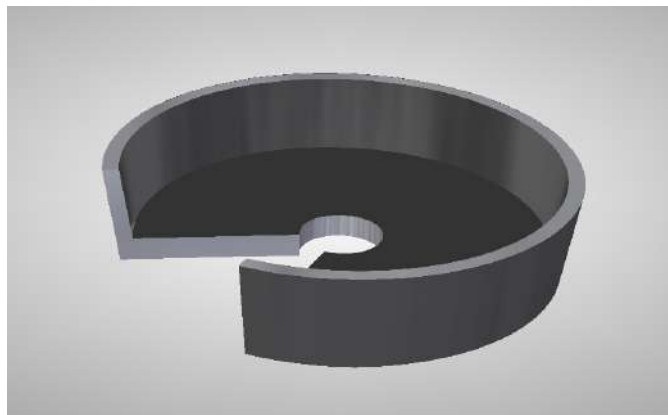
Dash N°	Nominal Size, Inches		
	OD	ID	H
022014-178	11-16	7/16	0,178
024016-178	3/4	1/2	0,178
100024-178	1	3/4	0,178
104028-178	1-1/8	7/8	0,178
108100-178	1-1/4	1	0,178
110102-178	1-5/16	1-1/16	0,178
112104-178	1-3/8	1-1/8	0,178
114106-178	1-7/16	1-3/16	0,178
116108-178	1-1/2	1-1/4	0,178
118110-178	1-9/16	1-5/16	0,178
120112-178	1-5/8	1-3/8	0,178
122114-178	1-11/16	1-7/16	0,178
124116-178	1-3/4	1-1/2	0,178
128116-265	1-7/8	1-1/2	0,265
200120-265	2	1-5/8	0,265
204124-265	2-1/8	1-3/4	0,265
208128-265	2-1/4	1-7/8	0,265
212200-265	2-3/8	2	0,265
216204-265	2-1/2	2-1/8	0,265
220208-265	2-5/8	2-1/4	0,265
224212-265	2-3/4	2-3/8	0,265
228216-265	2-7/8	2-1/2	0,265
300220-265	3	2-5/8	0,265
304224-265	3-1/8	2-3/4	0,265
308228-265	3-1/4	2-7/8	0,265
312300-265	3-3/8	3	0,265
316304-265	3-1/2	3-1/8	0,265
320308-265	3-5/8	3-1/4	0,265
328316-265	3-7/8	3-1/2	0,265
400320-265	4	3-5/8	0,265
404324-265	4-1/8	3-3/4	0,265
408328-265	4-1/4	3-7/8	0,265
412400-265	4-3/8	4	0,265
416404-265	4-1/2	4-1/8	0,265
420408-265	4-5/8	4-1/4	0,265
424412-265	4-3/4	4-3/8	0,265
428416-265	4-7/8	4-1/2	0,265
500420-265	5	4-5/8	0,265
504420-356	5-1/8	4-5/8	0,356
508424-356	5-1/4	4-3/4	0,356
512428-356	5-3/8	4-7/8	0,356
516500-356	5-1/2	5	0,356
520504-356	5-5/8	5-1/8	0,356
524508-356	5-3/4	5-1/4	0,356
528512-356	5-7/8	5-3/8	0,356
600516-356	6	5-1/2	0,356
604512-356	6-1/8	5-3/8	0,356
608524-356	6-1/4	5-3/4	0,356
616600-356	6-1/2	6	0,356
624608-356	6-3/4	6-1/4	0,356
700616-356	7	6-1/2	0,356

PISTON CUPS

Series 17 (Inch Sizes)

12





CHARACTERISTICS

Piston Cups are normally employed in moderate pressure cylinders up to 1500 P.S.I. A primary advantage is the ability to accommodate broad cylinder diameter tolerances as shown in Figure 1. Series N°. 17 — Piston Cups have knife trimmed sealing lips to eliminate all molding flash and to provide maximum sealing performance at low pressure.

In order to establish proper sealing interference on the piston cups, the piston should be machined to the dimension as shown in Figure 2.

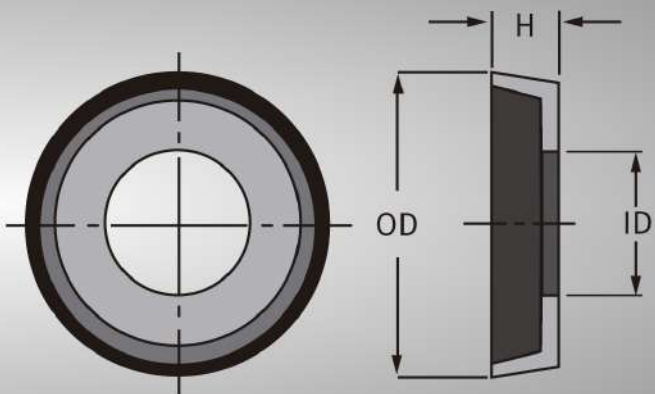
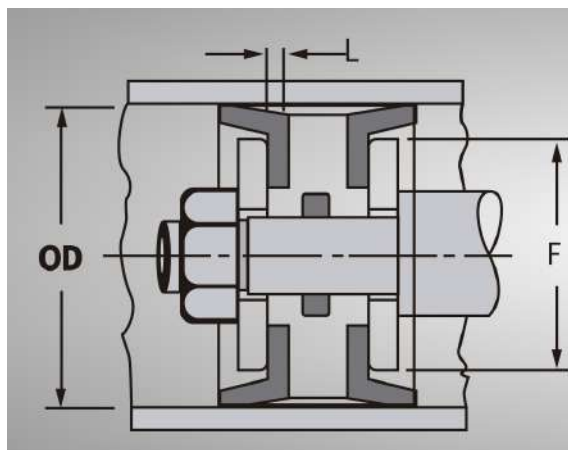
Standard sizes of Piston Cups are listed on page 12(2) of this technical bulletin. The I.D. dimension shown is standard, however, larger or smaller diameters can be provided to accommodate existing designs.

MATERIAL

- Type: Unithane 292A, liquid cast Polyurethane.
- Hardness: Durometer 92A.
- Fluid Compatibility: See 'Material Specifications',
- Technical Bulletin US- 96

Recommended Cylinder Bore Tolerances (Fig. 1)

Diameter Range	Cylinder Dia. Tolerance
0 to 1.625	+0.015 -0.005
1.625 to 3.500	+0.020 -0.010
3.500 to 5.500	+0.030 -0.015
5.500 to 7.500	+0.040 -0.020
7.500 to 10.000	+0.050 -0.020
10.000 to 12.000	+0.060 -0.030



PISTON CUPS

SERIES 17 (Inch Sizes)

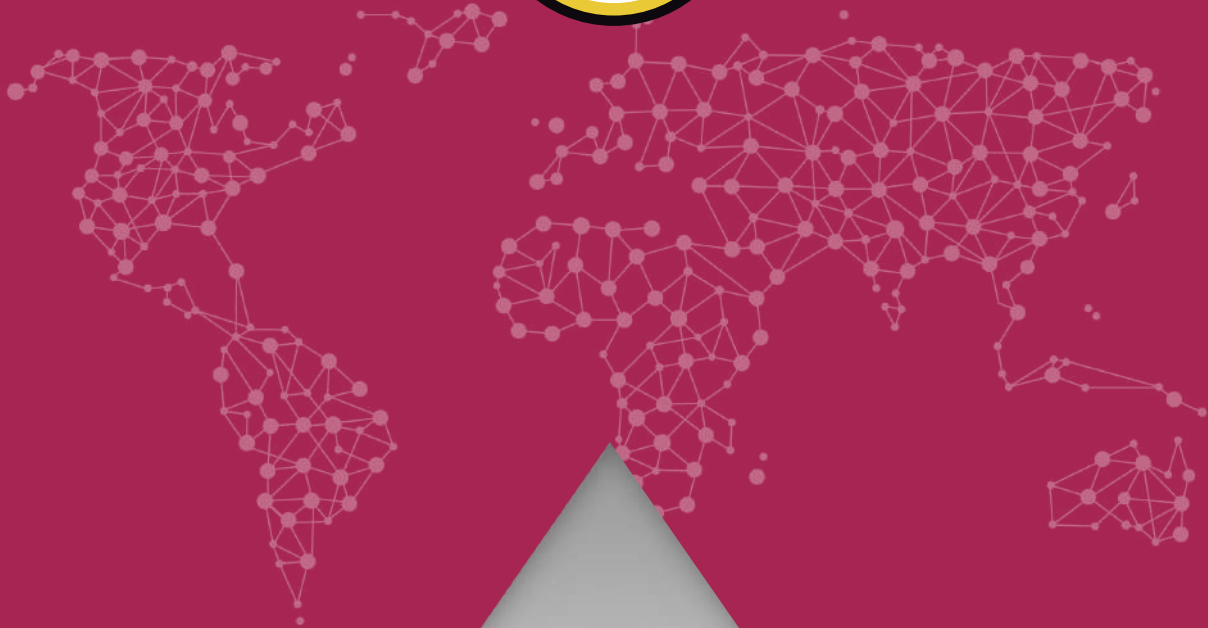


Partn° 17-	OD	ID	T	H	L +.000 -.003	F
-02400803-312	3/4	1/4	3/32	5/16	.090	1/2
-02600803-312	13/16	1/4	3/32	5/16	.090	9/16
-02800803-375	7/8	1/4	3/32	3/8	.090	5/8
-03000803-375	15/16	1/4	3/32	3/8	.090	5/8
-10001204-437	1	3/8	1/8	7/16	.120	5/8
-10401204-437	1-1/8	3/8	1/8	7/16	.120	3/4
-10801204-437	1-1/4	3/8	1/8	7/16	.120	7/8
-11202204-437	1-3/8	3/8	1/8	7/16	.120	1
-11601604-500	1-1/2	1/2	1/8	1/2	.120	1-1/8
-12001604-500	1-5/8	1/2	1/8	1/2	.120	1-1/4
-12401604-500	1-3/4	1/2	1/8	1/2	.120	1-3/8
-12801604-500	1-7/8	1/2	1/8	1/2	.120	1-1/2
-20001604-500	2	1/2	1/8	1/2	.120	1-5/8
-20401604-500	2-1/8	1/2	1/8	1/2	.120	1-3/4
-20801604-500	2-1/4	1/2	1/8	1/2	.120	1-7/8
-21201604-500	2-3/8	1/2	1/8	1/2	.120	2
-21601604-500	2-1/2	1/2	1/8	1/2	.120	2-1/8
-22001604-500	2-5/8	1/2	1/8	1/2	.120	2-1/4
-22401604-500	2-3/4	1/2	1/8	1/2	.120	2-3/8
-22801604-500	2-7/8	1/2	1/8	1/2	.120	2-1/2
-30002405-625	3	3/4	5/32	5/8	.150	2-1/2
-30402405-625	3-1/8	3/4	5/32	5/8	.150	2-5/8
-30802405-625	3-1/4	3/4	5/32	5/8	.150	2-3/4
-31202405-625	3-3/8	3/4	5/32	5/8	.150	2-7/8
-31602405-625	3-1/2	3/4	5/32	5/8	.150	3
-32002405-625	3-5/8	3/4	5/32	5/8	.150	3-1/8
-32402405-625	3-3/4	3/4	5/32	5/8	.150	3-1/4
-32802405-625	3-7/8	3/4	5/32	5/8	.150	3-3/8
-40002405-625	4	3/4	5/32	5/8	.150	3-1/2
-0802405-625	4-1/4	3/4	5/32	5/8	.150	3-3/4
-41610005-625	4-1/2	1	5/32	5/8	.150	4
-42410005-625	4-3/4	1	5/32	5/8	.150	4-1/4
-50011606-750	5	1-1/2	3/16	3/4	.180	4-1/2
-50811606-750	5-1/4	1-1/2	3/16	3/4	.180	4-3/4
-51611606-750	5-1/2	1-1/2	3/16	3/4	.180	5
-52411606-750	5-3/4	1-1/2	3/16	3/4	.180	5-1/4
-60011606-750	6	1-1/2	3/16	3/4	.180	5-1/2
-60811606-750	6-1/4	1-1/2	3/16	3/4	.180	5-3/4
-61620006-750	6-1/2	2	3/16	3/4	.180	6
-62420006-750	6-3/4	2	3/16	3/4	.180	6-1/4
-70020006-750	7	2	3/16	3/4	.180	6-1/2
-70820006-750	7-1/4	2	3/16	3/4	.180	6-3/4
-71621606-750	7-1/2	2-1/2	3/16	3/4	.180	7
-72421606-750	7-3/4	2-1/2	3/16	3/4	.180	7-1/4
-80032408-1000	8	3-3/4	1/4	1	.240	7-3/8
-81632408-1000	8-1/2	3-3/4	1/4	1	.240	7-7/8
-90040008-1000	9	4	1/4	1	.240	8-3/8
91640008-1000	9-1/2	4	1/4	1	.240	8-7/8
-100050008-1250	10	5	1/4	1-1/4	.240	9-3/8
-101650008-1250	10-1/2	5	1/4	1-1/4	.240	9-7/8
-110050008-1250	11	5	1/4	1-1/4	.240	10-3/8
-111650008-1250	11-1/2	5	1/4	1-1/4	.240	10-7/8
-120050008-1250	12	5	1/4	1-1/4	.240	11-3/8

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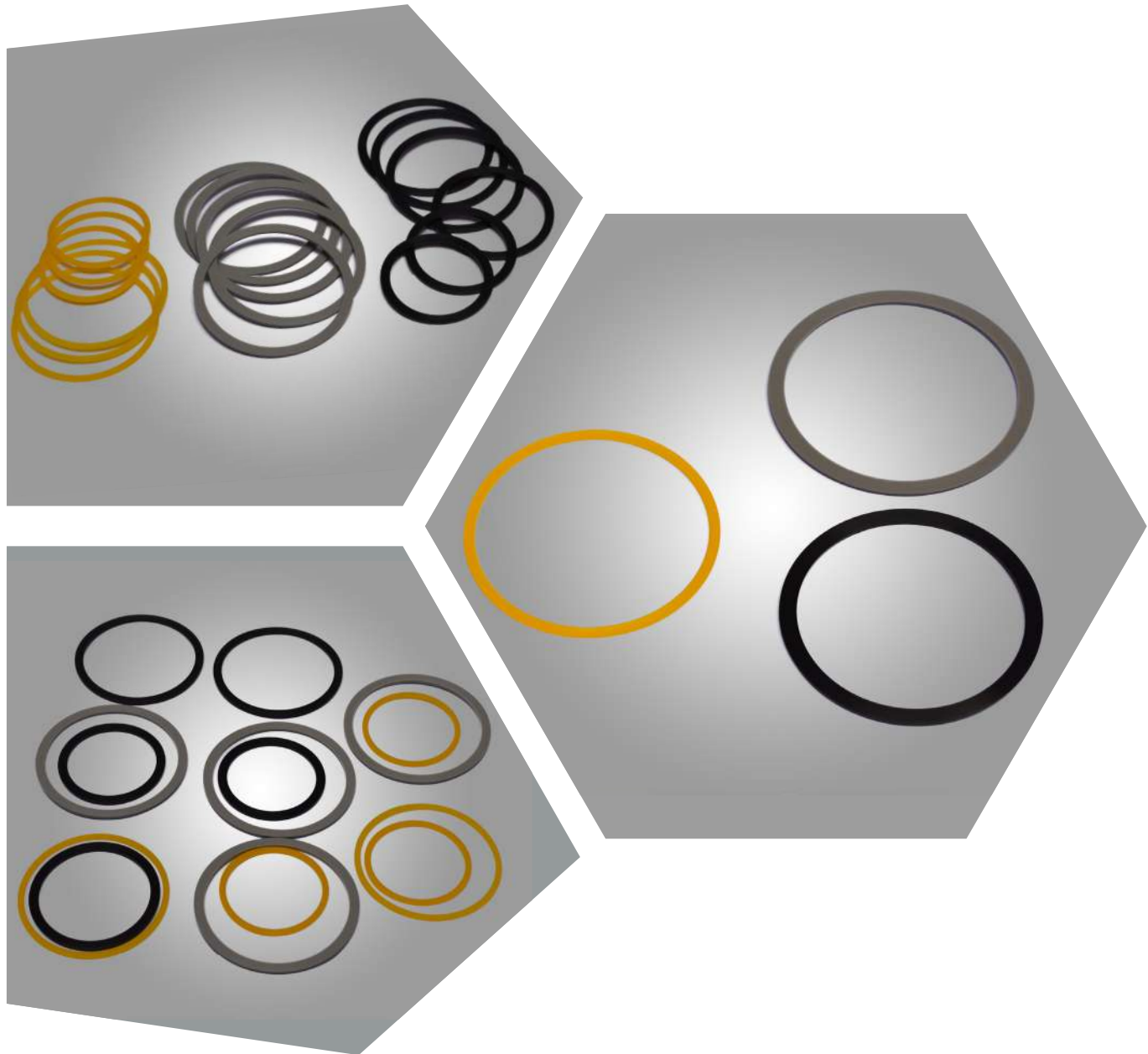
PISTON CUPS

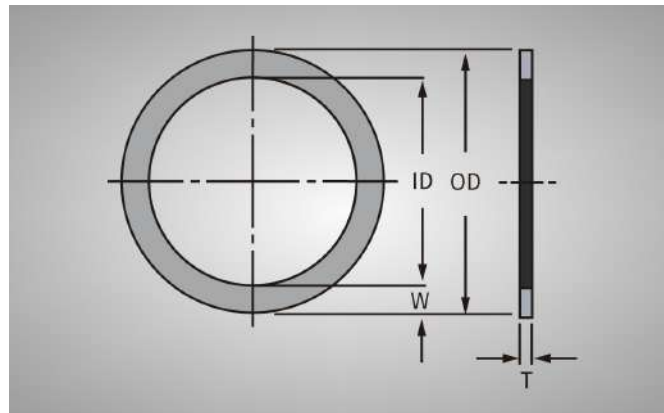
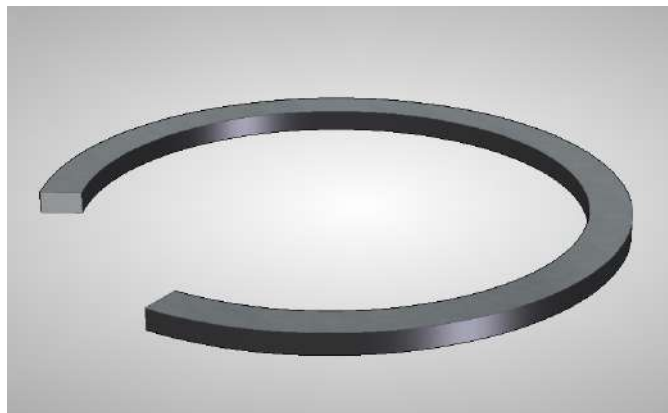
SERIES 17 (Inch Sizes)

BACK UP WASHERS

Series 19 (Inch Sizes)

13





CHARACTERISTICS

Back Up Washers are used in conjunction with 'O' Rings for both static and dynamic sealing applications. They prevent extrusion of the 'O' Ring when it is subjected to high pressures, or when the extrusion gaps are excessive.

Wherever possible two Back Up Washers should be used, On each side of the 'O' Ring. All Series 19 Back Up Washers are continuous one piece rings, so they Will not pinch 'O' Rings. The Polyurethane material used, allows the rings to be stretched over pistons for easy installation.

TYPES AVAILABLE

- For general use (i.e. either for rod or piston): request Series 19
- For rod applications (with interference fit on O.D.): Request Series 19/RO
- For piston application (with interference fit on I.D.): Request Series 19/PI

MATERIAL

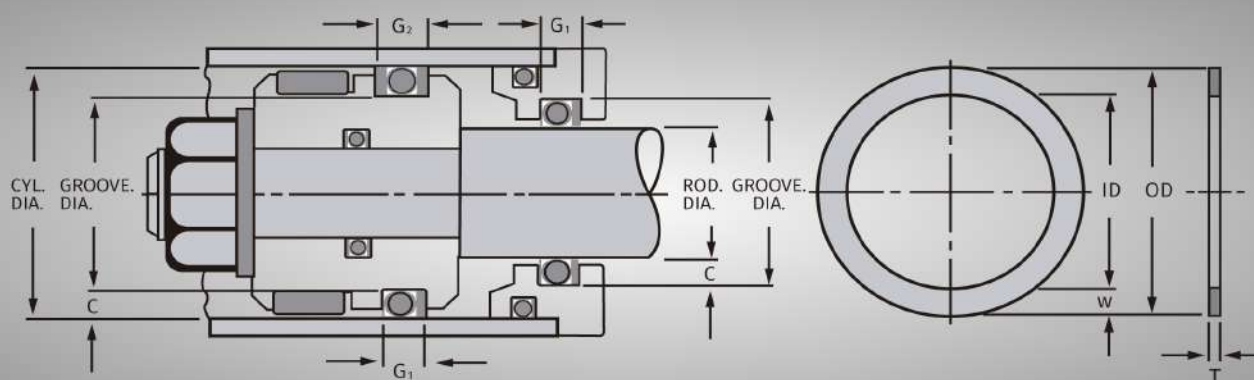
- Type: Unithane **395A**, liquid cast Polyurethane.
- Hardness: Durometer **95A**.
- Fluid Compatability: See 'Material Specifications',
- Technical Bulletin US- 96

BACK UP WASHERS

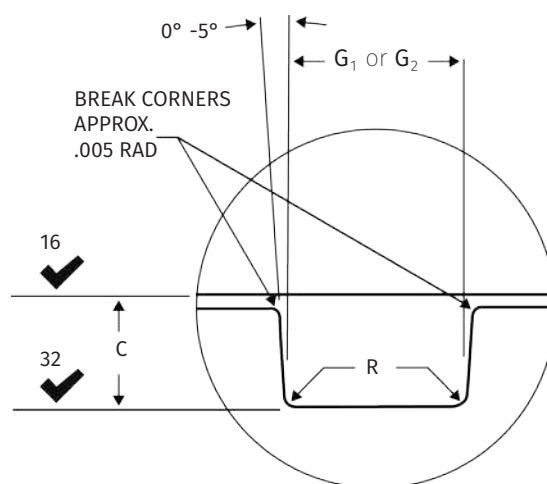
SERIES 19 (Inch Sizes)



BACK UP WASHERS



GROOVE DETAIL



G_1 = GROOVE WIDTH FOR ONE BACK UP WASHER

G_2 = GROOVE WIDTH FOR TWO BACK UP WASHERS

'O Ring		Back Up Washer			Groove Dimensions				
Nominal Cross Section	Actual Cross Section.	Part N ^o . 19-	W	T°	G_1 One Washer	G_2 Two Washers	C		R
							Recip. Rotating	Static	
1/16	.070 ±.003	-013	.053	.040	.013	.190	.055	.049	.005
		TO	±.003	±.003	TO	TO	TO	TO	TO
		-050	±.003	±.003	.135	.195	.057	.055	.015
3/32	.103 ±.003	-111	.086	.040	.163	.223	.087	.080	.005
		TO	±.003	±.003	TO	TO	TO	TO	TO
1/8	.139 ±.004	-178	±.003	±.003	.168	.228	.090	.086	.020
		-205	.118	.040	.209	.279	.119	.112	.005
		TO	±.004	±.003	TO	TO	TO	TO	TO
3/16	.210 ±.005	-273	±.004	±.003	.214	.284	.123	.118	.030
		-309	.183	.055	.300	.390	.183	.176	.005
		TO	±.005	±.004	TO	TO	TO	TO	TO
1/4	.275 ±.006	-375	±.005	±.004	.305	.395	.188	.184	.050
		-425	.236	.085	.400	.525	.234	.225	.005
		TO	±.006	±.005	TO	TO	TO	TO	TO
		-449	±.006	±.005	.405	.530	.240	.235	.060

***OTHER THICKNESSES AVAILABLE ON REQUEST**

Part N° . 19- 19/Ro. 19Pi.	Nominal Dim.	T	Tol ±.	W	Tol ±.
-221	1-7/16 x 1-11/16	.040	.003	.118	.004
-222	1-1/2 x 1-3/4	↑	↑	↑	↑
-223	1-5/8 x 1-7/8	↑	↑	↑	↑
-224	1/3/4 x 2	↑	↑	↑	↑
-225	1-7/8 x 2-1/8	↑	↑	↑	↑
-226	2 x 2-1/4	↑	↑	↑	↑
-227	2-1/8 x 2-3/8	↑	↑	↑	↑
-228	2-1/4 x 2-1/2	↑	↑	↑	↑
-229	2-3/8 x 2-5/8	↑	↑	↑	↑
-230	2-1/2 x 2-3/4	↑	↑	↑	↑
-231	2-5/8 x 2-7/8	↑	↑	↑	↑
-232	2-3/4 x 3	↑	↑	↑	↑
-233	2-7/8 x 3-1/8	↑	↑	↑	↑
-234	3 x 3-1/4	↑	↑	↑	↑
-235	3-1/8 x 3-3/8	↑	↑	↑	↑
-236	3-1/4 x 3-1/2	↑	↑	↑	↑
-237	3-3/8 x 3-5/8	↑	↑	↑	↑
-238	3-1/2 x 3-3/4	↑	↑	↑	↑
-239	3-5/8 x 3-7/8	↑	↑	↑	↑
-240	3-3/4 x 4	↑	↑	↑	↑
-241	3-7/8 x 4-1/8	↑	↑	↑	↑
-242	4 x 4-1/4	↑	↑	↑	↑
-243	4-1/8 x 4-3/8	↑	↑	↑	↑
-244	4-1/4 x 4-1/2	↑	↑	↑	↑
-245	4-3/8 x 4-5/8	↑	↑	↑	↑
-246	4-1/2 x 4-3/4	↑	↑	↑	↑
-247	4-5/8 x 4-7/8	↑	↑	↑	↑
-248	4-3/4 x 5	↑	↑	↑	↑
-249	4-7/8 x 5-1/8	↑	↑	↑	↑
-250	5 x 5-1/4	↑	↑	↑	↑
-251	5-1/8 x 5-3/8	↑	↑	↑	↑
-252	5-1/4 x 5-1/2	↑	↑	↑	↑
-253	5-3/8 x 5-5/8	↑	↑	↑	↑
-254	5-1/2 x 5-3/4	↑	↑	↑	↑
-255	5-5/8 x 5-7/8	↑	↑	↑	↑
-256	5-3/4 x 6	↑	↑	↑	↑
-257	5-7/8 x 6-1/8	↑	↑	↑	↑
-258	6 x 6-1/4	↑	↑	↑	↑
-259	6-1/4 x 6-1/2	↑	↑	↑	↑
-260	6-1/2 x 6-3/4	↑	↑	↑	↑
-261	6-3/4 x 7	↑	↑	↑	↑
-262	7 x 7-1/4	↑	↑	↑	↑
-263	7-1/4 x 7-1/2	↑	↑	↑	↑
-264	7-1/2 x 7-3/4	↑	↑	↑	↑
-265	7-3/4 x 8	↑	↑	↑	↑
-266	8 x 8-1/4	↑	↑	↑	↑
-267	8-1/4 x 8-1/2	↑	↑	↑	↑
-268	8-1/2 x 8-3/4	↑	↑	↑	↑
-269	8-3/4 x 9	↑	↑	↑	↑
-270	9 x 9-1/4	↑	↑	↑	↑
-271	9-1/4 x 9-1/2	↑	↑	↑	↑
-272	9-1/2 x 9-3/4	↑	↑	↑	↑
-273	9-3/4 x 10	.040	.003	.118	.004
-309	7/16 x 13/16	.055	.004	.183	.005
-310	1/2 x 7/8	↑	↑	↑	↑
-311	9/16 x 15/16	↑	↑	↑	↑
-312	5/8 x 1	↑	↑	↑	↑
-313	11/16 x 1-1/16	↑	↑	↑	↑
-314	3/4 x 1-1/8	↑	↑	↑	↑
-315	13/16 x 1-3/16	↑	↑	↑	↑
-316	7/8 x 1-1/4	↑	↑	↑	↑
-317	15/16 x 1-5/16	↑	↑	↑	↑
-318	1 x 1-3/8	↑	↑	↑	↑
-319	1-1/16 x 1-7/16	↑	↑	↑	↑
-320	1-1/8 x 1-1/2	↑	↑	↑	↑
-321	1-3/16 x 1-9/16	↑	↑	↑	↑
-322	1-1/4 x 1-5/8	↑	↑	↑	↑
-323	1-5/16 x 1-11/16	↑	↑	↑	↑
-324	1-3/8 x 1-3/4	↑	↑	↑	↑
-325	1-1/2 x 1-7/8	↑	↑	↑	↑
-326	1-5/8 x 2	↑	↑	↑	↑
-327	1-3/4 x 2-1/8	↑	↑	↑	↑
-328	1-7/8 x 2-1/4	.055	.004	.183	.005

Part N° . 19- 19/Ro. 19Pi.	Nominal Dim.	T	Tol ±.	W	Tol ±.
-329	2 x 2-3/8	.005	.004	.183	.005
-330	2-1/8 x 2-1/2	↑	↑	↑	↑
-331	2-1/4 x 2-5/8	↑	↑	↑	↑
-332	2-3/8 x 2-3/4	↑	↑	↑	↑
-333	2-1/2 x 2-7/8	↑	↑	↑	↑
-334	2-5/8 x 3	↑	↑	↑	↑
-335	2-3/4 x 3-1/8	↑	↑	↑	↑
-336	2-7/8 x 3-1/4	↑	↑	↑	↑
-337	3 x 3-3/8	↑	↑	↑	↑
-238	3-1/8 x 3-1/2	↑	↑	↑	↑
-339	3-1/4 x 3-5/8	↑	↑	↑	↑
-340	3-3/8 x 3-3/4	↑	↑	↑	↑
-341	3-1/2 x 3-7/8	↑	↑	↑	↑
-342	3-5/8 x 4	↑	↑	↑	↑
-243	3-3/4 x 4-1/8	↑	↑	↑	↑
-344	3-7/8 x 4-1/4	↑	↑	↑	↑
-345	4 x 4-3/8	↑	↑	↑	↑
-346	4-1/8 x 4-1/2	↑	↑	↑	↑
-347	4-1/4 x 4-5/8	↑	↑	↑	↑
-348	4-3/8 x 4-3/4	↑	↑	↑	↑
-349	4-1/2 x 4-7/8	↑	↑	↑	↑
-350	4-5/8 x 5	↑	↑	↑	↑
-351	4-3/4 x 5-1/8	↑	↑	↑	↑
-352	4-7/8 x 5-1/4	↑	↑	↑	↑
-353	5 x 5-3/8	↑	↑	↑	↑
-354	5-1/8 x 5-1/2	↑	↑	↑	↑
-355	5-1/4 x 5-5/8	↑	↑	↑	↑
-356	5-3/8 x 5-3/4	↑	↑	↑	↑
-357	5-1/2 x 5-7/8	↑	↑	↑	↑
-358	5-5/8 x 6	↑	↑	↑	↑
-359	5-3/4 x 6-1/8	↑	↑	↑	↑
-360	5-7/8 x 6-1/4	↑	↑	↑	↑
-361	6 x 6-3/8	↑	↑	↑	↑
-362	6-1/4 x 6-5/8	↑	↑	↑	↑
-363	6-1/2 x 6-7/8	↑	↑	↑	↑
-364	6-3/4 x 7-1/8	↑	↑	↑	↑
-365	7 x 7-3/8	↑	↑	↑	↑
-366	7-1/4 x 7-5/8	↑	↑	↑	↑
-367	7-1/2 x 7-7/8	↑	↑	↑	↑
-368	7-3/4 x 8-1/8	↑	↑	↑	↑
-369	8 x 8-3/8	↑	↑	↑	↑
-370	8-1/4 x 8-5/8	↑	↑	↑	↑
-371	8-1/2 x 8-7/8	↑	↑	↑	↑
-372	8-3/4 x 9-1/8	↑	↑	↑	↑
-373	9 x 9-3/9	↑	↑	↑	↑
-374	9-1/4 x 9-5/8	↑	↑	↑	↑
-375	9-1/2 x 9-7/8	.005	.004	.183	.005
-425	4-1/2 x 5	.085	.005	.236	.006
-426	4-5/8 x 5-1/8	↑	↑	↑	↑
-427	4-3/4 x 5-1/4	↑	↑	↑	↑
-428	4-7/8 x 5-3/8	↑	↑	↑	↑
-429	5 x 5-1/2	↑	↑	↑	↑
-430	5-1/8 x 5-5/8	↑	↑	↑	↑
-431	5-1/4 x 5-3/4	↑	↑	↑	↑
-432	5-3/8 x 5-7/8	↑	↑	↑	↑
-433	5-1/2 x 6	↑	↑	↑	↑
-434	5-5/8 x 6-1/8	↑	↑	↑	↑
-435	5-3/4 x 6-1/4	↑	↑	↑	↑
-436	5-7/8 x 6-3/8	↑	↑	↑	↑
-437	6 x 6-1/2	↑	↑	↑	↑
-438	6-1/4 x 6-3/4	↑	↑	↑	↑
-439	6-1/2 x 7	↑	↑	↑	↑
-440	6-3/4 x 7-1/4	↑	↑	↑	↑
-441	7 x 7-1/2	↑	↑	↑	↑
-442	7-1/4 x 7-3/4	↑	↑	↑	↑
-243	7-1/2 x 8	↑	↑	↑	↑
-444	7-3/4 x 8-1/4	↑	↑	↑	↑
-445	8 x 8-1/2	↑	↑	↑	↑
-446	8-1/2 x 9	↑	↑	↑	↑
-447	9 x 9-1/2	↑	↑	↑	↑
-448	9-1/2 x 10	↑	↑	↑	↑
-449	10 x 10-1/2	.085	.005	.236	.006

BACK UP WASHERS

SERIES 19 (Inch Sizes)



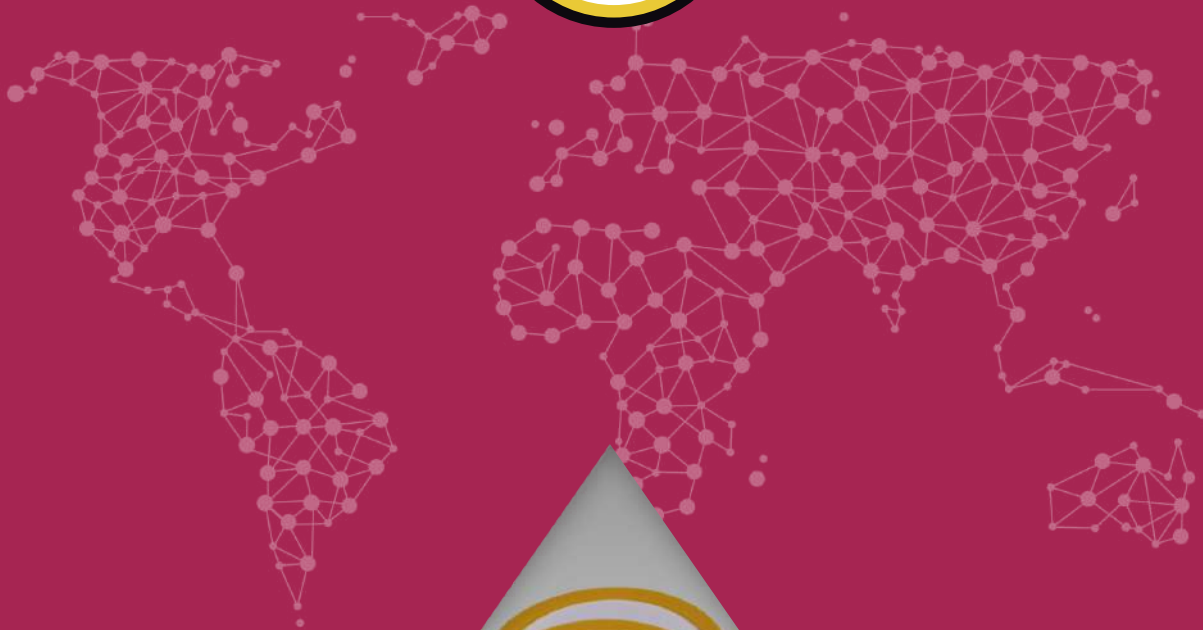
Part N°. 19- 19/Ro. 19Pi.	Nominal Dim.	T	Tol ±.	W	Tol ±.
-013	7/16 × 9/16	.040	.003	.053	.003
-014	1/2 × 5/8	↑	↑	↑	↑
-015	9/16 × 11/16	↑	↑	↑	↑
-016	5/8 × 3/4	↑	↑	↑	↑
-017	11/16 × 13/16	↑	↑	↑	↑
-018	3/4 × 7/8	↑	↑	↑	↑
-019	13/16 × 15/16	↑	↑	↑	↑
-020	7/8 × 1	↑	↑	↑	↑
-021	15/16 × 1-1/16	↑	↑	↑	↑
-022	1 × 1-1/8	↑	↑	↑	↑
-023	1-1/16 × 1-3/16	↑	↑	↑	↑
-024	1-1/8 × 1-1/4	↑	↑	↑	↑
-025	1-3/16 × 1-5/16	↑	↑	↑	↑
-026	1-1/4 × 1-3/8	↑	↑	↑	↑
-027	1-5/16 × 1-7/16	↑	↑	↑	↑
-028	1-3/8 × 1-1/2	↑	↑	↑	↑
-029	1-1/2 × 1-5/8	↑	↑	↑	↑
-030	1-5/8 × 1-3/4	↑	↑	↑	↑
-031	1-3/4 × 1-7/8	↑	↑	↑	↑
-032	1-7/8 × 2	↑	↑	↑	↑
-033	2 × 2-1/8	↑	↑	↑	↑
-034	2-1/8 × 2-1/4	↑	↑	↑	↑
-035	2-1/4 × 2-3/8	↑	↑	↑	↑
-036	2-3/8 × 2-1/2	↑	↑	↑	↑
-037	2-1/2 × 2-5/8	↑	↑	↑	↑
-038	2-5/8 × 2-3/4	↑	↑	↑	↑
-039	2-3/4 × 2-7/8	↑	↑	↑	↑
-040	2-7/8 × 3	↑	↑	↑	↑
-041	3 × 3-1/8	↑	↑	↑	↑
-042	3-1/4 × 3-3/8	↑	↑	↑	↑
-043	3-1/2 × 3-5/8	↑	↑	↑	↑
-044	3-3/4 × 3-7/8	↑	↑	↑	↑
-045	4 × 4-1/8	↑	↑	↑	↑
-046	4-1/4 × 4-3/8	↑	↑	↑	↑
-047	4-1/2 × 4-5/8	↑	↑	↑	↑
-048	4-3/4 × 4-7/8	↑	↑	↑	↑
-049	5 × 5-1/8	↑	↑	↑	↑
-050	5-1/4 × 5-3/8	.040	.003	.053	.003
-111	7/16 × 5/8	.040	.003	.086	.003
-112	1/2 × 11/16	↑	↑	↑	↑
-113	9/16 × 3/4	↑	↑	↑	↑
-114	5/8 × 13/16	↑	↑	↑	↑
-115	11/16 × 7/8	↑	↑	↑	↑
-116	3/4 × 15/16	↑	↑	↑	↑
-117	13/16 × 1	↑	↑	↑	↑
-118	7/8 × 1-1/16	↑	↑	↑	↑
-119	15/16 × 1-1/8	↑	↑	↑	↑
-120	1 × 1-3/16	↑	↑	↑	↑
-121	1-1/16 × 1-1/4	↑	↑	↑	↑
-122	1-1/8 × 1-5/16	↑	↑	↑	↑
-123	1-3/16 × 1-3/8	↑	↑	↑	↑
-124	1-1/4 × 1-7/16	↑	↑	↑	↑
-125	1-5/16 × 1-1/2	↑	↑	↑	↑
-126	1-3/8 × 1-9/16	↑	↑	↑	↑
-127	1-7/16 × 1-5/8	↑	↑	↑	↑
-128	1-1/2 × 1-11/16	↑	↑	↑	↑
-129	1-9/16 × 1-3/4	↑	↑	↑	↑
-130	1-5/8 × 1-13/16	↑	↑	↑	↑
-131	1-11/16 × 1-7/8	↑	↑	↑	↑
-132	1-3/4 × 1-15/16	↑	↑	↑	↑
-133	1-13/16 × 2	.040	.003	.086	.003

Part N°. 19- 19/Ro. 19Pi.	Nominal Dim.	T	Tol ±.	W	Tol ±.
-134	1-7/8 × 2-1/16	.040	.003	.086	.003
-135	1-15/16 × 2-1/8	↑	↑	↑	↑
-136	2 × 2-3/16	↑	↑	↑	↑
-137	2-1/16 × 2-1/4	↑	↑	↑	↑
-138	2-1/8 × 2-5/16	↑	↑	↑	↑
-139	2-3/16 × 2-3/8	↑	↑	↑	↑
-140	2-1/4 × 2-7/16	↑	↑	↑	↑
-141	2-5/16 × 2-1/2	↑	↑	↑	↑
-142	2-3/8 × 2-9/16	↑	↑	↑	↑
-143	2-7/16 × 2-5/8	↑	↑	↑	↑
-144	2-1/2 × 2-11/16	↑	↑	↑	↑
-145	2-9/16 × 2-3/4	↑	↑	↑	↑
-146	2-5/8 × 2-13/16	↑	↑	↑	↑
-147	2-11/16 × 2-7/8	↑	↑	↑	↑
-148	2-3/4 × 2-15/16	↑	↑	↑	↑
-149	2-13/16 × 3	↑	↑	↑	↑
-150	2-7/8 × 3-1/16	↑	↑	↑	↑
-151	3 × 3-3/16	↑	↑	↑	↑
-152	3-1/4 × 3-7/16	↑	↑	↑	↑
-153	3-1/2 × 3-11/16	↑	↑	↑	↑
-154	3-3/4 × 3-15/16	↑	↑	↑	↑
-155	4 × 4-3/16	↑	↑	↑	↑
-156	4-1/4 × 4-7/16	↑	↑	↑	↑
-157	4-1/2 × 4-11/16	↑	↑	↑	↑
-158	4-3/4 × 4-15/16	↑	↑	↑	↑
-159	5 × 5-3/16	↑	↑	↑	↑
-160	5-1/4 × 5-7/16	↑	↑	↑	↑
-161	5-1/2 × 5-11/16	↑	↑	↑	↑
-162	5-3/4 × 5-15/16	↑	↑	↑	↑
-163	6 × 6-3/16	↑	↑	↑	↑
-164	6-1/4 × 6-7/16	↑	↑	↑	↑
-165	6-1/2 × 6-11/16	↑	↑	↑	↑
-166	6-3/4 × 6-15/16	↑	↑	↑	↑
-167	7 × 7-3/16	↑	↑	↑	↑
-168	7-1/4 × 7-7/16	↑	↑	↑	↑
-169	7-1/2 × 7-11/16	↑	↑	↑	↑
-170	7-3/4 × 7-15/16	↑	↑	↑	↑
-171	8 × 8-3/16	↑	↑	↑	↑
-172	8-1/4 × 8-7/16	↑	↑	↑	↑
-173	8-1/2 × 8-11/16	↑	↑	↑	↑
-174	8-3/4 × 8-15/16	↑	↑	↑	↑
-175	9 × 9-3/16	↑	↑	↑	↑
-176	9-1/4 × 9-7/16	↑	↑	↑	↑
-177	9-1/2 × 9-11/16	↑	↑	↑	↑
-178	9-3/4 × 9-15/16	.040	.003	.086	.003
-205	7/16 × 11/16	.040	.003	.118	.004
-206	1/2 × 3/4	↑	↑	↑	↑
-207	9/16 × 13/16	↑	↑	↑	↑
-208	5/8 × 7/8	↑	↑	↑	↑
-209	11/16 × 15/16	↑	↑	↑	↑
-210	3/4 × 1	↑	↑	↑	↑
-211	13/16 × 1-1/16	↑	↑	↑	↑
-212	7/8 × 1-1/8	↑	↑	↑	↑
-213	15/16 × 1-3/16	↑	↑	↑	↑
-214	1 × 1-1/4	↑	↑	↑	↑
-215	1-1/16 × 1-5/16	↑	↑	↑	↑
-216	1-1/8 × 1-3/8	↑	↑	↑	↑
-217	1-3/16 × 1-7/16	↑	↑	↑	↑
-218	1-1/4 × 1-1/2	↑	↑	↑	↑
-219	1-5/16 × 1-9/16	↑	↑	↑	↑
-220	1-3/8 × 1-5/8	.040	.003	.118	.004

UNIVERSAL SEAL INC.

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BACK UP WASHERS

SERIES 19 (Inch Sizes)

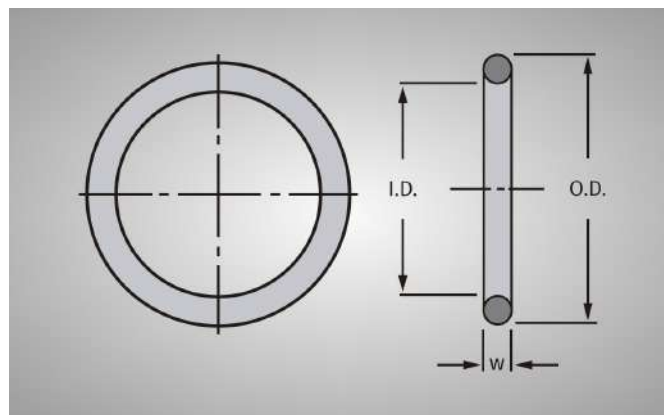


O'RINGS

Series 20 (Inch Sizes)

14





CHARACTERISTICS

Series 20 polyurethane 'O'-rings are rugged, versatile seals, suitable for both dynamic and static sealing applications. They are manufactured from thermo-setting liquid cast polyurethane of **92A** Durometer, and have exceptionally good abrasion resistant and extrusion resistant qualities. Polyurethane normally gives up to 10 times the service of nitrile rubber.

Their consistent quality exceeds the standards recommended for 'O'-rings by the American "Rubber Manufacturers Association".

The suggested temperature and pressure limits are: -40 to $+195^{\circ}\text{F}$ and 0-5,000 PSI, respectively.

DYNAMIC SEALING APPLICATIONS

'O'-rings are often used as rod or piston seals in hydraulic and pneumatic cylinders. The 'O'-ring must be installed in a rectangular groove with the correct radial squeeze (see Table 1, overleaf).

NOTE:

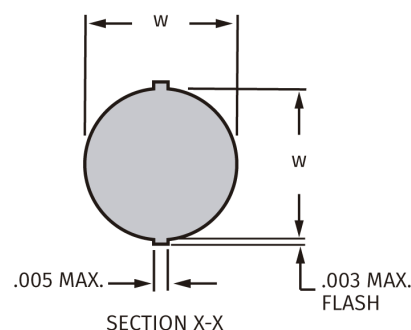
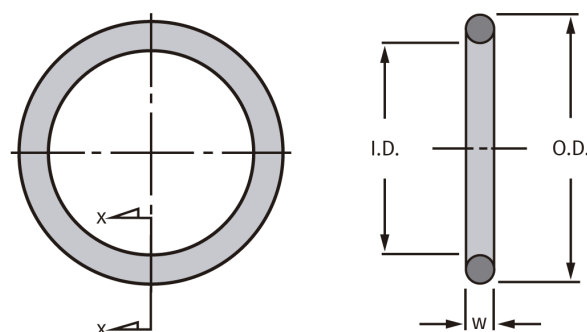
For static face seal applications see also Series 11 Flange seals, Technical Bulletin UFS- 96

MATERIAL

- TYPE: Unithane **292A** Liquid Cast Polyurethane.
- HARDNESS: Durometer **92A**
- FLUID COMPATABILITY: See 'Material Specifications', Technical Bulletin US-96

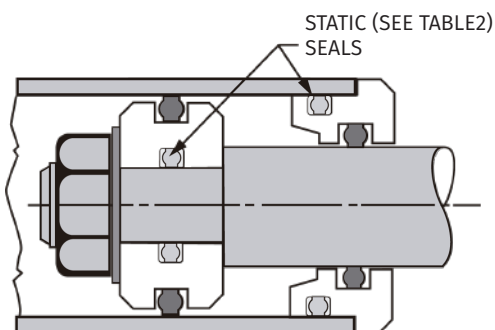
STATIC SEALING APPLICATIONS

'O'-rings may also be used as static seals, in flange connections, covers, pins, bolts, etc. The hard polyurethane material makes these 'O'-rings especially suitable for applications with high or pulsating pressures. Correct gland dimensions are important for effective sealing (see Table 2, overleaf).



RADIAL SQUEEZE SEALS

INDUSTRIAL RECIPROCATING 'O'-RING GLANDS



GROOVE DETAIL

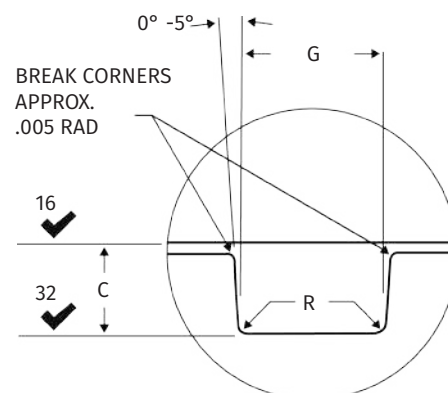
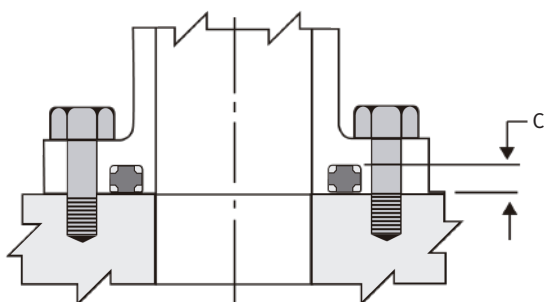


TABLE 1

O-Ring Part N°. 20-	W O-Ring Cross Section	C Gland Depth	Squeeze		G Groove Width	R Groove Radius
			Inches	%		
-008 thru -050	.070 ± .003	.055-.057	.010-.018	15-25	.090/100	.005-.015
-102 thru -178	.103 ± .003	.087-.090	.010-.019	10-18	.140/150	.005-.020
-201 thru -278	.139 ± .004	.119-.123	.012-.024	9-17	.190/200	.005-.030
-309 thru -380	.210 ± .005	.183-.188	.017-.032	8.5-15	.280/.290	.005-.050
-452 thru -452	.275 ± .006	.234-.240	.029-.047	10.5-17	.380/.390	.005-.060

AXIAL SQUEEZE SEAL

INDUSTRIAL STATIC SEAL 'O'-RING GLANDS



GROOVE DETAIL

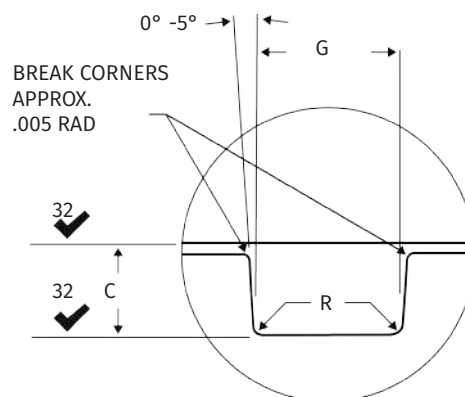


TABLE 2

O-Ring Part N° . 20-	W O-Ring Cross Section	C Gland Depth		Squeeze				G Groove Width	R Groove Radius
				Radial		Axial			
		Radial	Axial	Inches	%	Inches	%		
.008 thru -.050	.070 ± .003	.049-.055	.045-.050	.012-.014	18-19	.017-.028	25.5-38.5	.090/100	.005-.015
.102 thru -.178	.103 ± .003	.080-.086	.072-.080	.014-.026	13.5-25	.020-.034	20-32	.140/150	.005-.020
.201 thru -.278	.139 ± .004	.112-.118	.100-.110	.017-.031	12.5-29	.025-.043	18.5-30	.190/200	.500-.030
.309 thru -.380	.210 ± .005	.176-.184	.165-.175	.021-.039	10-18	.030-.050	14.5-23	.280/290	.005-.050
.425 thru -.452	.275 ± .006	.225-.235	.220-.230	.034-.056	12.5-20	.039-.061	14.5-21.5	.380/390	.005-.060

Part N° 20.	Fractional Dimensions			Actual Dimensions				
	I.D.	O.D.	W.	I.D.	Tol. +-	W.	Tol. +-	O.D. (Ref)
-008	3/16	5/16	1/16	.176	.005	.070	.003	.316
-009	7/32	11/32	1/16	.208	.005	.070	.003	.348
-010	1/4	3/8	1/16	.239	.005	.070	.003	.379
-011	5/16	7/16	1/16	.301	.005	.070	.003	.441
-012	3/8	1/2	1/16	.364	.005	.070	.003	.504
-013	7/16	9/16	1/16	.426	.005	.070	.003	.566
-014	1/2	5/8	1/16	.489	.005	.070	.003	.629
-015	9/16	11/16	1/16	.551	.005	.070	.003	.691
-016	5/8	3/4	1/16	.614	.005	.070	.003	.754
-017	11/16	13/16	1/16	.676	.005	.070	.003	.816
-018	3/4	7/8	1/16	.739	.005	.070	.003	.879
-019	13/16	15/16	1/16	.801	.006	.070	.003	.941
-020	7/8	1	1/16	.864	.006	.070	.003	1.004
-021	15/16	1-1/16	1/16	.926	.006	.070	.003	1.066
-022	1	1-1/8	1/16	.989	.006	.070	.003	1.129
-023	1-1/16	1-3/16	1/16	1.051	.006	.070	.003	1.191
-024	1-1/8	1-1/4	1/16	1.114	.006	.070	.003	1.254
-025	1-3/16	1-5/16	1/16	1.176	.006	.070	.003	1.1316
-026	1-1/4	1-3/8	1/16	1.239	.006	.070	.003	1.1379
-027	1-5/16	1-7/16	1/16	1.301	.006	.070	.003	1.441
-028	1-3/8	1-1/2	1/16	1.364	.006	.070	.003	1.504
-029	1-1/2	1-5/8	1/16	1.489	.010	.070	.003	1.629
-030	1-5/8	1-3/4	1/16	1.614	.010	.070	.003	1.754
-031	1-3/4	1-7/8	1/16	1.739	.010	.070	.003	1.879
-032	1-7/8	2	1/16	1.864	.010	.070	.003	2.004
-033	2	2-1/8	1/16	1.989	.010	.070	.003	2.129
-034	2-1/8	2-1/4	1/16	2.114	.010	.070	.003	2.254
-035	2-1/4	2-3/8	1/16	2.239	.010	.070	.003	2.379
-036	2-3/8	2-1/2	1/16	2.364	.010	.070	.003	2.504
-037	2-1/2	2-5/8	1/16	2.489	.010	.070	.003	2.629
-038	2-5/8	2-3/4	1/16	2.614	.010	.070	.003	2.754
-039	2-3/4	2-7/8	1/16	2.739	.015	.070	.003	2.879
-040	2-7/8	3	1/16	2.864	.015	.070	.003	3.004
-041	3	3-1/8	1/16	2.989	.015	.070	.003	3.129
-042	3-1/4	3-3/8	1/16	3.239	.015	.070	.003	3.379
-043	3-1/2	3-5/8	1/16	3.489	.015	.070	.003	3.629
-044	3-3/4	3-7/8	1/16	3.739	.015	.070	.003	3.879
-045	4	4-1/8	1/16	3.989	.015	.070	.003	4.129
-046	4-1/4	4-3/8	1/16	4.239	.015	.070	.003	4.379
-047	4-1/2	4-5/8	1/16	4.489	.015	.070	.003	4.629

Part N° 20.	Fractional Dimensions			Actual Dimensions				
	I.D.	O.D.	W.	I.D.	Tol. +-	W.	Tol. +-	O.D. (Ref)
-048	4-3/4	4-7/8	1/16	4.739	.015	.070	.003	4.879
-049	5	5-1/8	1/16	4.989	.023	.070	.003	5.129
-050	5-1/4	5-3/8	1/16	5.239	.023	.070	.003	5.379
-104	1/8	5/16	3/32	.112	.005	.003	.003	.318
-105	5/32	11/32	3/32	.143	.005	.003	.003	.349
-106	3/16	3/8	3/32	.174	.005	.003	.003	.380
-107	7/32	13/32	3/32	.206	.005	.003	.003	.412
-108	1/4	7/16	3/32	.237	.005	.003	.003	.443
-109	5/16	1/2	3/32	.299	.005	.003	.003	.505
-110	3/8	9/16	3/32	.362	.005	.003	.003	.568
-111	7/16	5/8	3/32	.424	.005	.003	.003	.630
-112	1/2	11/16	3/32	.487	.005	.003	.003	.693
-113	9/16	3/4	3/32	.549	.005	.003	.003	.775
-114	5/8	13/16	3/32	.612	.005	.003	.003	.818
-115	11/16	7/8	3/32	.674	.005	.003	.003	.880
-116	3/4	15/16	3/32	.737	.005	.003	.003	.943
-117	13/16	1	3/32	.799	.006	.003	.003	1.005
-118	7/8	1-1/16	3/32	.862	.006	.003	.003	1.068
-119	15/16	1-1/8	3/32	.924	.006	.003	.003	1.130
-120	1	1-3/16	3/32	.987	.006	.003	.003	1.193
-121	1-1/16	1-1/4	3/32	1.049	.006	.003	.003	1.255
-122	1-1/8	1-5/16	3/32	1.112	.006	.003	.003	1.318
-123	1-3/16	1-3/8	3/32	1.174	.006	.003	.003	1.380
-124	1-1/4	1-7/16	3/32	1.237	.006	.003	.003	1.443
-125	1-5/16	1-1/2	3/32	1.299	.006	.003	.003	1.505
-126	1-3/8	1-9/16	3/32	1.362	.006	.003	.003	1.568
-127	1-7/16	1-5/8	3/32	1.424	.006	.003	.003	1.630
-128	1-1/2	1-11/16	3/32	1.487	.006	.003	.003	1.693
-129	1-9/16	1-3/4	3/32	1.549	.010	.003	.003	1.755
-130	1-5/8	1-13/16	3/32	1.612	.010	.003	.003	1.818
-131	1-11/16	1-7/8	3/32	1.674	.010	.003	.003	1.880
-132	1-3/4	1-15/16	3/32	1.737	.010	.003	.003	1.943
-133	1-13/16	2	3/32	1.799	.010	.003	.003	2.005
-134	1-7/8	2-1/16	3/32	1.862	.010	.003	.003	2.068
-135	1-15/16	2-1/8	3/32	1.925	.010	.003	.003	2.131
-136	2	2-3/16	3/32	1.987	.010	.003	.003	2.193
-137	2-1/16	2-1/4	3/32	2.050	.010	.003	.003	2.256
-138	2-1/8	2-5/16	3/32	2.112	.010	.003	.003	2.318
-139	2-3/16	2-3/8	3/32	2.175	.010	.003	.003	2.381
-140	2-1/4	2-7/16	3/32	2.237	.010	.003	.003	2.443

Part N° 20.	Fractional Dimensions			Actual Dimensions				
	I.D.	O.D.	W.	I.D.	Tol. +-	W.	Tol. +-	O.D. (Ref)
-141	2-5/16	2-1/2	3/32	2.300	.010	.103	.003	2.506
-142	2-3/8	2-9/16	3/32	2.362	.010	.103	.003	2.568
-143	2-7/16	2-5/8	3/32	2.425	.010	.103	.003	2.631
-144	2-1/2	2-11/16	3/32	2.487	.010	.103	.003	2.693
-145	2-9/16	2-3/4	3/32	2.550	.010	.103	.003	2.756
-146	2-5/8	2-13/16	3/32	2.612	.010	.103	.003	2.818
-147	2-11/16	2-7/8	3/32	2.675	.015	.103	.003	2.881
-148	2-3/4	2-15/16	3/32	2.737	.015	.103	.003	2.943
-149	2-13/16	3	3/32	2.800	.015	.103	.003	3.006
-150	2-7/8	3-1/16	3/32	2.862	.015	.103	.003	3.068
-151	3	3-3/16	3/32	2.987	.015	.103	.003	3.193
-152	3-1/2	3-7/16	3/32	3.237	.015	.103	.003	3.443
-153	3-1/2	3-11/16	3/32	3.487	.015	.103	.003	3.693
-154	3-3/4	3-15/16	3/32	3.737	.015	.103	.003	3.943
-155	4	4-3/16	3/32	3.987	.015	.103	.003	4.193
-156	4-1/2	4-7/16	3/32	4.237	.015	.103	.003	4.443
-157	4-1/4	4-11/16	3/32	4.487	.015	.103	.003	4.693
-158	4-3/4	4-15/16	3/32	4.737	.015	.103	.003	4.943
-159	5	5-3/16	3/32	4.987	.015	.103	.003	5.193
-160	5-1/4	5-7/16	3/32	5.237	.023	.103	.003	5.443
-161	5-1/2	5-11/16	3/32	5.487	.023	.103	.003	5.693
-162	5-3/4	5-15/16	3/32	5.737	.023	.103	.003	5.943
-163	6	6-3/16	3/32	5.987	.023	.103	.003	6.193
-164	6-1/4	6-7/16	3/32	6.237	.023	.103	.003	6.443
-165	6-1/2	6-11/16	3/32	6.487	.023	.103	.003	6.693
-166	6-3/4	6-15/16	3/32	6.737	.023	.103	.003	6.943
-167	7	7-3/16	3/32	6.987	.023	.103	.003	7.193
-168	7-1/4	7-7/16	3/32	7.237	.030	.103	.003	7.443
-169	7-1/2	7-11/16	3/32	7.487	.030	.103	.003	7.693
-170	7-3/4	7-15/16	3/32	7.737	.030	.103	.003	7.943
-171	8	8-3/16	3/32	7.987	.030	.103	.003	8.193
-201	3/16	7/16	1/8	.171	.005	.139	.004	.449
-202	1/4	1/2	1/8	.234	.005	.139	.004	.512
-203	5/16	9/16	1/8	.296	.005	.139	.004	.574
-204	3/8	5/8	1/8	.359	.005	.139	.004	.637
-205	7/16	11/16	1/8	.421	.005	.139	.004	.699
-206	1/2	3/4	1/8	.484	.005	.139	.004	.762
-207	9/16	13/16	1/8	.546	.005	.139	.004	.824
-208	5/8	7/8	1/8	.609	.005	.139	.004	.887

Part N° 20.	Fractional Dimensions			Actual Dimensions				
	I.D.	O.D.	W.	I.D.	Tol. +-	W.	Tol. +-	O.D. (Ref)
-209	11/16	15/16	1/8	.671	.005	.139	.004	.949
-210	3/4	1	1/8	.734	.006	.139	.004	1.012
-211	13/16	1-1/16	1/8	.796	.006	.139	.004	1.074
-212	7/8	1-1/8	1/8	.859	.006	.139	.004	1.137
-213	15/16	1-3/16	1/8	.921	.006	.139	.004	1.199
-214	1	1-1/4	1/8	.984	.006	.139	.004	1.262
-215	1-1/16	1-5/6	1/8	1.046	.006	.139	.004	1.324
-216	1-1/8	1-3/8	1/8	1.109	.006	.139	.004	1.387
-217	1-3/16	1-7/16	1/8	1.171	.006	.139	.004	1.449
-218	1-1/4	1-1/2	1/8	1.234	.006	.139	.004	1.512
-219	1-5/16	1-9/16	1/8	1.296	.006	.139	.004	1.574
-220	1-3/8	1-5/8	1/8	1.359	.006	.139	.004	1.637
-221	1-7/16	1-11/16	1/8	1.421	.006	.139	.004	1.699
-222	1-1/2	1-3/4	1/8	1.484	.006	.139	.004	1.762
-223	1-5/8	1-7/8	1/8	1.609	.010	.139	.004	1.887
-224	1-3/4	2	1/8	1.734	.010	.139	.004	2.012
-225	1-7/8	2-1/8	1/8	1.859	.010	.139	.004	2.137
-226	2	2-1/4	1/8	1.984	.010	.139	.004	2.262
-227	2-1/8	2-3/8	1/8	2.109	.010	.139	.004	2.387
-228	2-1/4	2-1/2	1/8	2.234	.010	.139	.004	2.512
-229	2-3/8	2-5/8	1/8	2.359	.010	.139	.004	2.637
-230	2-1/2	2-3/4	1/4	2.484	.010	.139	.004	2.762
-231	2-5/8	2-7/8	1/8	2.609	.010	.139	.004	2.887
-232	2-3/4	3	1/8	2.734	.015	.139	.004	3.012
-233	2-7/8	3-1/8	1/8	2.859	.015	.139	.004	3.137
-234	3	3-1/4	1/8	2.984	.015	.139	.004	3.262
-235	3-1/8	3-3/8	1/8	3.109	.015	.139	.004	3.387
-236	3-1/4	3-1/2	1/8	3.234	.015	.139	.004	3.512
-237	3-3/8	3-5/8	1/8	3.359	.015	.139	.004	3.637
-238	3-1/2	3-3/4	1/8	3.484	.015	.139	.004	3.762
-239	3-5/8	3-7/8	1/8	3.609	.015	.139	.004	3.887
-240	3-3/4	4	1/8	3.734	.015	.139	.004	4.012
-241	3-7/8	4-1/8	1/8	3.859	.015	.139	.004	4.137
-242	4	4-1/4	1/8	3.984	.015	.139	.004	4.262
-243	4-1/8	4-3/8	1/8	4.109	.015	.139	.004	4.387
-244	4-1/4	4-1/2	1/8	4.234	.015	.139	.004	4.512
-245	4-3/8	4-5/8	1/8	4.359	.015	.139	.004	4.637
-246	4-1/2	4-3/4	1/8	4.484	.015	.139	.004	4.762
-247	4-5/8	4-7/8	1/8	4.609	.015	.139	.004	4.887
-248	4-3/4	5	1/8	4.734	.015	.139	.004	5.012
-249	4-7/8	5-1/8	1/8	4.859	.015	.139	.004	5.137
-250	5	5-1/4	1/8	4.984	.015	.139	.004	5.262
-251	5-1/8	5-3/8	1/8	5.109	.023	.139	.004	5.387
-252	5-1/4	5-1/2	1/8	5.234	.023	.139	.004	5.512
-253	5-3/8	5-5/8	1/8	5.359	.023	.139	.004	5.637
-254	5-1/2	5-3/4	1/8	5.484	.023	.139	.004	5.762

Part N° 20.	Fractional Dimensions			Actual Dimensions				
	I.D.	O.D.	W.	I.D.	Tol. +-	W.	Tol. +-	O.D. (Ref)
-255	5-5/8	5-7/8	1/8	5.609	.023	.139	.004	5.887
-256	5-3/4	6	1/8	5.734	.023	.139	.004	6.012
-257	5-7/8	6-1/8	1/8	5.859	.023	.139	.004	6.137
-258	6	6-1/4	1/8	5.984	.023	.139	.004	6.262
-259	6-1/4	6-1/2	1/8	6.234	.023	.139	.004	6.512
-260	6-1/2	6-3/4	1/8	6.484	.023	.139	.004	6.762
-261	6-3/4	7	1/8	6.734	.023	.139	.004	7.012
-262	7	7-1/4	1/8	6.984	.023	.139	.004	7.262
-263	7-1/4	7-1/2	1/8	7.234	.030	.139	.004	7.512
-264	7-1/2	7-3/4	1/8	7.484	.030	.139	.004	7.762
-265	7-3/4	8	1/8	7.734	.030	.139	.004	8.012
-309	7/16	13/16	3/16	.412	.005	.210	.005	.832
-310	1/2	7/8	3/16	.475	.005	.210	.005	.895
-311	9/16	15/16	3/16	.537	.005	.210	.005	.957
-312	5/8	1	3/16	.600	.005	.210	.005	1.020
-313	11/16	1-1/16	3/16	.662	.005	.210	.005	1.082
-314	3/4	1-1/8	3/16	.725	.006	.210	.005	1.145
-315	13/16	1-3/16	3/16	.787	.006	.210	.005	1.207
-316	7/8	1-1/4	3/16	.850	.006	.210	.005	1.270
-317	15/16	1-5/16	3/16	.912	.006	.210	.005	1.332
-318	1	1-3/8	3/16	.975	.006	.210	.005	1.395
-319	1-1/16	1-7/16	3/16	1.037	.006	.210	.005	1.457
-320	1-1/8	1-1/2	3/16	1.100	.006	.210	.005	1.520
-321	1-3/16	1-9/16	3/16	1.162	.006	.210	.005	1.582
-322	1-1/4	1-5/8	3/16	1.225	.006	.210	.005	1.645
-323	1-5/16	1-11/16	3/16	1.287	.006	.210	.005	1.707
-324	1-3/8	1-3/4	3/16	1.350	.006	.210	.005	1.770
-325	1-1/2	1-7/8	3/16	1.475	.010	.210	.005	1.895
-326	1-5/8	2	3/16	1.600	.010	.210	.005	2.020
-327	1-3/4	2-1/8	3/16	1.725	.010	.210	.005	2.145
-328	1-7/8	2-1/4	3/16	1.850	.010	.210	.005	2.270
-329	2	2-3/8	3/16	1.975	.010	.210	.005	2.395
-330	2-1/8	2-1/2	3/16	2.100	.010	.210	.005	2.520

Part N° 20.	Fractional Dimensions			Actual Dimensions				
	I.D.	O.D.	W.	I.D.	Tol. +-	W.	Tol. +-	O.D. (Ref)
-331	2-1/4	2-5/8	3/16	2.225	.010	.210	.005	2.645
-332	2-3/8	2-3/4	3/16	2.350	.010	.210	.005	2.770
-333	2-1/2	2-7/8	3/16	2.475	.010	.210	.005	2.895
-334	2-5/3	3	3/16	2.600	.010	.210	.005	3.020
-333	2-3/4	3-1/8	3/16	2.725	.015	.210	.005	3.145
-336	2-7/8	3-1/4	3/16	2.850	.015	.210	.005	3.270
-337	3	3-3/8	3/16	2.975	.015	.210	.005	3.395
-338	3-1/8	3-1/2	3/16	3.100	.015	.210	.005	3.520
-339	3-1/4	3-5/8	3/16	3.225	.015	.210	.005	3.645
-340	3-3/8	3-3/4	3/16	3.350	.015	.210	.005	3.770
-341	3-1/2	3-7/8	3/16	3.475	.015	.210	.005	3.895
-342	3-5/8	4	3/16	3.600	.015	.210	.005	4.020
-343	3-3/4	4-1/8	3/16	3.725	.015	.210	.005	4.145
-344	3-7/8	4-1/4	3/16	3.850	.015	.210	.005	4.270
-345	4	4-3/8	3/16	3.975	.015	.210	.005	4.395
-346	4-1/8	4-1/2	3/16	4.100	.015	.210	.005	4.520
-347	4-1/4	4-5/8	3/16	4.225	.015	.210	.005	4.645
-348	4-3/8	4-3/4	3/16	4.350	.015	.210	.005	4.770
-349	4-1/2	4-7/8	3/16	4.475	.015	.210	.005	4.895
-350	4-5/8	5	3/16	4.600	.015	.210	.005	5.020
-351	4-3/4	5-1/8	3/16	4.725	.015	.210	.005	5.145
-352	4-7/8	5-1/4	3/16	4.850	.015	.210	.005	5.270
-353	5	5-3/8	3/16	4.975	.015	.210	.005	5.395
-354	5-1/8	5-1/2	3/16	5.100	.023	.210	.005	5.520
-355	5-1/4	5-5/8	3/16	5.225	.023	.210	.005	5.645
-356	5-3/8	5-3/4	3/16	5.350	.023	.210	.005	5.770
-357	5-1/2	5-7/8	3/16	5.475	.023	.210	.005	5.895
-358	5-5/8	6	3/16	5.600	.023	.210	.005	6.020
-359	5-3/4	6-1/8	3/16	5.725	.023	.210	.005	6.145
-360	5-7/8	6-1/4	3/16	5.850	.023	.210	.005	6.270
-361	6	6-3/8	3/16	5.975	.023	.210	.005	6.395
-362	6-1/4	6-5/8	3/16	6.225	.023	.210	.005	6.645
-363	6-1/2	6-7/8	3/16	6.475	.023	.210	.005	6.895
-364	6-3/4	7-1/8	3/16	6.725	.023	.210	.005	7.145
-365	7	7-3/8	3/16	6.975	.023	.210	.005	7.395
-366	7-1/4	7-5/8	3/16	7.225	.030	.210	.005	7.645
-367	7 1/2	7-7/8	3/16	7.475	.030	.210	.005	7.895
-368	7-3/4	8-1/8	3/16	7.725	.030	.210	.005	8.145

Part N° 20.	Fractional Dimensions			Actual Dimensions				
	I.D.	O.D.	W.	I.D.	Tol. +-	W.	Tol. +-	O.D. (Ref)
-377	10	10-3/8	3/16	9.975	.030	.210	.005	10.395
-378	10-1/2	10-7/8	3/16	10.475	.030	.210	.005	10.895
-379	11	11-3/8	3/16	10.975	.030	.210	.005	11.395
-380	11-1/2	11-7/8	3/16	11.475	.030	.210	.005	11.895
-425	4-1/2	5	1/4	4.475	.015	.275	.006	5.025
-426	4-5/8	5-1/8	1/4	4.600	.015	.275	.006	5.150
-427	4-3/4	5-1/4	1/4	4.725	.015	.275	.006	5.275
-428	4-7/8	5-3/8	1/4	4.850	.015	.275	.006	5.400
-429	5	5-1/2	1/4	4.975	.015	.275	.006	5.525
-430	5-1/8	5-5/8	1/4	5.100	.023	.275	.006	5.650
-431	5-1/4	5-3/4	1/4	5.225	.023	.275	.006	5.775
-432	5-3/8	5-7/8	1/4	5.350	.023	.275	.006	5.900
-433	5-1/2	6	1/4	5.475	.023	.275	.006	6.025
-434	5-5/8	6-1/8	1/4	5.600	.023	.275	.006	6.150
-435	5-3/4	6-1/4	1/4	5.725	.023	.275	.006	6.275
-436	5-7/8	6-3/8	1/4	5.850	.023	.275	.006	6.400

Part N° 20.	Fractional Dimensions			Actual Dimensions				
	I.D.	O.D.	W.	I.D.	Tol. +-	W.	Tol. +-	O.D. (Ref)
-437	6	6-1/2	1/4	5.975	.023	.275	.006	6.525
-438	6-1/4	6-3/4	1/4	6.225	.023	.275	.006	6.775
-439	6-1/2	7	1/4	6.475	.023	.275	.006	7.025
-440	6-3/4	7-1/4	1/4	6.725	.023	.275	.006	7.275
-441	7	7-1/2	1/4	6.975	.023	.275	.006	7.525
-442	7-1/4	7-3/4	1/4	7.225	.023	.275	.006	7.775
-443	7-1/2	8	1/4	7.475	.023	.275	.006	8.025

Part N° .20.	Fractional Dimensions			Actual Dimensions		
	I.D.	O.D.	W.	I.D.	Tol. +-	W.
-901	.185	.005	.056	.003	.297	3/32
-902	.239	.005	.064	.003	.367	1/8
-903	.301	.005	.064	.003	.429	3/16
-904	.351	.005	.072	.003	.495	1/4
-905	.414	.005	.072	.003	.558	5/16
-906	.468	.005	.078	.003	.624	3/8
-907	.530	.005	.082	.003	.694	7/16
-908	.644	.005	.087	.003	.818	1/2
-909	.706	.005	.097	.003	.900	9/16
-910	.755	.005	.097	.003	.949	5/8
-911	.863	.005	.116	.004	1.095	11/16
-912	.924	.006	.116	.004	1.156	3/4
-913	.986	.006	.116	.004	1.218	13/16
-914	1.047	.006	.116	.004	1.279	7/8
-916	1.171	.006	.116	.004	1.403	1
-918	1.355	.006	.116	.004	1.587	1-1/8
-920	1.475	.010	.118	.004	1.711	1-1/4
-924	1.720	.010	.118	.004	1.965	1-1/2
-928	2.090	.010	.118	.004	2.326	1-3/4
-932	2.337	.010	.118	.004	2.573	2

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O'RINGS

SERIES 20 (Inch Sizes)

UNIVERSAL SEAL INC.

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INCHES ROD WIPERS

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15. MEDIUM DUTY ROD WIPERS

Series 50 (Inch Sizes)

16. HEAVY DUTY ROD WIPERS

Series 52 (Inch Sizes)





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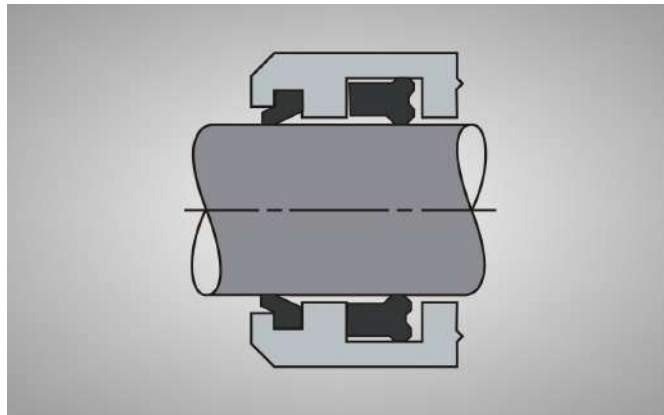
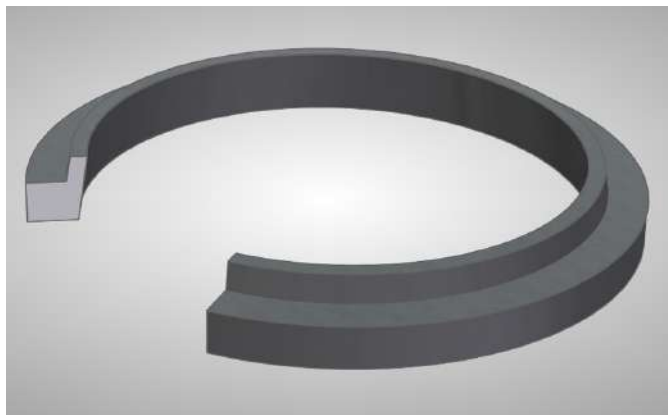
MEDIUM DUTY ROD WIPERS

Series 50 (Inch Sizes)

15

ROD WIPERS





CHARACTERISTICS

ROD WIPERS or EXCLUSION SEALS, prevent the drawing of foreign matter into the cylinder or the ingoing stroke, Abrasive particles adhering to the rod will cause rapid wear to the Gland Seal if they are not effectively excluded. The SERIES 50 MEDIUM DUTY ROD WIPER has proved itself over many years of service in a variety of industrial and farm equipment applications.

It is manufactured from **95A** Durometer, liquid cast polyurethane. The exceptional abrasion resistant qualities of this material ensure over five times the service life of most rubber wipers.

The cross sectional profile is designed to provide a clean wiping action with a light preload condition for long life.

Installation of the wiper is just a matter of snapping into a simple groove.

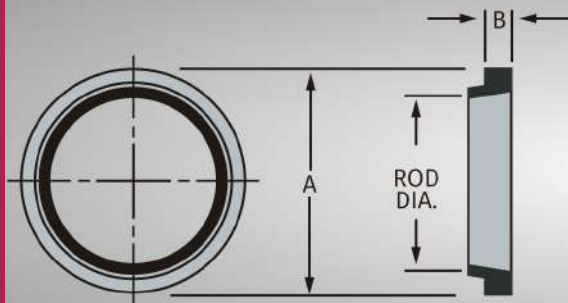
MATERIAL

- TYPE: Unithane **395A**, Liquid Cast Polyurethane.
- HARDNESS: Durometer **95A**
- CHEMICAL COMPATABILITY See 'Material Specifications', Technical Bulletin US -96

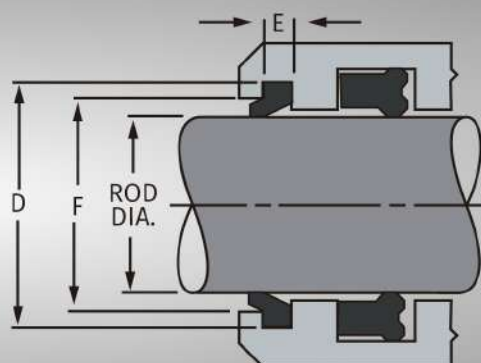
NOTE

For Heavy Duty applications refer to Technical Bulletin UHW-96, 'Series 52 Heavy Duty Rod Wipers'

SEAL DIMENSIONS



GROOVE DIMENSIONS



MEDIUM DUTY ROD WIPERS

SERIES 50 (Inch Sizes)



Part. N° 50-	Rod Dia..	Seal Dimensions		Groove Dimensions		
		A	B	D Dia. +.004 -.000	E + -.003	F Dia. +.005 -.003
-1	1/2	0.766	.104	0.760	.107	0.647
-2	9/16	0.829	.104	0.823	.107	0.710
-3	5/8	0.891	.104	0.885	.107	0.772
-4	11/16	0.954	.104	0.948	.107	0.839
-5	3/4	1.016	.104	1.010	.107	0.897
-6	13/16	1.090	.104	1.086	.107	0.960
-7	7/8	1.153	.104	1.148	.107	1.023
-8	15/16	1.215	.104	1.210	.107	1.085
-9	1	1.278	.104	1.273	.107	1.148
-10	1-1/16	1.340	.104	1.335	.107	1.210
-11	1-1/8	1.403	.104	1.398	.107	1.273
-12	1-3/16	1.465	.104	1.460	.107	1.335
-13	1-1/4	1.528	.104	1.523	.107	1.398
-14	1-5/16	1.621	.104	1.614	.107	1.480
-15	1-3/8	1.684	.104	1.677	.107	1.542
-16	1-7/16	1.746	.104	1.739	.107	1.605
-17	1-1/2	1.809	.104	1.802	.107	1.668
-18	1-5/8	1.934	.104	1.927	.107	1.793
-19	1-3/4	2.059	.104	2.052	.107	1.918
-20	1-7/8	2.184	.104	2.177	.107	2.043
-21	2	2.309	.104	2.302	.107	2.178
-22	2-1/8	2.434	.104	2.427	.107	2.303
-23	2-1/4	2.559	.104	2.552	.107	2.428
-24	2-3/8	2.684	.104	2.677	.107	2.553
-25	2-1/2	2.809	.104	2.802	.107	2.678
-26	2-5/8	2.996	.119	2.989	.122	2.834
-27	2-3/4	3.121	.119	3.114	.122	2.959
-28	2-7/8	3.246	.119	3.239	.122	3.084
-29	3	3.372	.119	3.364	.122	3.209
-30	3-1/8	3.497	.119	3.489	.122	3.334
-31	3-1/4	3.622	.119	3.614	.122	3.459
-32	3-3/8	3.747	.119	3.739	.122	3.584

Part. N° 50-	Rod Dia..	Seal Dimensions		Groove Dimensions		
		A	B	D Dia. +.004 -.000	E + -.003	F Dia. +.005 -.003
-33	3-1/2	3.872	.119	3.864	.122	3.709
-34	3-5/8	3.997	.119	3.989	.122	3.834
-35	3-3/4	4.122	.119	4.114	.122	3.959
-36	3-7/8	4.246	.119	4.239	.122	4.084
-37	4	4.434	.135	4.427	.138	4.240
-38	4-1/8	4.560	.135	4.552	.138	4.365
-39	4-1/4	4.684	.135	4.677	.138	4.490
-40	4-3/8	4.810	.135	4.802	.138	4.615
-41	4-1/2	4.934	.135	4.927	.138	4.740
-42	4-5/8	5.060	.135	5.052	.138	4.865
-43	4-3/4	5.184	.135	5.177	.138	4.990
-44	4-7/8	5.310	.135	5.302	.138	5.115
-45	5	5.434	.135	5.427	.138	5.240
-46	5-1/8	5.560	.135	5.552	.138	5.365
-47	5-1/4	5.684	.135	5.677	.138	5.490
-48	5-3/8	5.810	.135	5.802	.138	5.615
-49	5-1/2	5.934	.151	5.927	.138	5.740
-50	5-5/8	6.122	.151	6.114	.154	5.896
-51	5-3/4	6.246	.151	6.239	.154	6.022
-52	5-7/8	6.372	.151	6.364	.154	6.146
-53	6	6.496	.151	6.489	.154	6.272
-54	6-1/4	6.746	.151	6.739	.154	6.522
-55	6-1/2	6.996	.151	6.989	.154	6.772
-56	6-3/4	7.246	.151	7.239	.154	7.022
-57	7	7.496	.151	7.489	.154	7.272
-58	7-1/4	7.746	.151	7.739	.154	7.522
-59	7-1/2	7.997	.151	7.989	.154	7.772
-60	7-3/4	8.247	.151	8.239	.154	8.022
-61	8	8.497	.151	8.489	.154	8.272
-62	8-1/2	8.997	.151	8.989	.154	8.772
-63	9	9.497	.151	9.489	.154	9.272
-64	9-1/2	9.997	.151	9.989	.154	9.772

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MEDIUM DUTY ROD WIPERS

SERIES 50 (Inch Sizes)



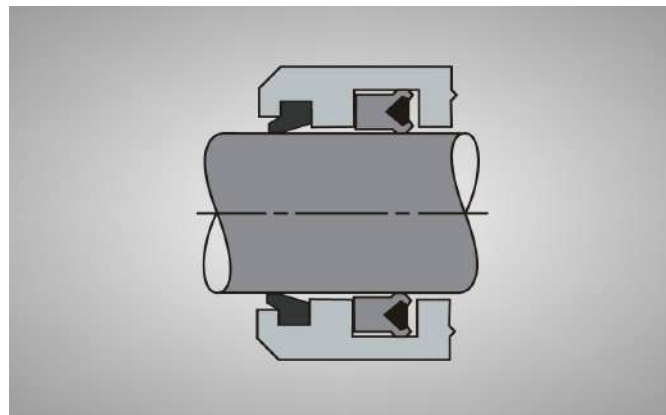
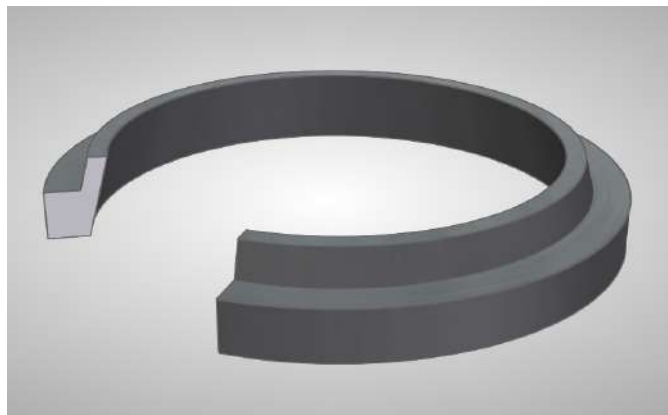
HEAVY DUTY ROD WIPERS

Series 52 (Inch Sizes)

16

ROD WIPPERS





CHARACTERISTICS

The 52 Series Wiper/Scraper is designed to remove the more aggressive contaminants encountered by heavy outdoor machinery such as earth moving equipment.

Its solid cross section profile and heavy duty lip with good interference on the rod, are its main features.

Combining these characteristics with the proven abrasion resistant qualities of liquid cast polyurethane, has resulted in a tough durable wiper able to handle the most severe service conditions.

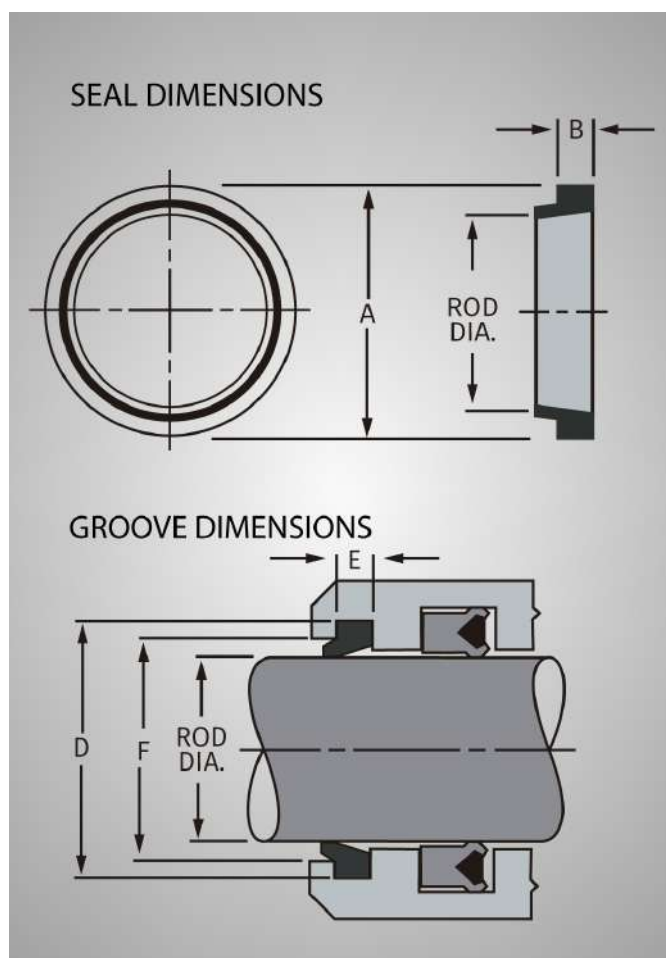
This wiper is available in a full range of sizes. It is installed by springing into a simple groove.

MATERIAL

- TYPE: Unithane 395A, Liquid Cast Polyurethane
- HARDNESS: Durometer 95A
- CHEMICAL COMPATABILITY: See 'Material Specifications', Technical Bulletin US -96

NOTE

For Medium Duty applications refer to Technical Bulletin UMW-96, 'Series 50 Medium Duty Rod Wipers'



HEAVY DUTY ROD WIPERS

SERIES 52 (Inch Sizes)



Part. N° 50-	Rod Dia..	Seal Dimensions		Groove Dimensions		
		A	B	D Dia. +.004 -.000	E + -.003	F Dia. +.005 -.003
-0437	7/16	11/16	1/8	0.685	.124	0.598
-0500	1/2	3/4	1/8	0.747	.124	0.660
-0562	9/16	13/16	1/8	0.810	.124	0.725
-0625	5/8	7/8	1/8	0.872	.124	0.785
-0687	11/16	15/16	1/8	0.935	.124	0.850
-0750	3/4	1-1/8	3/16	1.122	.187	0.995
-0812	13/16	1-3/16	3/16	1.185	.187	1.060
-0875	7/8	1-1/4	3/16	1.247	.187	1.120
-0937	15/16	1-5/16	3/16	1.310	.187	1.185
-1000	1	1-3/8	3/16	1.372	.187	1.245
-1062	1-1/16	1-7/16	3/16	1.435	.187	1.310
-1125	1-1/8	1-1/2	3/16	1.497	.187	1.370
-1187	1-3/16	1-9/16	3/16	1.560	.187	1.435
-1250	1-1/4	1-5/8	3/16	1.622	.187	1.495
-1312	1-5/16	1-11/16	3/16	1.685	.187	1.560
-1375	1-3/8	1-3/4	3/16	1.747	.187	1.620
-1437	1-7/16	1-13/16	3/16	1.810	.187	1.685
-1500	1-1/2	1-7/8	3/16	1.872	.187	1.745
-1562	1-9/16	1-15/16	3/16	1.935	.187	1.810
-1625	1-5/8	2	3/16	1.997	.187	1.870
-1687	1-11/16	2-1/16	3/16	2.060	.187	1.935
-1750	1-3/4	2-1/8	3/16	2.122	.187	1.995
-1812	1-13/16	2-3/16	3/16	2.185	.187	2.060
-1875	1-7/8	2-1/4	3/16	2.247	.187	2.120
-1937	1-15/16	2-5/16	3/16	2.310	.187	2.185
-2000	2	2-1/2	1/4	2.497	.247	2.327
-2062	2-1/16	2-9/16	1/4	2.560	.247	2.390
-2125	2-1/8	2-5/8	1/4	2.622	.247	2.452
-2187	2-3/16	2-11/16	1/4	2.685	.247	2.515
-2250	2-1/4	2-3/4	1/4	2.747	.247	2.577
-2312	2-5/16	2-13/16	1/4	2.810	.247	2.640
-2375	2-3/8	2-7/8	1/4	2.872	.247	2.702
-2437	2-7/16	2-15/16	1/4	2.935	.247	2.765
-2500	2-1/2	3	1/4	2.997	.247	2.827
-2562	2-9/16	3-1/16	1/4	3.060	.247	2.890
-2687	2-5/8	3-1/8	1/4	3.122	.247	2.952
-2687	2-11/16	3-3/16	1/4	3.185	.247	3.015
-2750	2-3/4	3-1/4	1/4	3.247	.247	3.077
-2812	2-13/16	3-5/16	1/4	3.310	.247	3.140
-2875	2-7/8	3-3/8	1/4	3.372	.247	3.202

Part. N° 50-	Rod Dia..	Seal Dimensions		Groove Dimensions		
		A	B	D Dia. +.004 -.000	E + -.003	F Dia. +.005 -.003
-2937	2-15/16	3-7/16	1/4	3.435	.249	3.265
-3000	3	3-1/2	1/4	3.497	.249	3.327
-3125	3-1/8	3-5/8	1/4	3.622	.249	3.452
-3250	3-1/4	3-3/4	1/4	3.747	.249	3.577
-3375	3-3/8	3-7/8	1/4	3.872	.249	3.702
-3500	3-1/2	4	1/4	3.997	.249	3.827
-3625	3-5/8	4-1/8	1/4	4.122	.249	3.952
-3750	3-3/4	4-1/4	1/4	4.247	.249	4.077
-3875	3-7/8	4-3/8	1/4	4.372	.249	4.202
-4000	4	4-1/2	1/4	4.497	.249	4.327
-4125	4-1/8	4-5/8	1/4	4.622	.249	4.452
-4250	4-1/4	4-3/4	1/4	4.747	.249	4.577
-4375	4-3/8	4-7/8	1/4	4.872	.249	4.702
-4500	4-1/2	5-1/4	3/8	5.247	.374	4.993
-4625	4-5/8	5-3/8	3/8	5.372	.374	5.118
-4750	4-3/4	5-1/2	3/8	5.497	.374	5.243
-4875	4-7/8	5-5/8	3/8	5.622	.374	5.368
-5000	5	5-3/4	3/8	5.747	.374	5.493
-5125	5-1/8	5-7/8	3/8	5.872	.374	5.618
-5250	5-1/4	6	3/8	5.997	.374	5.743
-5375	5-3/8	6-1/8	3/8	6.122	.374	5.868
-5500	5-1/2	6-1/4	3/8	6.247	.374	5.993
-5625	5-5/8	6-3/8	3/8	6.372	.374	6.118
-5750	5-3/4	6-1/2	3/8	6.497	.374	6.243
-5875	5-7/8	6-5/8	3/8	6.622	.374	6.368
-6000	6	6-3/4	3/8	6.747	.374	6.493
-6250	6-1/4	7	3/8	6.997	.374	6.743
-6500	6-1/2	7-1/4	3/8	7.247	.374	6.993
-6750	6-3/4	7-1/2	3/8	7.497	.374	7.243
-7000	7	7-3/4	3/8	7.747	.374	7.493
-7250	7-1/4	8	3/8	7.997	.374	7.743
-7500	7-1/2	8-1/4	3/8	8.247	.374	7.993
-7750	7-3/4	8-1/2	3/8	8.497	.374	8.243
-8000	8	8-3/4	3/8	8.747	.374	8.493
-8250	8-1/4	9	3/8	8.997	.374	8.743
-8500	8-1/2	9-1/4	3/8	9.247	.374	8.993
-8750	8-3/4	9-1/2	3/8	9.497	.374	9.243
-9000	9	9-3/4	3/8	9.747	.374	9.493
-9250	9-1/4	10	3/8	9.997	.374	9.743

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HEAVY DUTY ROD WIPERS

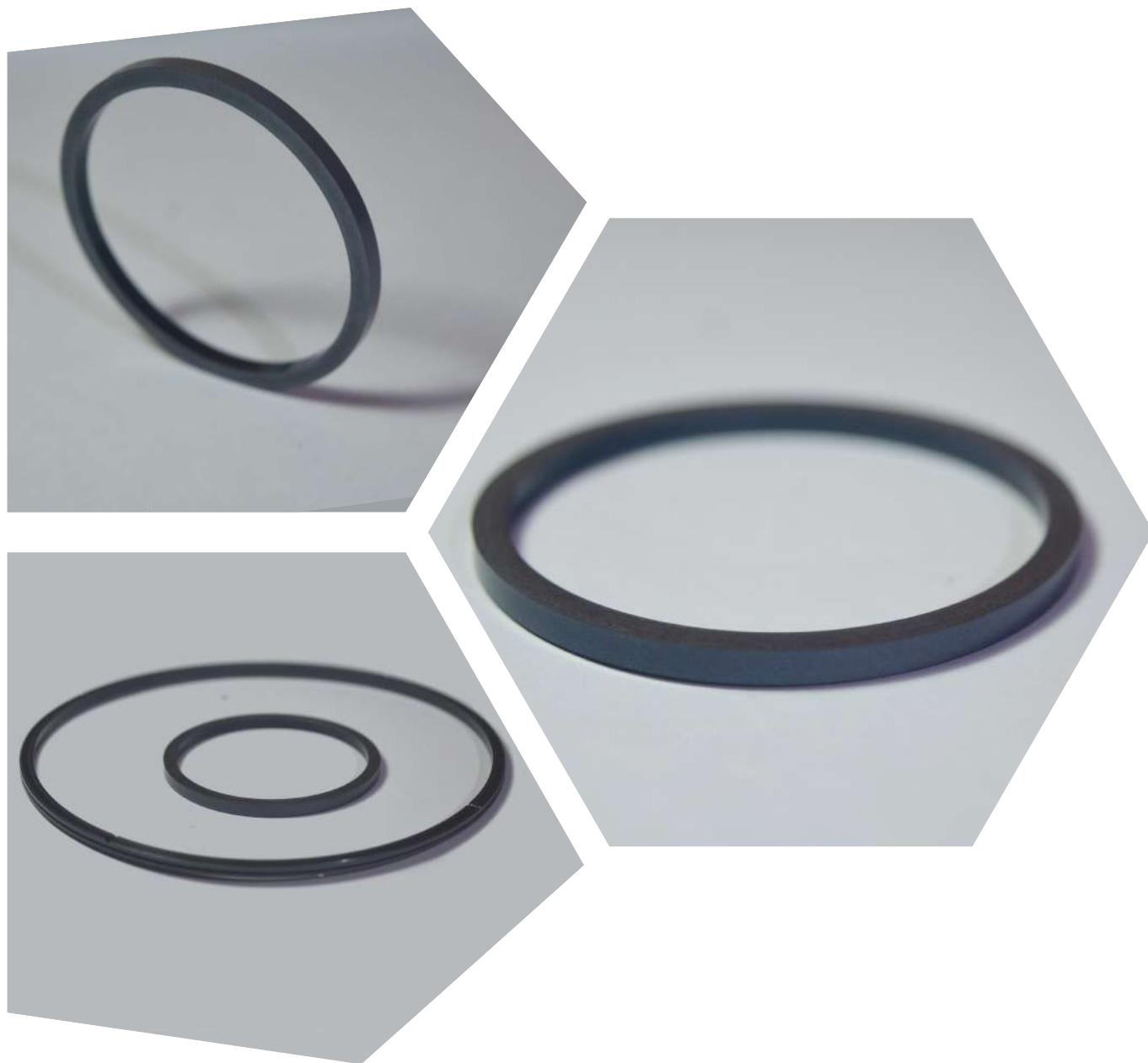
SERIES 52 (Inch Sizes)



PISTON RINGS

Series 77 (Inch Sizes)

17





CHARACTERISTICS

Universal Seal Piston Rings were developed specifically to be totally interchangeable with the TFE piston rings currently available, and to provide a product which can be more readily installed on the pistons and provide longer field service life.

Polyurethane Piston Rings are manufactured from Unithane **460D** material with an outer wear layer containing a concentration of Molybdenum Disulfide (MSO_2). The purpose being to provide a low friction surface during the initial break-in period of the hydraulic cylinder. Series 77 Piston Rings can be manufactured from alternate materials to meet specific design requirements.

Series N°. 77 - Piston Rings provide advantages as seals.

1. Unithane piston rings expand readily to fit over the major piston diameter and recover quickly to permit immediate installation of the piston into the cylinder bore. No expensive expanding arbors or re-sizing dies are required. This results in a reduction of assembly time and eases field replacement.

2. The superior cut strength of Unithane **460 D** material in combination with an ultimate elongation Of 430% insures that fewer rings are scrapped during assembly.

This also helps to avoid cylinder rework by eliminating damaged rings which become broken, cut, Or nicked while being installed on the piston.

3. Unithane piston rings resist field failures attributed to minor scoring or galling of the cylinder bore which Will cause rapid failure of piston rings made from other less abrasion and cut resistant materials.

4. The inherent elastic memory exhibited by Unithane piston rings insures instantaneous response to rapidly varying system pressures and eliminates the objectionable compression set or "cold flow" characteristic commonly associated with TFE materials.

Unithane piston rings will operate effectively in hydraulic cylinders with pressures up to 3000 P.S.I. and with radial clearances as great as .008 inches. The cylinder bore should be finished not to exceed 20 RMS for maximum service life although somewhat higher limits can be accepted depending on pressure and frequency of cycling.

The standard bore diameter and the corresponding groove diameter for normal application of Unithane piston rings is as shown on page 17(2). These recommendations conform to ANSIB93.32-1973 and NFPA STD T3.19.18-1973 Groove Dimensions for Fluid Power Radial Compression Type Piston Rings. Oversize or undersize cylinder bore diameters from — to + can readily be accommodated provided that an equivalent adjustment is made in the groove diameter. In extreme oversize conditions beyond + .025 the groove diameter may need to be increased slightly more than a matching equivalent and a 90 durometer O ring may be substituted for the normal 70 durometer to help maintain sufficient circumferential contact between the piston ring and the cylinder bore.

MATERIAL

- TYPE: Unithane **460D**, Liquid Cast Polyurethane
- HARDNESS: Durometer **60D**
- FLUID COMPATIBILITY: See Material Specifications', Technical Bulletin US-96

PISTON RINGS

SERIES 77 (Inch Sizes)

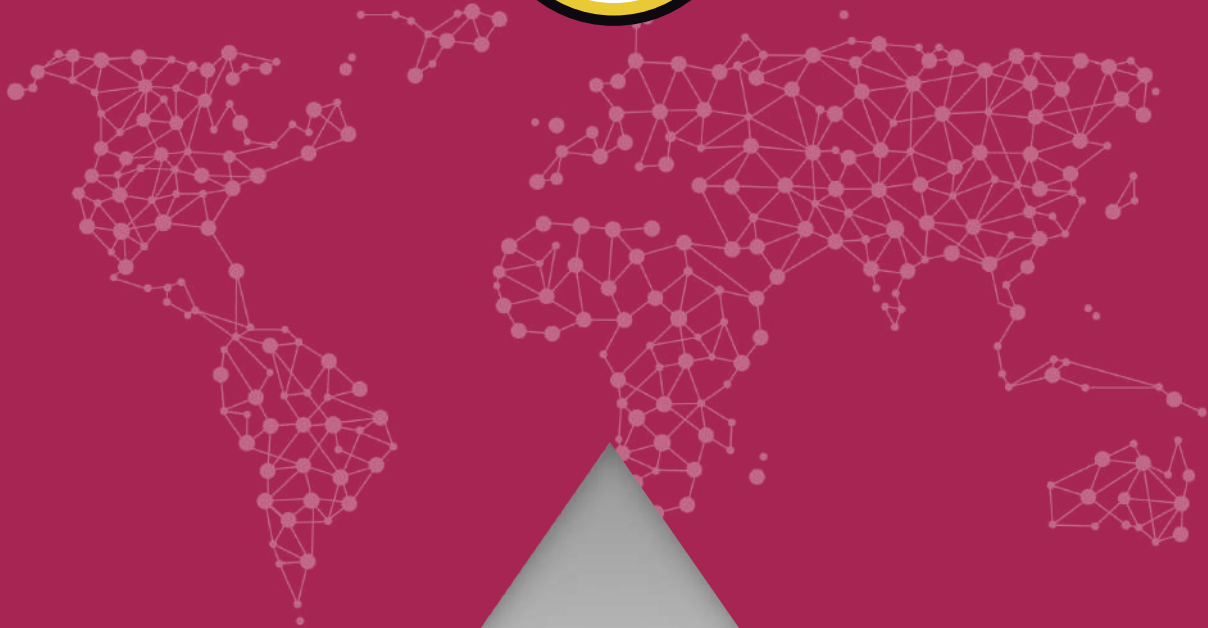


Part N° 77	Bore Dia. A			Piston Dia. B			Groove Dia. C			Groove Width F			Ring Dia. D	Ring C/S E			Oring As-
-009	.500	±	.001	.497	±	.001	.241	±	.002	.083	±	.002	.515	.070	±	.005	.009
-011	.625		↑	.622		↑	.366		↑				.640		↑		-011
-013	.750		↑	.747		↑	.491		↑				.765		↑		-013
-015	.875		↑	.872		↑	.616		↑				.890		↑		-015
-017	1.000		↑	.997		↑	.741		↑				1.015		↑		-017
-019	1.125		↑	1.122		↑	.866		↑				1.140		↑		-019
-021	1.250		↑	1.247		↑	.991		↑				1.265		↑		-021
-023	1.375		↑	1.372		↑	1.116		↑				1.390		↑		-023
-025	1.500	±	.001	1.497	±	.001	1.241	±	.002	.083	±	.002	1.515	.070	±	.005	-025
-121	1.562	±	.001	1.599	±	.001	1.172	±	.002	.122	±	.002	1.577	.109	±	.005	-122
-123	1.625		↑	1.622		↑	1.235		↑				1.640		↑		-123
-124	1.687		↑	1.684		↑	1.297		↑				1.702		↑		-124
-125	1.750		↑	1.747		↑	1.360		↑				1.765		↑		-125
-126	1.812		↑	1.809		↑	1.422		↑				1.827		↑		-126
-127	1.875		↑	1.872		↑	1.485		↑				1.890		↑		-127
-128	1.938	±	.001	1.935	±	.001	1.548	±	.002	.122	±	.002	1.953	.109	±	.005	-128
-129	2.000	+	.004	1.996	±	.002	1.606	±	.002	.129	±	.002	2.015	.115	±	.006	-129
-131	2.125	-	.000	2.121		↑	1.731		↑				2.140		↑		-131
-133	2.250		↑	2.246		↑	1.856		↑				2.265		↑		-133
-135	2.375		↑	2.371		↑	1.981		↑				2.390		↑		-135
-137	2.500		↑	2.496		↑	2.106		↑				2.515		↑		-137
-141	2.750		↑	2.746		↑	2.356		↑				2.765		↑		-141
-145	3.000		↑	2.996		↑	2.606		↑				3.015		↑		-145
-149	3.250		↑	3.246		↑	2.856		↑				3.265		↑		-149
-151	3.500		↑	3.496		↑	3.106		↑				3.515		↑		-151
-152	3.750		↑	3.746		↑	3.356		↑				3.765		↑		-152
-153	4.000		↑	3.996		↑	3.606		↑				4.015		↑		-153
-154	4.250		↑	4.246		↑	3.856		↑				4.265		↑		-154
-155	4.500		↑	4.496		↑	4.106		↑				4.515		↑		-155
-156	4.750		↑	4.746		↑	4.356		↑				4.765		↑		-156
-157	5.000		↑	4.996		↑	4.606		↑				5.015		↑		-157
-158	5.250	+	.004	5.246		↑	4.856		↑				5.265		↑		-158
-159	5.500	-	.000	5.496	±	.002	5.106	±	.002	.129	±	.002	5.515	.115	±	.006	-159
-251	5.750	+	.004	5.746	±	.002	5.232	±	.002	.159	±	.003	5.765	.143	±	.007	-251
-253	6.000	-	.000	5.996		↑	5.482		↑				6.015		↑		-253
-255	6.250		↑	6.246		↑	5.732		↑				6.265		↑		-255
-257	6.500		↑	6.496		↑	5.982		↑				6.515		↑		-257
-258	6.750		↑	6.746		↑	6.232		↑				6.765		↑		-258
-259	7.000		↑	6.996		↑	6.482		↑				7.015		↑		-259
-260	7.250		↑	7.245		↑	6.732		↑				7.265		↑		-260
-261	7.500		↑	7.495		↑	6.982		↑				7.515		↑		-261
-262	7.750		↑	7.745		↑	7.232		↑				7.765		↑		-262
-263	8.000		↑	7.995		↑	7.482		↑				8.015		↑		-263
-264	8.250		↑	8.245		↑	7.732		↑				8.265		↑		-264
-265	8.500		↑	8.494		↑	6.982		↑				8.515		↑		-265
-267	9.000		↑	8.994		↑	8.482		↑				9.015		↑		-267
-271	10.000		↑	9.994		↑	9.482		↑				10.015		↑		-271
-274	11.000	+	.004	10.994		↑	10.482		↑				11.015		↑		-274
-276	12.000	-	.000	11.994	±	.002	11.482	±	.002	.159	±	.003	12.015	.143	±	.007	-276

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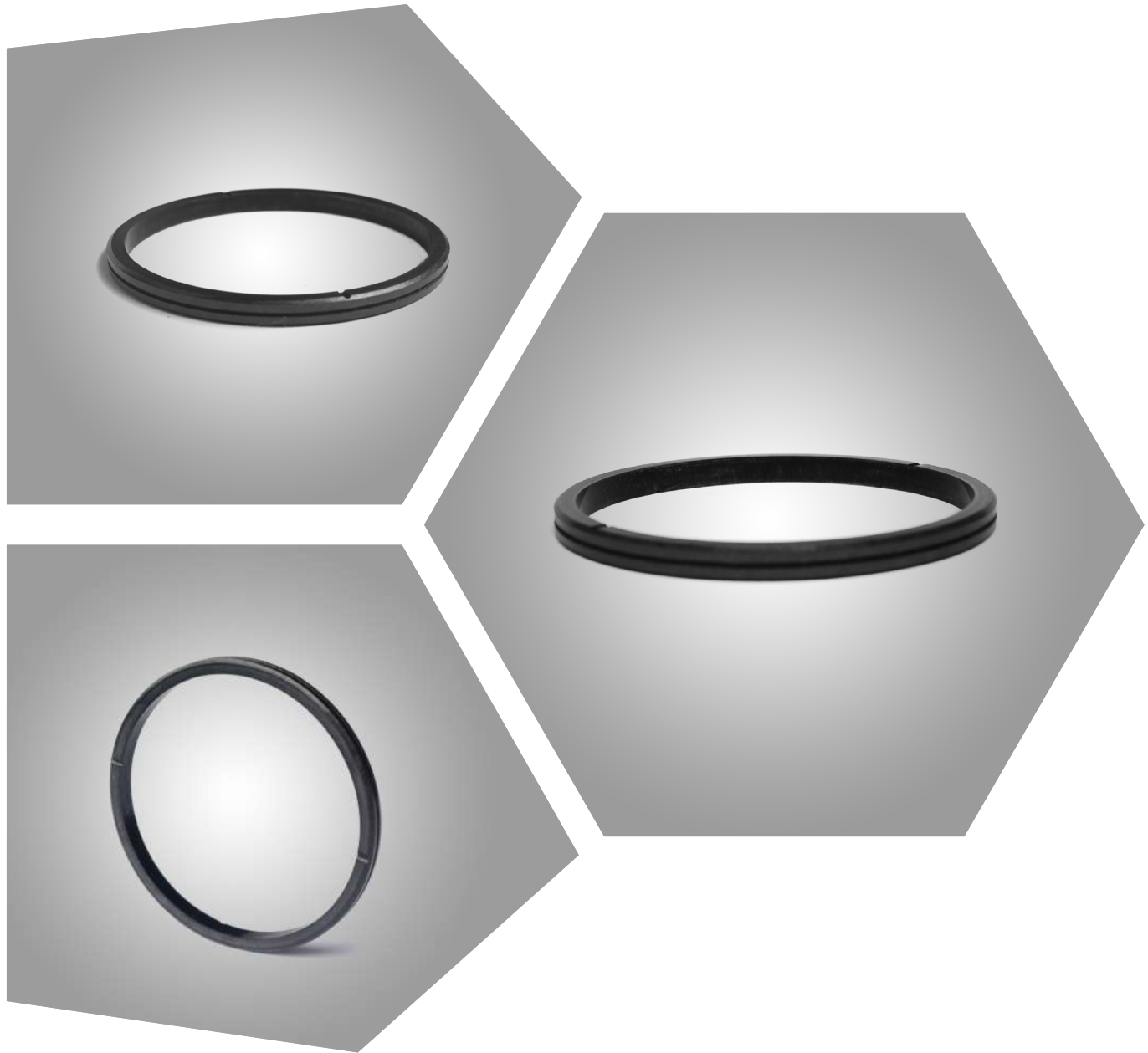
PISTON RINGS

SERIES 77 (Inch Sizes)

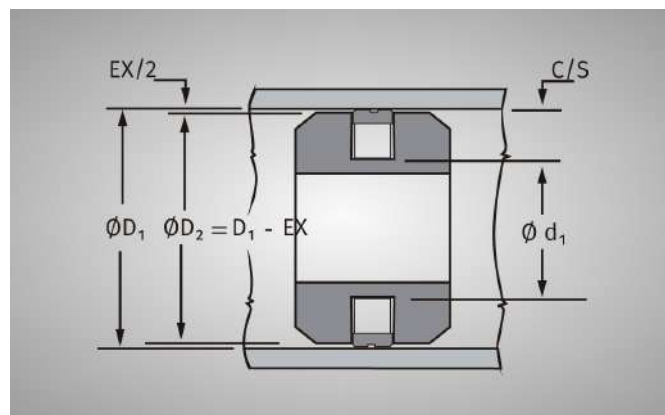
PISTON GLIDE RINGS

90 Series

18







CHARACTERISTICS

Piston Glide Rings are used in conjunction with square section nitrile rubber energizers. The square section ensures the ring stability under varying pressures and speeds.

The Glide Ring material is a hard (65 shore D) thermoset polyurethane with a modulus to resist extrusion.

The dynamic surface is impregnated with molybdenum disulfide (MSO_2) to reduce friction.

In addition to the standard sizes shown, which interchange with PTFE rings, tooling is available for most other sizes. Unlike PTFE rings, the elastic properties of the polyurethane make installation easy, without the need for special tooling.

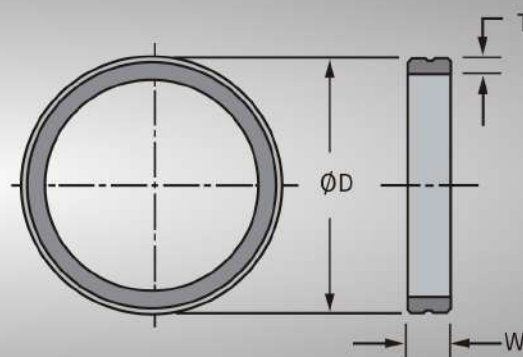
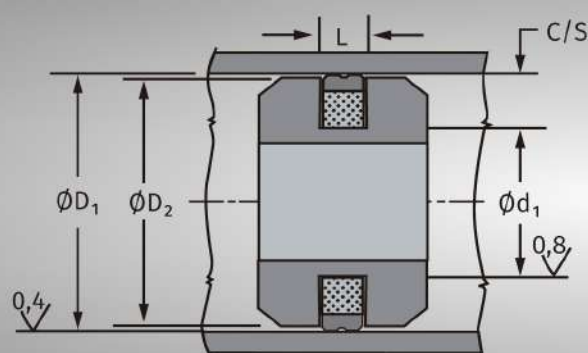
MATERIALS

Type: Unithane 460 D, Liquid Cast Polyurethane

Hardness: Durometer 65 D

Fluid Compatibility: See Material Specifications: Technical Bulletin USM-03

PISTON GLIDE RINGS



PISTON GLIDE RINGS

90 Series



Polyurethane Equivalent
Size for 1710 Tuf-Trel Piston Seal

Part Number		Groove				
1710	Universal	Bore Dia.	Dia.	Width	Seal	Seal
Dash #	Seal	+/- 0.001	+0.000 -0.002	+0.002 -0.000	Width	C/S
016-208	89-208	1,000	0,633	0,170	0,155	0,062
020-212	89-212	1,250	0,833	0,170	0,155	0,062
024-216	89-216	1,500	1,133	0,170	0,155	0,062
028-220	89-220	1,750	1,258	0,170	0,155	0,062
032-325	90-325	2,000	1,380	0,250	0,235	0,062
036-327	90-327	2,250	1,630	0,250	0,235	0,062
040-329	90-329	2,500	1,880	0,250	0,235	0,062
044-330	90-330	2,750	2,130	0,250	0,235	0,125
048-332	90-332	3,000	2,380	0,250	0,235	0,125
052-334	90-334	3,250	2,630	0,250	0,235	0,125
056-336	90-336	3,500	2,880	0,250	0,235	0,125
060-338	90-338	3,750	3,130	0,250	0,235	0,125
064-340	90-340	4,000	3,380	0,250	0,235	0,125
068-342	90-342	4,250	3,630	0,250	0,235	0,125
072-344	90-344	4,500	3,880	0,250	0,235	0,125
076-346	90-346	4,750	4,130	0,250	0,235	0,125
080-348	90-348	5,000	4,380	0,250	0,235	0,125
084-425	90-425	5,250	4,500	0,310	0,290	0,125
088-427	90-427	5,500	4,750	0,310	0,290	0,125
090-428	90-428	5,625	4,875	0,310	0,290	0,125
092-429	90-429	5,750	5,000	0,310	0,290	0,125
096-431	90-431	6,000	5,250	0,310	0,290	0,125
100-433	90-433	6,250	5,500	0,310	0,290	0,125
104-435	90-435	6,500	5,750	0,310	0,290	0,125
112-438	90-438	7,000	6,250	0,310	0,290	0,125
120-440	90-440	7,500	6,750	0,310	0,290	0,125
128-442	90-442	8,000	7,250	0,310	0,290	0,125
132-443	90-443	8,250	7,500	0,310	0,290	0,125
136-444	90-444	8,500	7,750	0,310	0,290	0,125
144-445	90-445	9,000	8,250	0,310	0,290	0,125
152-446	90-446	9,500	8,750	0,310	0,290	0,125
160-447	90-447	10,000	9,250	0,310	0,290	0,125
176-449	90-449	11,000	10,250	0,310	0,290	0,125
192-450	90-450	12,000	11,250	0,310	0,290	0,125
208-453	90-453	13,000	12,250	0,310	0,290	0,125

Polyurethane Equivalent Size for
Style PS 1600 Glass Filled Teflon Seals or 1706

Part Number		Groove				
1600	Universal	Bore Dia.	Dia.	Width	Seal	Seal
Dash #	Seal	+/- 0.001	+0.000 -0.002	+0.002 -0.000	Width	C/S
016-018	91-018	1,000	0,787	0,094	0,055	0,085
018-020	91-020	1,125	0,912	0,094	0,055	0,085
020-022	91-022	1,250	1,037	0,094	0,055	0,085
022-024	91-024	1,375	1,162	0,094	0,055	0,085
024-026	91-026	1,500	1,287	0,094	0,055	0,085
026-028	91-028	1,625	1,412	0,094	0,055	0,085
028-127	91-127	1,750	1,473	0,094	0,055	0,085
030-129	91-129	1,875	1,598	0,126	0,055	0,115
032-131	91-131	2,000	1,723	0,126	0,055	0,115
036-135	91-135	2,250	1,937	0,126	0,055	0,115
038-137	91-137	2,375	2,098	0,126	0,055	0,115
040-139	91-139	2,500	2,223	0,126	0,055	0,115
044-229	91-229	2,750	2,348	0,157	0,085	0,143
048-231	91-231	3,000	2,603	0,157	0,085	0,143
052-233	91-233	3,250	2,853	0,157	0,085	0,143
056-235	91-235	3,500	3,103	0,157	0,085	0,143
060-237	91-237	3,750	3,353	0,157	0,085	0,143
064-239	91-239	4,000	3,603	0,157	0,085	0,143
068-241	91-241	4,250	3,853	0,157	0,085	0,143
072-243	91-243	4,500	4,103	0,157	0,085	0,143
076-245	91-245	4,750	4,353	0,157	0,085	0,143
080-247	91-247	5,000	4,603	0,157	0,085	0,143
084-249	91-249	5,250	4,853	0,157	0,085	0,143
088-251	91-251	5,500	5,103	0,157	0,085	0,143
092-253	91-253	5,750	5,353	0,157	0,085	0,143
096-355	91-355	6,000	5,350	0,293	0,120	0,272
112-362	91-362	7,000	6,350	0,293	0,120	0,272

Polyurethane Equivalent Size for
Style 1711 Tuf-Trel Rod Seals

1711	Part Number	Bore Dia.	Dia.	Groove Width	Seal
Dash #	Universal	+/- 0.001	+0.000 -0.002	+0.002 -0.000	Width
003-208	93-208	0,500	0,858	0,150	0,135
004-210	93-210	0,625	0,885	0,150	0,135
005-212	93-212	0,750	1,110	0,150	0,135
007-214	93-214	0,875	1,235	0,150	0,135
009-216	93-216	1,000	1,360	0,150	0,135
013-220	93-220	1,250	1,610	0,150	0,135
017-326	94-326	1,500	1,991	0,222	0,205
019-328	94-328	1,750	2,241	0,222	0,205
021-330	94-330	2,000	2,491	0,222	0,205
023-332	94-332	2,250	2,741	0,222	0,205
025-334	94-334	2,500	2,991	0,222	0,205
027-336	94-336	2,750	3,241	0,222	0,205
029-338	94-338	3,000	3,491	0,222	0,205
031-340	94-340	3,250	3,741	0,222	0,205
033-342	94-342	3,500	3,991	0,222	0,205
035-344	94-344	3,750	4,241	0,222	0,205
037-346	94-346	4,000	4,491	0,222	0,205
039-348	94-348	4,250	4,741	0,222	0,205
041-427	94-427	4,500	5,228	0,300	0,280
043-429	94-429	4,750	5,478	0,300	0,280
045-431	94-431	5,000	5,728	0,300	0,280
047-433	94-433	5,250	5,978	0,300	0,280
049-435	94-435	5,500	6,225	0,300	0,280
051-437	94-437	5,750	6,478	0,300	0,280
053-439	94-439	6,000	6,728	0,300	0,280

PIP SEAL

(Inch Sizes)

19



CHARACTERISTICS

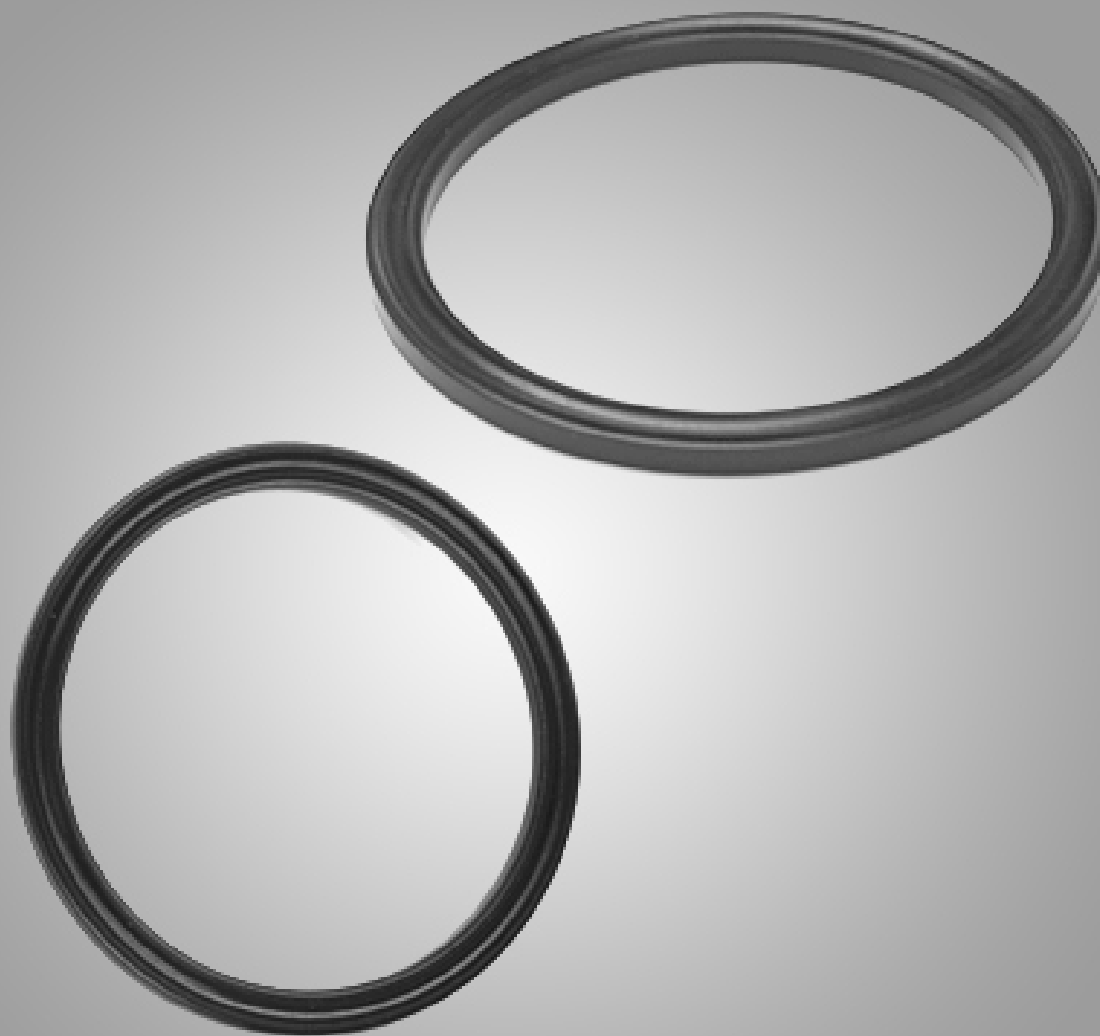
The PIP Seal combined with our Loaded U-Cup (O-Pack) will convert the O-Pack seal into a bi-directional device.

The PIP Seal needs only a single groove and can be installed on one-piece pistons in most cases, thus reducing the number of piston components.

The PIP seal replaces two U-Pack or O-Pack at a considerable savings in seal costs and machining two grooves.

ADVANTAGES:

1. 60D hardness
2. Centrifugally moulded- no embedded air
3. Knife trimmed – No injection points
4. Any colour any size

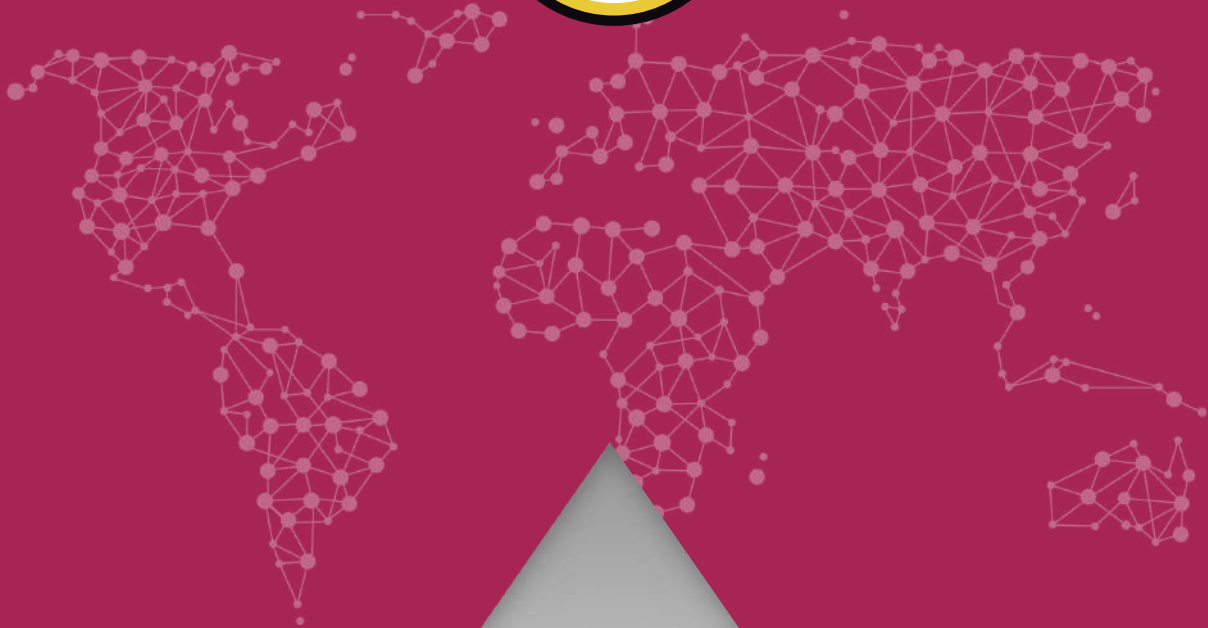




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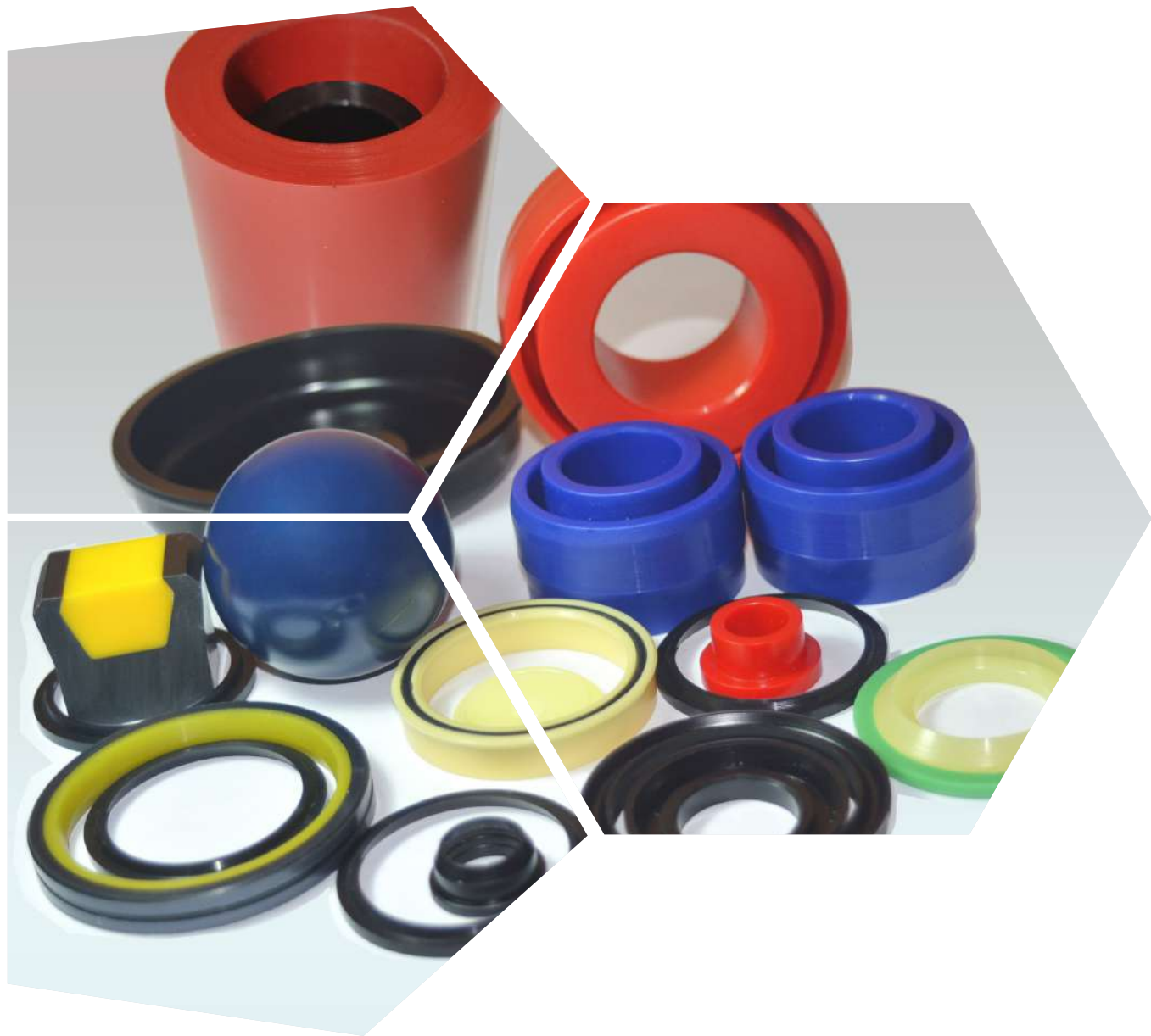
PIP SEAL

Universal Seal INC.



MATERIAL SPECIFICATIONS & COMPATIBILITY CHART

20



The materials used for Universal Seal INC. products are all Thermosetting Liquid Cast Polyurethanes.

Each material is selected after thorough testing to ensure that its mechanical properties match or exceed the specific requirements of its intended use.

The main properties considered during selection are: abrasion resistance, compression set, tear strength and resilience.

Our material testing program is on-going and we reserve the right to change materials should we conclude that another material is superior in one or more of its critical properties.

Polymer Type	Unithane 157A	Unithane 160A	Unithane 292A
Durometer	57A	60A	92A
Standard Applications	— Activation lamina of "Unirings" — Sealing lamina of flange seals	— Yellow Jacket expanders	— 'U' — Cups — 'U' Packs — 'O' Rings — Piston Cups

Polymer Type	Unithane 395A	Unithane 460D	Unithane 480D
Durometer	95A	60D	80D
Standard Applications	— Rod Wipers — Back-up Washers — Anti-extrusion lamina of Flange Seal	— Piston Rings — Dynamic sealing lamina of "Unirings" — Modular back-ups	— Piston & Rod Wear Rings

MATERIAL SPECIFICATIONS



Polymer Type	157A	160A	180A	292A	395A	460D	480D
Hardness, Shore A	59	60	84	92	95	-	-
Hardness, Shore D	-	-	32	-	48	65	-
Tensile Modulus,							85
PSI @ 100%	229	299	800	1400	2100	3250	
PSI @ 200%	-	-	-	-	-	-	7040
PSI @ 300%	477	-	1470	2600	4300	5646	-
Ultimate Tensile,							-
Strength, PSI	2334	452	5500	5800	6500	6328	7790
Ultimate Elongation, %	488	154	490	420	380	313	140
Tear Strength, PLI,							
ASTM D-470	24	7.3	40	100	120	154	130
Compression Set,							
Method "b", %	8.7	<1	20	24	30	32	80
Bashore Rebound, %	60	46	58	45	40	-	33
Compresion Modulus,							
PSI @5%	-	-	-	-	-	-	3200
@10%	-	-	-	-	-	-	6400
@15%	-	-	-	-	-	-	8200
@20%	-	-	-	-	-	-	9250
@25%	-	-	-	-	-	-	-
@30%	-	-	-	-	-	-	11000
@40%	-	-	-	-	-	-	13400
@50%	-	-	-	-	-	-	16800

General Temperature Limitations

Minimum Usable Temperature	-40 Degrees F.
Maximum Usable Temperature	195 Degrees F.
Maximum Short Exposure Temperature	250 Degrees F.

The compatibility chart is intended as a use guide only. We recommend that the user conduct tests under actual service conditions to determine the suitability of the Unithane compounds for the intended application.

The chart applies to all Unithane compounds, and was prepared from the results of tests in which samples were immersed for seven days at 75°F.

The rating is based on volume change according to the following key:

- 1- Excellent (0-3%)
- 2- Good (4-15%)
- 3- Fair (16 - 35%)
- 4- Poor (36% Up)

Fluid	Rating	Fluid	Rating
Acetic Acid	2-3	Boric Acid	1
Acetic Anhydride	4	Bromine	2-3
Acetone	4	Bunker Oil	1-2
Aluminum Chloride	2	Butane	1
Aluminum Sulphate	2	Butyl Acetate	4
Ammonia	2	Calcium Chloride	1
Ammonium Hydroxide	1-2	Calcium Hydroxide	1
Ammonium Sulfate	2	Carbon Dioxide	1
Amyl Acetate	4	Carbon Monoxide	1
Amyl Alcohol	3	Carbon Tetrachloride	3
ASTM Oil N°. 1	1-2	Castor Oil	1-2
ASTM Oil N°. 2	2	Chlorine	2-3
ASTM Oil N°. 3	2	Chlorascetic Acid	3-4
ASTM Reference Fuel A	1	Chloroform	4
ASTM Reference Fuel B	2	Chromic Acid	3-4
Atlantic Oil	1	Citric Acid	2
Barium Hydroxide	1	Cottonseed Oil	1
Benzine	4	Cresol (Meta)	4
Benzine (Gasoline, Aromatic)	2-3	Cyclohexane	2

COMPATIBILITY CHART



Fluid	Rating	Fluid	Rating
Dibutyl Phthalate	3-4	Mil-D-5606 Oil	3
Diester Oil	2	Mil-L-7808	1-2
DTE Oil (Heavy, Medium)	2	Mineral Oil	1
Ethyl Acetate	4	Mobil Arctic Oil	1
Ethyl Alcohol (Ethanol)	3	Napthalene	2
Ethyl Chloride	3	Natural Gas	2
Ethylene Glycol	2	Nitric Acid	4
Esso#90 Lube Oil	1	Nitrobenzene	4
Ferric Chloride	2	Oleic Acid	1-2
Formaldehyde	3	Palmitic Acid	1
Formic Acid	3-4	Perchloroethylene	3-4
Freon, 12 or 113	1	Petroleum	1-2
Fuel Oil	2	Phenol (Carbolic Acid)	4
Gasoline	2	Phosphoric Acid (Dil)	2-3
Glycerine (Glycerol)	1	Phosphoric Acid (Conc.)	3
Greases	1-2	Potassium Salts	2
Hexane	1	SAE#10 Oil	1
Hydraulic Oils	1	Skydrol Oil (500)	4
Hydrochloric Acid 20%	2	Soap	2-3
Hydrogen	1-2	Sodium Dichromate	2
Hydrogen Peroxide	2	Sodium Hydroxide 45%	2
Hydrogen Sulfide	3-4	Sodium Hypochlorite 5%	4
Isooctane	2	Sperry Oil	2
Isopropyl Alcohol	2-3	Sulfur Dioxide	2
Isopropyl Ether	2	Sulfuric Acid, 10-50%	3-4
JP-4 Oil	2-3	Tannic Acid 10%	1
JP-5 & 6	4	Tartaric Acid	1
Kerosene	2	Toluene	4
Lactic Acid	2	Transformer Oil	2-3
Linseed Oil	2	Trichloroethylene	4
Lubricating Oil	2	Tricresyl Phosphate	3-4
Magnesium Hydroxide	1	Triethanol Amine	2
Magnesium Salts	2	Trisodium Phosphate	2
Mercury	1-2	Turpentine	3
Methyl Alcohol (Methanol)	4	Water	2
Methyl Ethyl Ketone	4	Xylene	3
Methylene Chloride	4	Zinc Chloride	2



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21.

FLANGE SEALS

Series 11M (Metric Sizes)

22.

PISTON UNIRINGS

Series 12M (Metric Sizes)

23. RO. U-CUPS

Series 13M (Metric Sizes)

24. PI. U-CUPS

Series 14M (Metric Sizes)

25. SYMMETRICAL U-CUPS

Series 15M (Metric Sizes)

26. A.N. TYPE U-CUPS

Series 16M (Metric Sizes)

27. U-PACKS

Series 30M (Metric Sizes)

28. HIGH PRESSURE U-PACKS

Series 31M (Metric Sizes)

29. TRIPLE LIP RO. U-CUPS

Series 33M (Metric Sizes)

30. O-PACK

Series 35M (Metric Sizes)

31. PART NUMBER LIST

(Metric Sizes)

32.

BACK UP WASHERS

Series 19M (Metric Sizes)

33.

'O'-RINGS

Series 20M (Metric Sizes)

METRIC SIZES
ROD WIPERS
(Series 50M & 52M)

34. MEDIUM DUTY ROD WIPERS

Series 50M (Metric Sizes)

35. HEAVY DUTY ROD WIPERS

Series 52M (Metric Sizes)

36.

PISTON RINGS

Series 77M (Metric Sizes)

37.

PISTON GLIDE RINGS

Series 88M (Metric Sizes)

38.

PIP SEAL

(Metric Sizes)

39.

MATERIAL SPECIFICATIONS & COMPATIBILITY CHART (Metric Sizes)

METRIC SIZES U-CUPS & U-PACKS (Series 13M, 14M, 15M, 16M, 30M, 31M, 33M, 35M)



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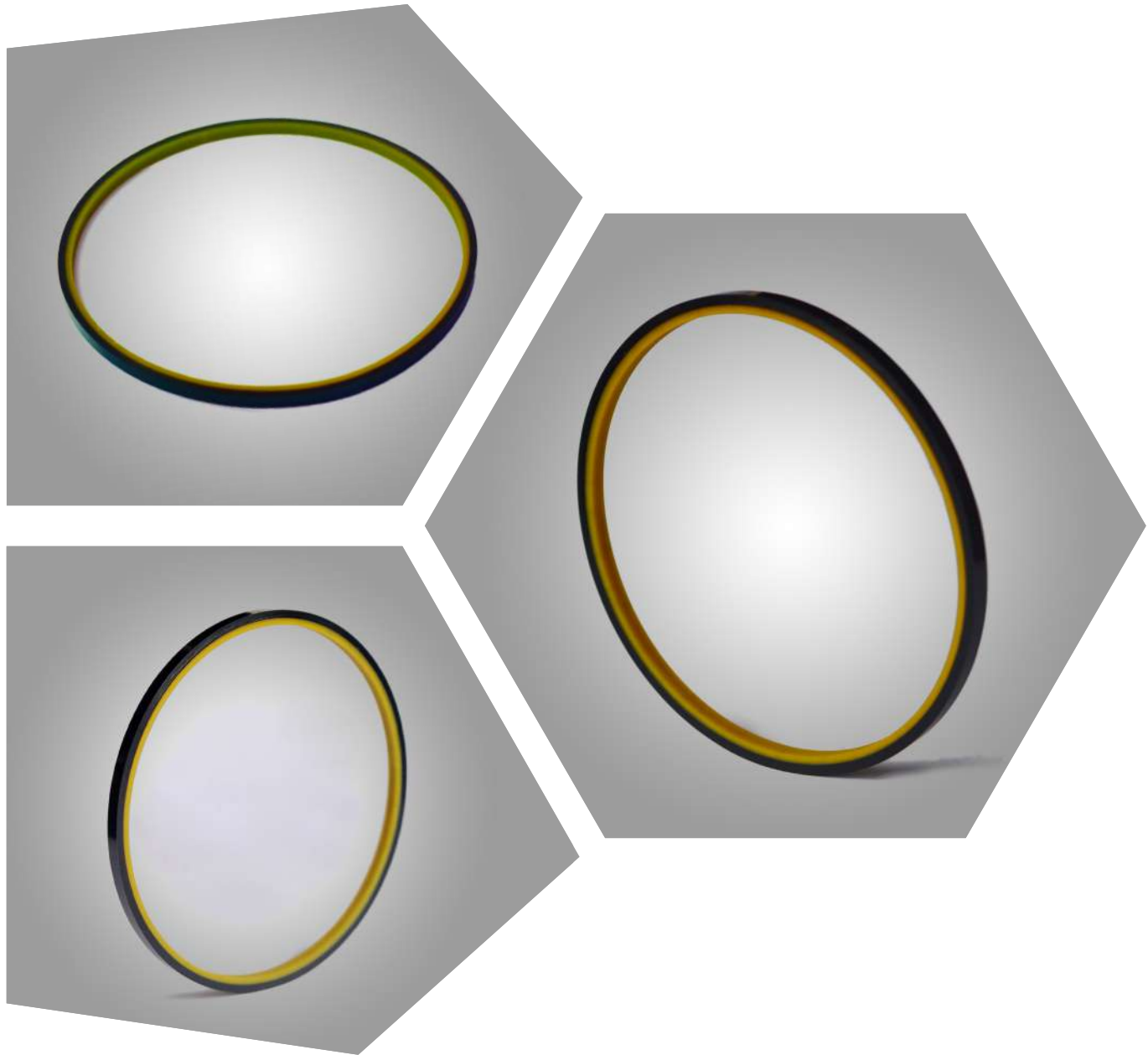
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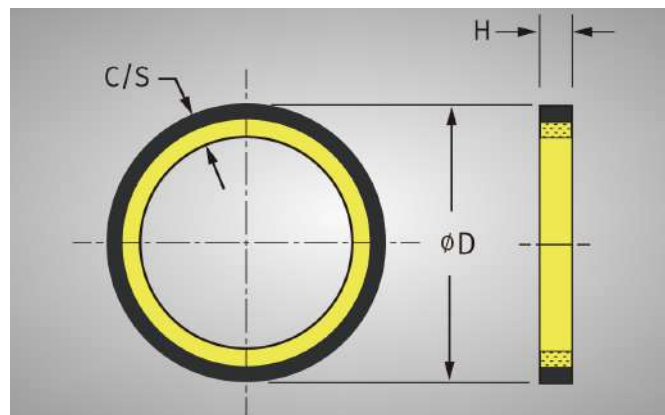
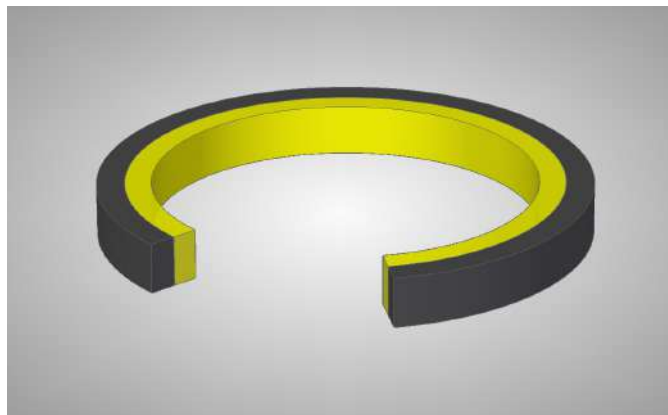
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FLANGE SEALS

Series 11M (Metric Sizes)

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CHARACTERISTICS

Series 11M Flange Seals are designed for use on all Hydraulic Flange Tube, Pipe and Hose Connections, 4 Bolt Split Flange Type. They provide a direct replacement for the 'O'-Rings without any modifications of the existing grooves.

Special sizes of Flange Seals may be economically produced for a variety of other applications, including manifold mounted pumps, stack valves and similar static hydraulic applications.

Flange Seals are one piece, dual durometer static seals that consists of outer lamina of Unithane 395 A Polyurethane.

This material provides maximum extrusion resistance for the inner sealing lamina of Unithane 157 A Polyurethane, which exhibits extremely low compression set and has excellent sealing characteristics. Refer to Technical Bulletin USM-03 for specific details on all Unithane materials.

Flange Seals are suitable for use in standard hydraulic fluids in a temperature range of -40°C to $+90^{\circ}\text{C}$ and 0 to 20 MPa (200 Bar).

This unique combination of an outer extrusion resistant lamina bonded to an inner pressure responsive sealing lamina provides improved sealing performance and longer service life than normally can be obtained 'O'-Rings or other more expensive sealing devices.

MATERIAL

- Outer Lamina:
Unithane 395 A, Liquid Cast Polyurethane, Duro 95 A.
- Inner Lamina:
Unithane 157 A, Liquid Cast Polyurethane, Duro 59 A.
- Fluid Compatibility:
See Material Specifications:
Technical Bulletin USM-03

ORDERING INFORMATION

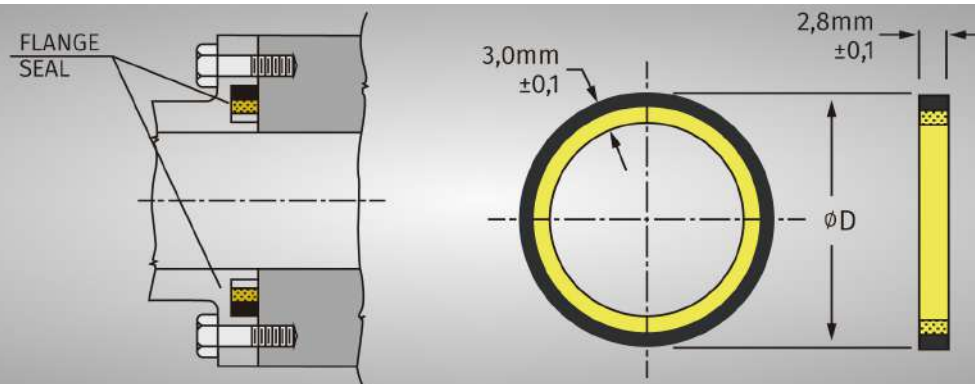
1. Flange seals are ordered by giving the 'O'-Ring size which the flange seal is required to replace for example Flange Seal part# 11M - 19,0 x 3 replaces an 'O'-Ring 19,0mm(ϕd) x 3mm(c/s).
2. We have tooling available for most metric sizes from 12mm to 250mm inside diameter (ϕd).

FLANGE SEALS

Series 11M (Metric Sizes)



FLANGE SEALS

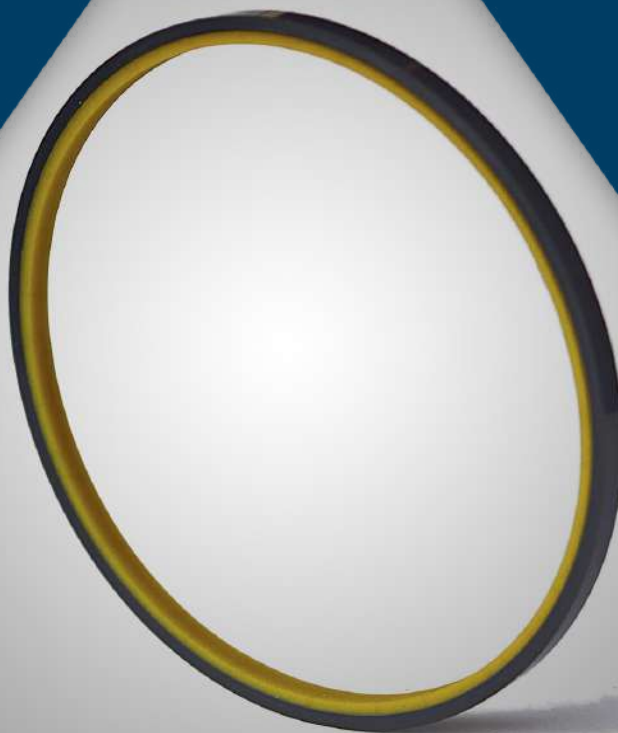


Part Number 11M-	Outside Diameter (ϕd)	Part Number 11M-	Outside Diameter (ϕd)	Part Number 11M-	Outside Diameter (ϕd)
- 19,0 x 3,0	25,0 $\pm$ 0,15	- 40,0 x 3,0	46,0 $\pm$ 0,25	- 84,0 x 3,0	90,0 $\pm$ 0,4
- 20,0 x 3,0	26,0 $\pm$ 0,15	- 44,0 x 3,0	50,0 $\pm$ 0,25	- 87,0 x 3,0	93,0 $\pm$ 0,4
- 21,0 x 3,0	27,0 $\pm$ 0,15	- 45,0 x 3,0	51,0 $\pm$ 0,25	- 89,0 x 3,0	95,0 $\pm$ 0,4
- 22,0 x 3,0	28,0 $\pm$ 0,15	- 49,0 x 3,0	55,0 $\pm$ 0,25	- 94,0 x 3,0	100,0 $\pm$ 0,4
- 23,0 x 3,0	29,0 $\pm$ 0,15	- 54,0 x 3,0	60,0 $\pm$ 0,25	- 99,0 x 3,0	105,0 $\pm$ 0,4
- 24,0 x 3,0	30,0 $\pm$ 0,15	- 57,0 x 3,0	63,0 $\pm$ 0,25	- 104,0 x 3,0	110,0 $\pm$ 0,4
- 26,0 x 3,0	32,0 $\pm$ 0,15	- 59,0 x 3,0	65,0 $\pm$ 0,25	- 109,0 x 3,0	115,0 $\pm$ 0,4
- 28,0 x 3,0	34,0 $\pm$ 0,15	- 60,0 x 3,0	66,0 $\pm$ 0,25	- 114,0 x 3,0	120,0 $\pm$ 0,4
- 29,0 x 3,0	35,0 $\pm$ 0,15	- 64,0 x 3,0	70,0 $\pm$ 0,4	- 119,0 x 3,0	125,0 $\pm$ 0,4
- 32,0 x 3,0	38,0 $\pm$ 0,15	- 67,0 x 3,0	73,0 $\pm$ 0,4	- 124,0 x 3,0	130,0 $\pm$ 0,6
- 34,0 x 3,0	40,0 $\pm$ 0,15	- 69,0 x 3,0	75,0 $\pm$ 0,4	- 129,0 x 3,0	135,0 $\pm$ 0,6
- 36,0 x 3,0	42,0 $\pm$ 0,15	- 74,0 x 3,0	80,0 $\pm$ 0,4	- 134,0 x 3,0	140,0 $\pm$ 0,6
- 38,0 x 3,0	44,0 $\pm$ 0,15	- 76,0 x 3,0	82,0 $\pm$ 0,4	- 139,0 x 3,0	145,0 $\pm$ 0,6
- 39,0 x 3,0	45,0 $\pm$ 0,25	- 79,0 x 3,0	85,0 $\pm$ 0,4	- 144,0 x 3,0	150,0 $\pm$ 0,6

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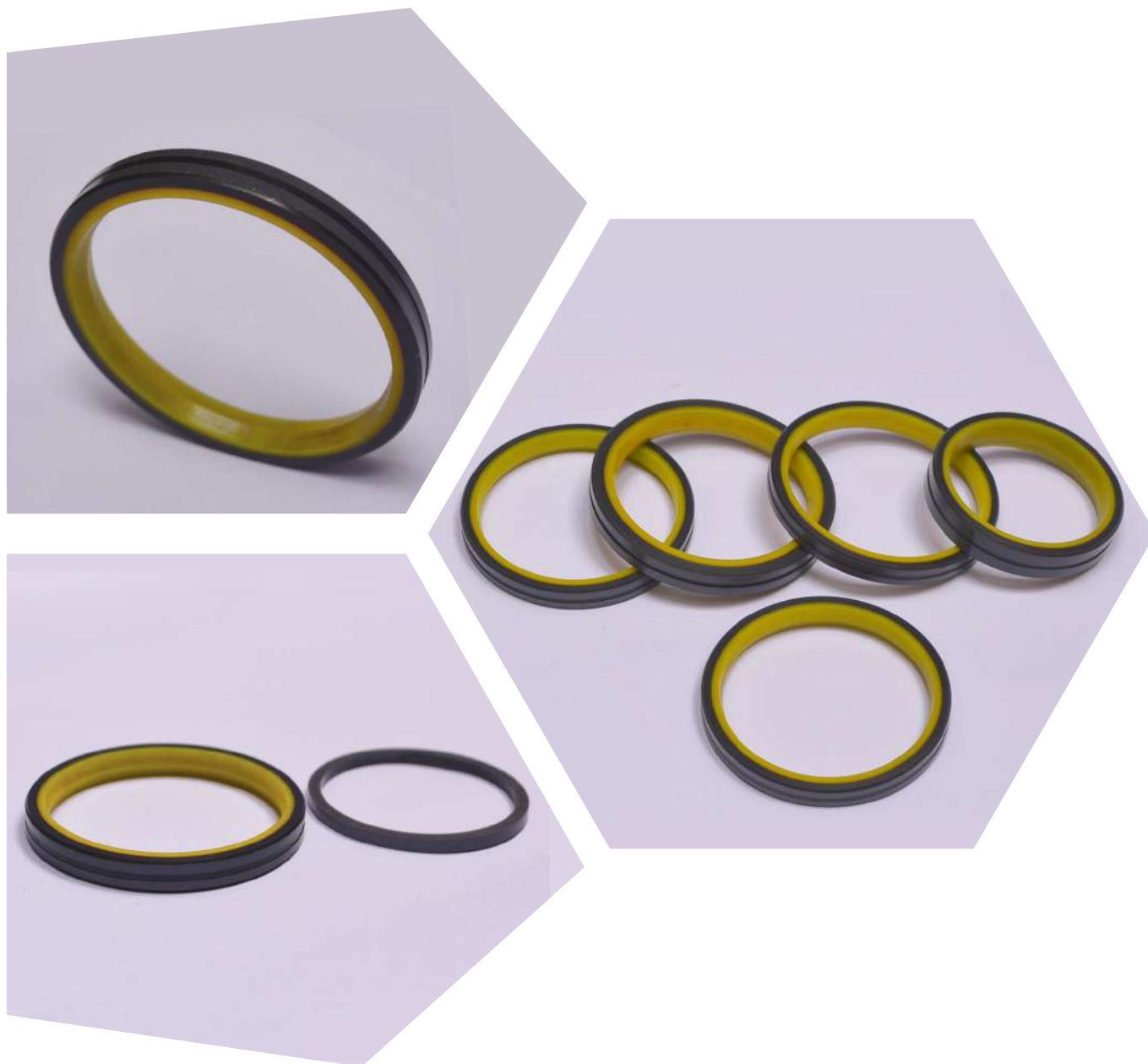
FLANGE SEALS

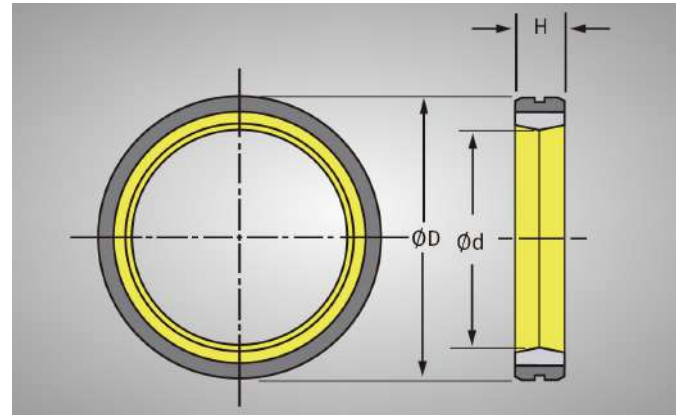
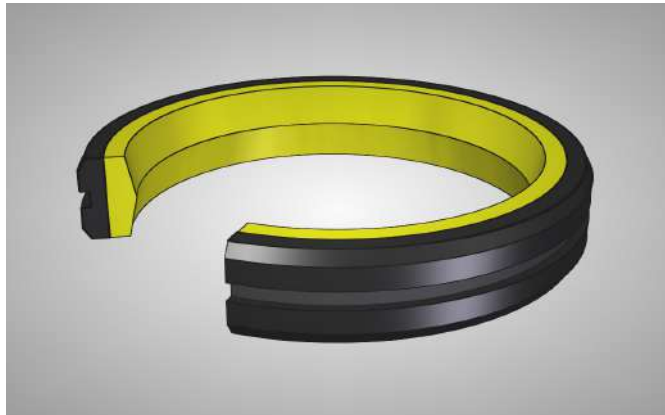
SERIES 11M (Metric Sizes)

PISTON UNIRINGS

Series 12M (Metric Sizes)

22





CHARACTERISTICS

The Piston Uniring is a Dual Durometer, one piece double acting piston seal. It consists of a (Duro 65 D) dynamic sealing and wear lamina bonded to a (Duro 59 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 energizing spring element and assures positive sealing performance throughout a board pressure range. The dynamic sealing element is made of a harder material, selected for its high abrasion resistant qualities. Piston Unirings can readily be substituted in existing cavities to replace other types of double acting seals, such as TFE Piston rings and the T Cross Section seals.

Unirings can easily be installed on one piece pistons without costly and time consuming assembly fixtures. They simplify the task of eventual field replacement.

Piston Unirings permit substantial cost saving in cylinder design by allowing larger tolerances and poorer surface finishes.

MATERIAL

- Sealing Lamina:
Unithane 460 D, Liquid Cast
Polyurethane, Duro 65 D.
- Activation Lamina:
Unithane 157 A, Liquid Cast
Polyurethane, Duro 59 A.
- Fluid Compatibility:
See Material Specifications:
Technical Bulletin USM-03

SEAL SELECTION

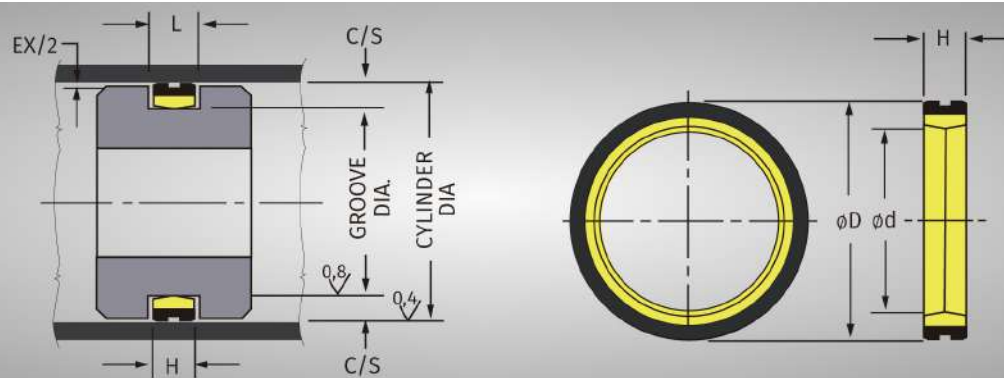
1. Find appropriate nominal outside diameter ($\varnothing D$) in size listings, Pages 21(3) & 21(4).
2. Select the largest practical cross-section (C/S) for longest wear life and maximum allowable tolerances.
3. Identify the according inside diameter ($\varnothing d$) and seal width (H).
4. Refer to charts on page 21(2) for recommended groove and cylinder tolerances, surface finishes, and the maximum extrusion gap (EX) for your system pressure.

PISTON UNIRINGS

Series 12M (Metric Sizes)



PISTON UNIRINGS



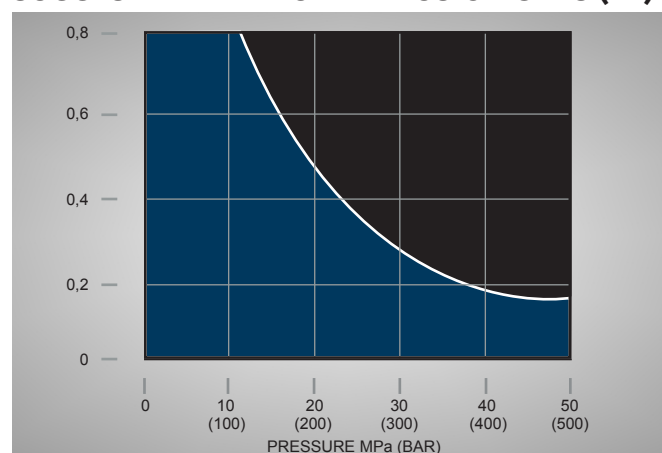
GROOVE WIDTH (mm)

H	6,5	7,1	7,6	8,1	10,0	10,5	10,9	11,4	11,9	14,0	14,6	15,2	16,2
L	6,8	7,5	8,0	8,5	10,5	11,1	11,5	12,0	12,5	14,7	15,4	16,0	17,0
Tolerance	+0,4 -0,0	+0,4 -0,0	+0,4 -0,0	+0,4 -0,0	+0,4 -0,0	+0,4 -0,0	+0,4 -0,0	+0,4 -0,0	+0,4 -0,0	+0,4 -0,0	+0,4 -0,0	+0,4 -0,0	+0,4 -0,0

GROOVE DEPTH (mm)

C/S (Nominal-groove Depth)		Diametrical Tolerances	
Frac.		Cyl. Dia.	Groove Dia.
2,5		+0,08 -0,0	+0,08 -0,0
5,0		+0,1 -0,0	+0,1 -0,0
6,0		+0,15 -0,0	+0,13 -0,0
7,0		+0,15 -0,0	+0,15 -0,0
7,5		+0,15 -0,0	+0,15 -0,0
10,0		+0,2 -0,0	+0,18 -0,0
11,5		+0,25 -0,0	+0,2 -0,0
14,0		+0,25 -0,0	+0,2 -0,0

SUGGESTED MAXIMUM EXTRUSION GAPS (EX)



The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges. Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

Part N° 12M-	Nominal Size, Mm		
	ød	øD	H
-020025-06,5	20	25	6,5
-023028-06,5	23	28	6,5
-025030-06,5	25	30	6,5
-027032-06,5	27	32	6,5
-030035-06,5	30	35	6,5
-030040-07,6	30	40	7,6
-032037-06,5	32	37	6,5
-033038-06,5	33	38	6,5
-035040-06,5	35	40	6,5
-037042-06,5	37	42	6,5
-040045-06,5	40	45	6,5
-040050-07,1	40	50	7,1
-040050-07,6	40	50	7,6
-043048-06,5	43	48	6,5
-045050-06,5	45	50	6,5
-045055-10,5	45	55	10,5
-046060-08,1	46	60	8,1
-050055-06,5	50	55	6,5
-050060-07,5	50	60	7,6
-050060-10,5	50	60	10,5
-053063-07,6	53	63	7,6
-053063-10,5	53	63	10,5
-055060-06,5	55	60	6,5
-055065-06,5	55	65	6,5
-055070-10,5	55	70	10,0

Part N° 12M-	Nominal Size, Mm		
	ød	øD	H
-055070-11,9	55	70	11,9
-058063-06,5	58	63	6,5
-060065-06,5	60	65	6,5
-060070-07,1	60	70	7,1
-060070-07,6	60	70	7,6
-060075-10,0	60	75	10,0
-060070-10,5	60	70	10,5
-063075-08,1	63	75	8,1
-065075-06,5	65	70	6,5
-065080-10,0	65	80	10,0
-065075-10,5	65	75	10,5
-065080-10,9	65	80	10,9
-065080-11,9	65	80	11,9
-070075-06,5	70	75	6,5
-070085-10,0	70	85	10,0
-070080-10,5	70	80	10,5
-075080-06,5	75	80	6,5
-075090-10,0	75	90	10,0
-075085-10,5	75	85	10,5
-075090-10,9	75	90	10,9
-075090-11,9	75	90	11,9
-080085-06,5	80	85	6,5
-080095-10,0	80	95	10,0
-080090-10,5	80	90	10,5
-085090-06,5	85	90	6,5

PISTON UNIRINGS

Series 12M (Metric Sizes)



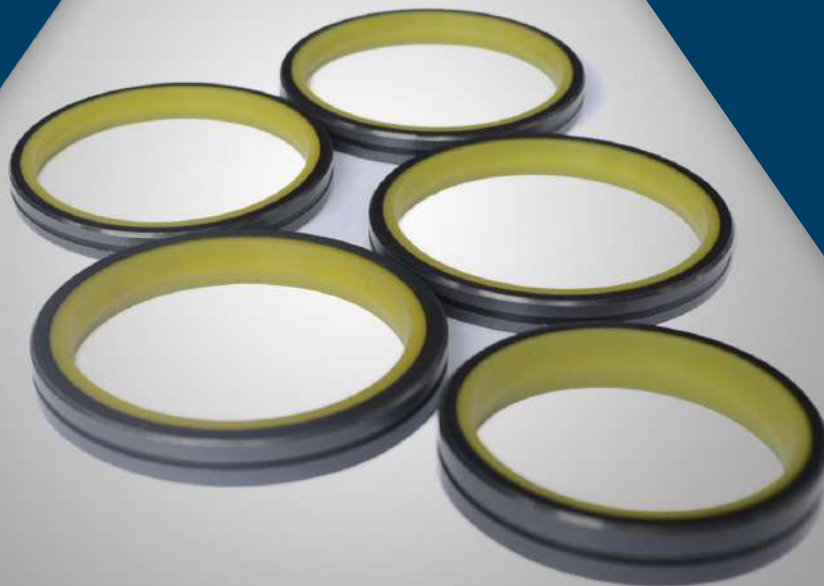
Part N° 12M-	Nominal Size, Mm		
	ød	øD	H
-085095-10,5	85	95	10,5
-085100-11,4	85	100	11,4
-085100-11,9	85	100	11,9
-090095-06,5	90	95	6,5
-090100-10,5	90	100	10,5
-090105-11,4	90	105	11,4
-095100-06,5	95	100	6,5
-095105-10,5	95	105	10,5
-095110-11,4	95	110	11,4
-095110-11,9	95	110	11,9
-100105-06,5	100	105	6,5
-100110-10,5	100	110	10,5
-100115-11,4	100	115	11,4
-102125-14,6	102	125	14,6
-105110-06,5	105	110	6,5
-105115-10,5	105	115	10,5
-105120-11,4	105	120	11,4
-107130-14,6	107	130	14,6
-110115-06,5	110	115	6,5
-110120-10,5	110	120	10,5
-110125-11,9	110	125	11,9
-112135-14,6	112	135	14,6
-115120-06,5	115	120	6,5
-115125-10,5	115	125	10,5
-115130-11,9	115	130	11,9
-117140-14,6	117	140	14,6
-120125-06,5	120	125	6,5
-120130-10,5	120	130	10,5
-122145-14,6	122	145	14,6
-125130-06,5	125	130	6,5
-125135-10,5	125	135	10,5
-125140-11,9	125	140	11,9
-127150-14,6	127	150	14,6
-130135-06,5	130	135	6,5
-130140-10,5	130	140	10,5
-135140-06,5	135	140	6,5
-135145-10,5	135	145	10,5
-137160-14,6	137	160	14,6
-140145-06,5	140	145	6,5
-140150-10,5	140	150	10,5
-140160-14,6	140	160	14,6
-142165-14,6	142	165	14,6
-145150-06,5	145	150	6,5
-145160-11,9	145	160	11,9
-147170-14,6	147	170	14,6

Part N° 12M-	Nominal Size, Mm		
	ød	øD	H
-150160-10,5	150	160	10,5
-155165-10,5	155	165	10,5
-155170-11,9	155	170	11,9
-157180-14,6	157	180	14,6
-160170-10,5	160	170	10,5
-160180-14,5	160	80	14,6
-162185-14,6	162	185	14,6
-165175-10,5	165	175	10,5
-165180-11,9	165	180	11,9
-167190-14,6	167	190	14,6
170180-10,5	170	180	10,5
-175185-10,5	175	185	10,5
-175190-11,9	175	190	11,9
-177200-14,6	177	200	14,6
-180190-10,5	180	190	10,5
-180200-15,2	180	200	15,2
-185195-10,5	185	195	10,5
-190200-10,5	190	200	10,5
-195205-10,5	195	205	10,5
-200210-10,5	200	210	10,5
-200220-15,2	200	220	15,2
-202225-14,6	202	225	14,6
-205215-10,5	205	215	10,5
-210220-10,5	210	220	10,5
-210230-15,2	210	230	15,2
-215225-10,5	215	225	10,5
-220230-10,5	220	230	10,5
-222250-16,2	222	250	16,2
-230250-15,2	230	250	15,2

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PISTON UNIRING

SERIES 12M (Metric Sizes)

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METRIC U-CUPS & U-PACKS

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 **23. RO. U-CUPS**
Series 13M (Metric Sizes)

 **24. PI. U-CUPS**
Series 14M (Metric Sizes)

 **25. SYMMETRICAL U-CUPS**
Series 15M (Metric Sizes)

 **26. A.N. TYPE U-CUPS**
Series 16M (Metric Sizes)

 **27. U-PACKS**
Series 30M (Metric Sizes)

 **28. HIGH PRESSURE U-PACKS**
Series 31M (Metric Sizes)

 **29. TRIPLE LIP RO. U-CUPS**
Series 33M (Metric Sizes)

 **30. O-PACK**
Series 33M (Metric Sizes)

 **31. PART NUMBER LIST**
(Metric Sizes)





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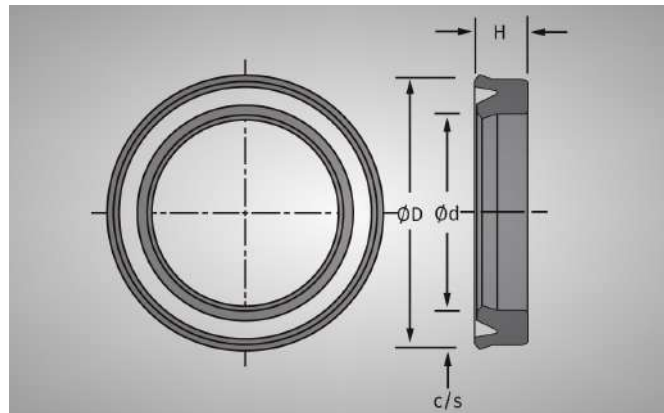
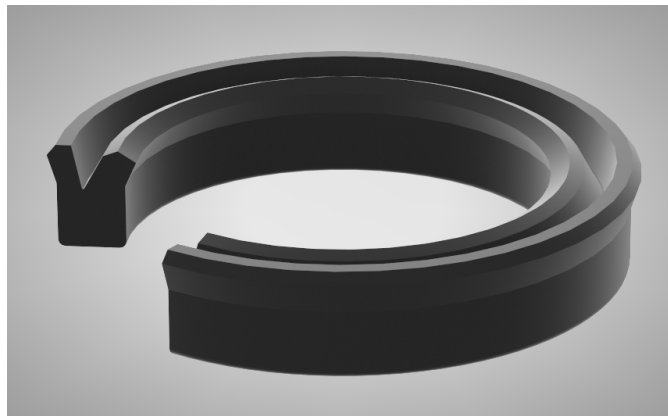
R0. U-CUPS

Series 13M (Metric Sizes)

23

U-CUPS & U-PACKS





CHARACTERISTICS

The RO. U-Cup is a specialized rod seal design, developed from the standard Symmetrical U-Cup. It assures improved sealing performance due to the following features:

- **Interference Fit in the Groove.** The RO. U-Cup has an OD larger than the groove for which it is intended. This insures a tight fit in the groove to prevent movement of the seal during cylinder operation. It also overcomes any problem with shrinkage and low temperature leaking.
- **Improved Lip Design.** The static lip, being supported by full surface contact with the groove wall, has a comparatively thin cross section. This permits the dynamic sealing lip to have a heavier cross section for an improved high pressure capability. Also the outer lip is longer, to give better stability during installation and protect the dynamic sealing lip. Both lips have precision knife trimmed chamfers to provide complete circumferential lip Contact.

MATERIAL

- **Type:**
Unithane 292 A, Liquid Cast Polyurethane
- **Hardness:**
Durometer 92 A
- **Fluid Compatibility:**
See Material Specifications:
Technical Bulletin USM-03

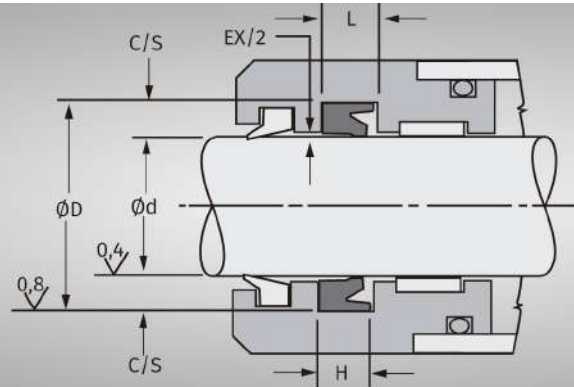
ORDERING INFORMATION

Please enquire about tooling availability before ordering. Nominal tooling charges may apply for some sizes.

Refer to the Part Number List (Technical Bulletin and find the 'Dash Number' corresponding to the nominal dimensions (shown at right) of the seal required. Add Prefix Number '**13M**' to signify an **RO. U-Cup** in a Metric size.

e.g. An **RO. U-Cup** 100mm ød x 120mm øD x 15mm H is **Part N°. 13M-100120-15.**

RO.U-CUPS



GROOVE WIDTH (mm)

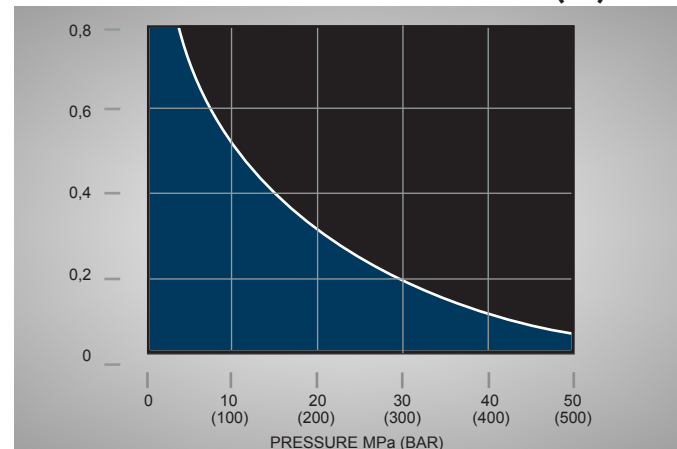
H	4,0	4,5	5,0	5,1	5,5	5,8	6,0	6,8	7,0	7,2	7,5	8,0	8,5	9,0	9,5	9,6	10,0	10,5
L +0,4 -0,0	4,5	5,0	5,5	5,6	6,0	6,3	6,5	7,8	8,0	8,2	8,5	9,0	9,5	10,0	10,5	10,6	11,0	11,5

H	11,0	11,5	11,8	12,0	12,5	13,0	13,5	14,0	15,0	15,5	16,0	17,0	18,0	18,5	20,0	22,0	25,0	26,0
L +0,4 -0,0	12,0	12,5	12,8	13,0	13,5	14,0	14,5	15,0	16,0	16,5	17,0	18,0	19,0	19,5	21,0	23,0	26,0	27,0

GROOVE DEPTH (mm)

C/S (Nominal-Groove Depth)	Diametrical Tolerances	
Frac	Cyl. Dia.	Groove Dia.
3,0	+0,0 -0,03	+0,05 -0,0
3,5	+0,0 -0,03	+0,05 -0,0
4,0	+0,0 -0,03	+0,05 -0,03
5,0	+0,0 -0,05	+0,05 -0,0
6,0	+0,0 -0,05	+0,08 -0,0
7,5	+0,0 -0,05	+0,09 -0,0
10,0	+0,0 -0,05	+0,13 -0,0
12,5	+0,0 -0,06	+0,17 -0,0
15,0	+0,0 -0,08	+0,22 -0,0

SUGGESTED MAXIMUM EXTRUSION GAPS (EX) mm



The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges. Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

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RO. U-CUPS

SERIES 13M (Metric Sizes)



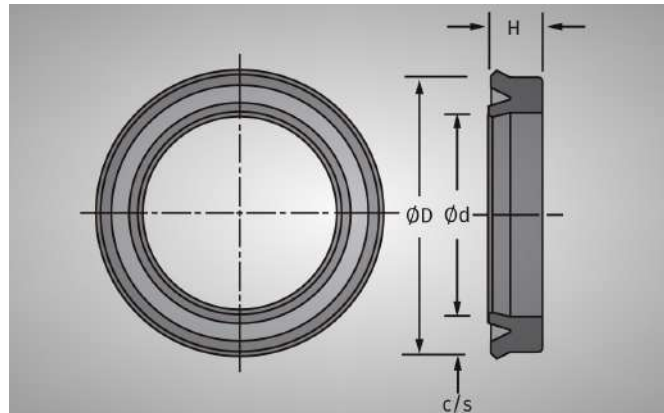
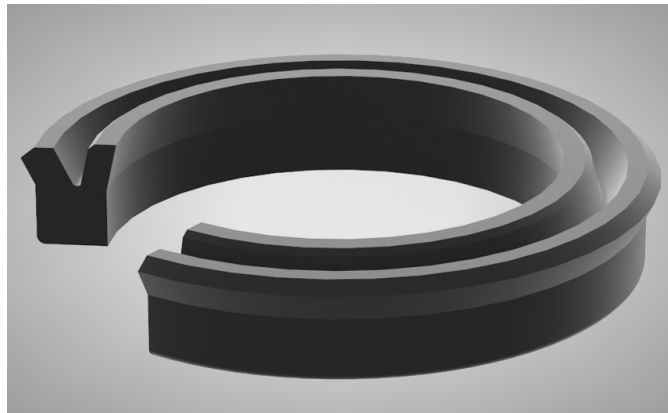
PI. U-CUPS

Series 14M (Metric Sizes)

24

U-CUPS & U-PACKS





CHARACTERISTICS

The PI. U-Cup is a specialized piston seal design, developed from the standard Symmetrical U-Cup.

It assures improved sealing performance due to the following features:

- Interference fit in the groove. The U-Cup has an $\varnothing d$ smaller than the groove for which it is intended. This insures a tight fit in the groove to prevent movement of the seal during cylinder operation. It also provides a sufficient preload condition to prevent interference with the cylinder wall due to thermal expansion at high operating temperatures.
- Improved lip design. The static lip, being supported by full surface contact with the groove wall, has a comparatively thin cross section. This permits the dynamic sealing lip to have a heavier cross section for an improved high pressure capability. Also the outer lip is longer, to give better stability during installation on a one piece piston and protect the dynamic sealing lip. Both lips have precision knife trimmed chamfers to provide complete circumferential lip contact.

MATERIAL

- Type:
Unithane 292 A, Liquid Cast
Polyurethane
- Hardness:
Durometer 92 A
- Fluid Compatibility:
See Material Specifications: Technical Bulletin
USM-03

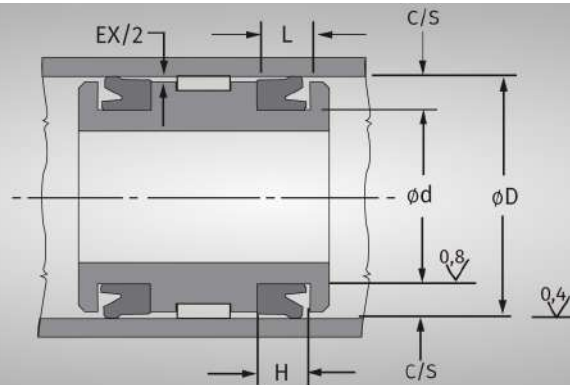
ORDERING INFORMATION

Please enquire about tooling availability before ordering. Nominal tooling charges may apply for some sizes.

Refer to the Part Number List (Technical Bulletin UNM-03) and find the 'Dash Number' corresponding to the nominal dimensions (shown at right) of the seal required. Add Prefix Number '14M' to signify an **PI. U-Cup** in a Metric size.

e.g An **PI. U-Cup** 100mm $\varnothing d \times 120\text{mm } \varnothing D \times 15\text{mm H}$ is
Part N°. 14M-100120-15.

PI. U-CUPS



GROOVE WIDTH (mm)

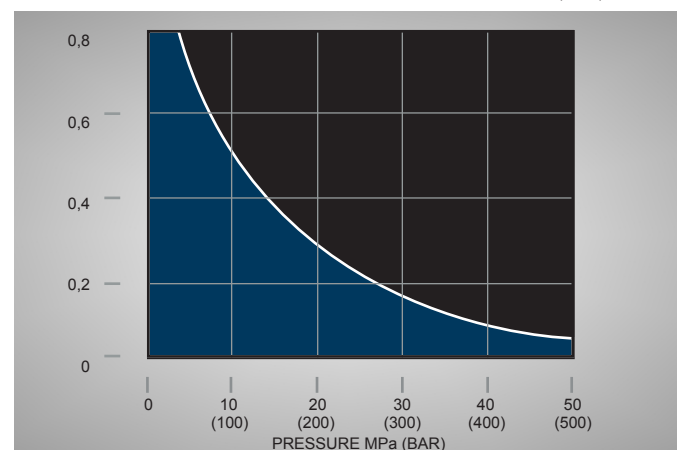
H	4,0	4,5	5,0	5,1	5,5	5,8	6,0	6,8	7,0	7,2	7,5	8,0	8,5	9,0	9,5	9,6	10,0	10,5
L +0,4 -0,0	4,5	5,0	5,5	5,6	6,0	6,3	6,5	7,8	8,0	8,2	8,5	9,0	9,5	10,0	10,5	10,6	11,0	11,5

H	11,0	11,5	11,8	12,0	12,5	13,0	13,5	14,0	15,0	15,5	16,0	17,0	18,0	18,5	20,0	22,0	25,0	26,0
L +0,4 -0,0	12,0	12,5	12,8	13,0	13,5	14,0	14,5	15,0	16,0	16,5	17,0	18,0	19,0	19,5	21,0	23,0	26,0	27,0

GROOVE DEPTH (mm)

C/S (Nominal-Groove Depth)	Diametrical Tolerances	
	Cyl. Dia.	Groove Dia.
3,0	+0,05 -0,0	+0,0 -0,05
3,5	+0,05 -0,0	+0,0 -0,05
4,0	+0,05 -0,0	+0,0 -0,05
5,0	+0,05 -0,0	+0,0 -0,05
6,0	+0,08 -0,0	+0,0 -0,08
7,5	+0,08 -0,0	+0,0 -0,09
10,0	+0,10 -0,0	+0,0 -0,13
12,5	+0,12 -0,0	+0,0 -0,17
15,0	+0,15 -0,0	+0,0 -0,22

SUGGESTED MAXIMUM EXTRUSION GAPS (EX) mm



The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges. Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

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PI. U-CUPS

SERIES 14M (Metric Sizes)

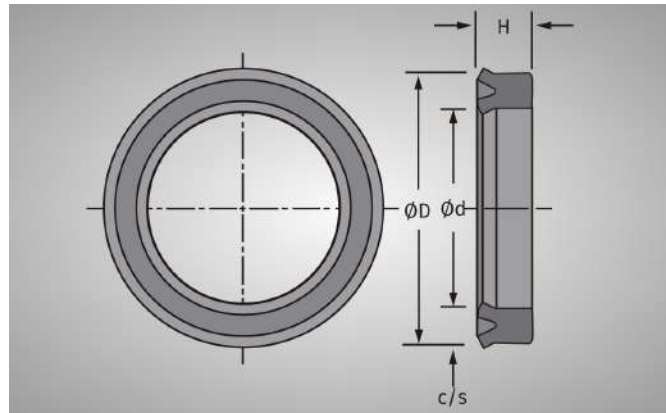
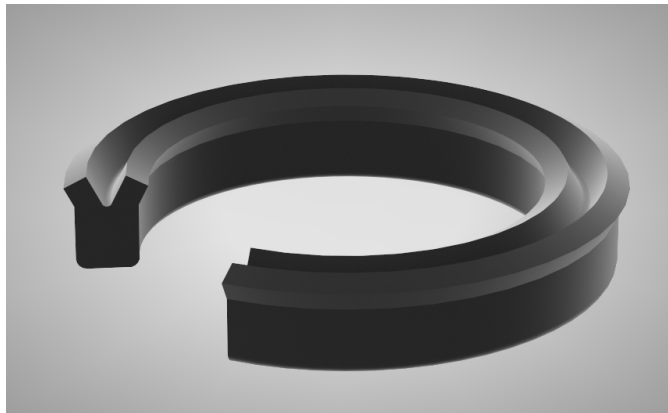
SYMMETRICAL U-CUPS

Series 15M (Metric Sizes)

25

U-CUPS & U-PACKS





CHARACTERISTICS

The Symmetrical U-Cup is a double chamfered U-Ring Seal manufactured from Unithane 292 A liquid cast Polyurethane. This material, which is used for many of our other products, 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 rod and piston sealing applications.

The sealing lips are knife trimmed to eliminate all moulding flash and to provide superior low pressure sealing performance.

Series 15M U-Cups can be easily snapped into a groove or stretched over a one piece piston. Once installed they will immediately return to their original dimensions.

MATERIAL

- Type:
Unithane 292 A, Liquid Cast Polyurethane
- Hardness:
Durometer 92 A
- Fluid Compatibility:
See Material Specifications:
Technical Bulletin USM-03

ORDERING INFORMATION

Please enquire about tooling availability before ordering. Nominal tooling charges may apply for some sizes. Refer to the Part Number List (Technical Bulletin UNM-03) and find the 'Dash Number' corresponding to the nominal dimensions (shown at right) of the seal required.

Add Prefix Number '15M' to signify a Symmetrical U-Cup in a Metric size.

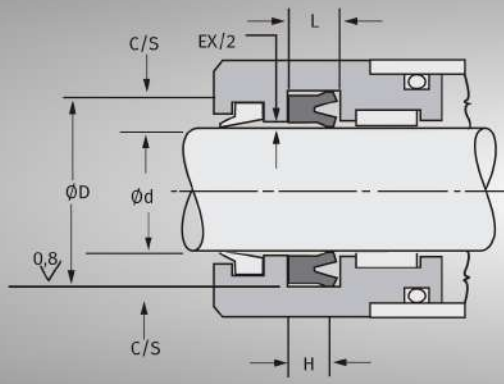
e.g. A Symmetrical U-Cup 100mm ϕd x 120mm ϕD x 15mm H is Part N°. 15M-100120-15.

SYMMETRICAL U-CUPS

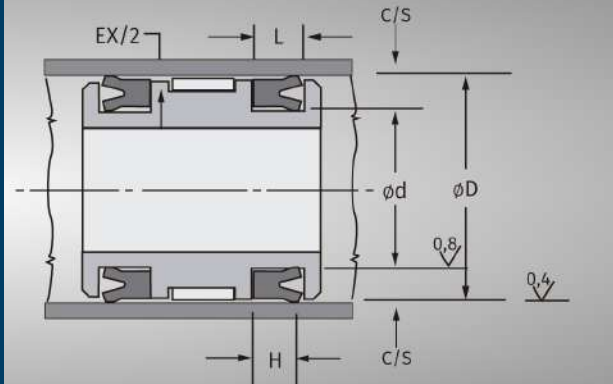
Series 15M (Metric Sizes)



ROD APPLICATIONS



PISTON APPLICATIONS



GROOVE WIDTH (mm)

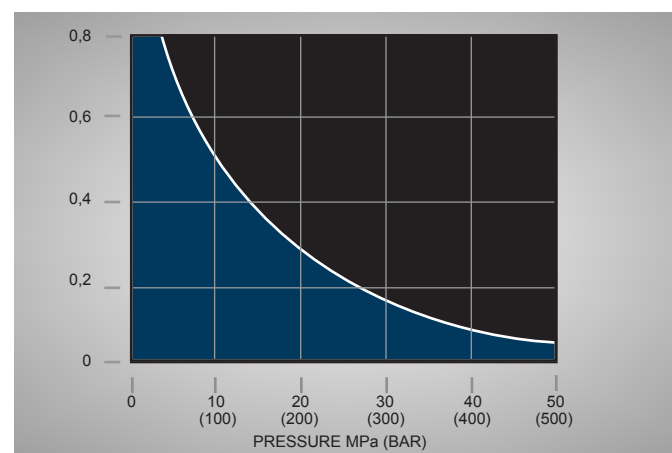
H	4,0	4,5	5,0	5,1	5,5	5,8	6,0	6,8	7,0	7,2	7,5	8,0	8,5	9,0	9,5	9,6	10,0	10,5
L +0,4 -0,0	4,5	5,0	5,5	5,6	6,0	6,3	6,5	7,8	8,0	8,2	8,5	9,0	9,5	10,0	10,5	10,6	11,0	11,5

H	11,0	11,5	11,8	12,0	12,5	13,0	13,5	14,0	15,0	15,5	16,0	17,0	18,0	18,5	20,0	22,0	25,0	26,0
L +0,4 -0,0	12,0	12,5	12,8	13,0	13,5	14,0	14,5	15,0	16,0	16,5	17,0	18,0	19,0	19,5	21,0	23,0	26,0	27,0

GROOVE DEPTH (mm)

C/S (Nominal Groove Depth)	Diametrical Tolerances			
	Rod Applications		Piston Applications	
	Rod. Dia.	Groove Dia.	Cyl. Dia.	Groove Dia.
3,0	+0,0 -0,03	+0,05 -0,0	+0,05 -0,0	+0,0 -0,05
3,5	+0,0 -0,03	+0,05 -0,0	+0,05 -0,0	+0,0 -0,05
4,0	+0,0 -0,03	+0,05 -0,0	+0,05 -0,0	+0,0 -0,05
5,0	+0,0 -0,05	+0,05 -0,0	+0,05 -0,0	+0,0 -0,05
6,0	+0,0 -0,05	+0,08 -0,0	+0,08 -0,0	+0,0 -0,08
7,5	+0,0 -0,05	+0,09 -0,0	+0,08 -0,0	+0,0 -0,09
10,0	+0,0 -0,05	+0,13 -0,0	+0,10 -0,0	+0,0 -0,13
12,5	+0,0 -0,06	+0,17 -0,0	+0,12 -0,0	+0,0 -0,17
15,0	+0,0 -0,08	+0,22 -0,0	+0,15 -0,0	+0,0 -0,22

SUGGESTED MAXIMUM EXTRUSION GAPS (EX) mm



The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges. Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

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SYMMETRICAL U-CUPS

SERIES 15M (Metric Sizes)

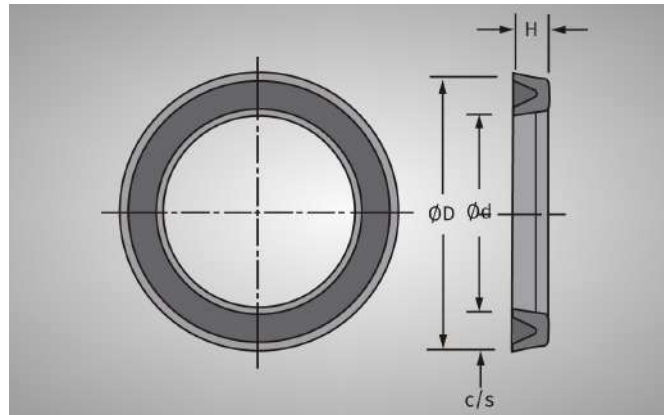
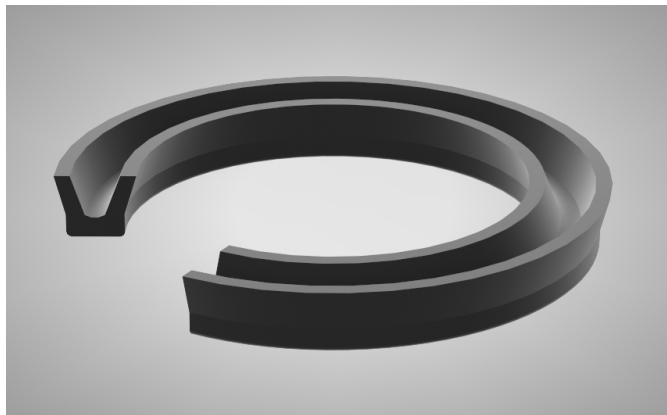
A.N. TYPE U-CUPS

Series 16M (Metric Sizes)

26

U-CUPS & U-PACKS





CHARACTERISTICS

The A.N. Type U-Cup is the original U-Cup design and was previously manufactured from rubber. Our Series 16M seals are made from thermosetting liquid cast polyurethane, which delivers up to ten times the service life of nitrile rubber.

The Cross section of the A N. Type seal has a symmetrical profile with considerably flexible lips. The lips are knife trimmed at 90° to the seal axis. The lip design insures a lighter preload condition when the seal is installed.

This, in turn, reduces friction and break out force.

A.N. Type U-Cups are most suited to pneumatic and low pressure hydraulic use, in both rod and piston applications.

MATERIAL

- Type: Unithane 292 A, Liquid Cast Polyurethane
- Hardness: Durometer 92 A
- Fluid Compatibility: See Material Specifications: Technical Bulletin USM-03

ORDERING INFORMATION

Please enquire about tooling availability before ordering.

Nominal tooling charges may apply for some sizes.

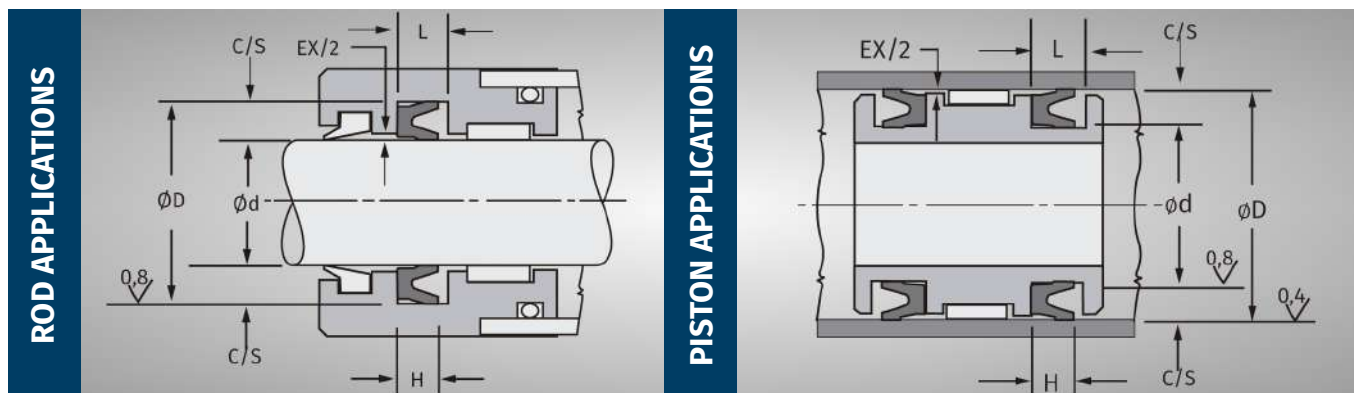
Refer to the Part Number List (Technical Bulletin UNM-03) and find the 'Dash Number' corresponding to the nominal dimensions (shown at right) of the seal required.

Add Prefix Number '16M' to signify an A.N. Type U-Cup in a Metric size.

e.g. An **A.N. Type U-Cup** 100mm ϕd x 120mm ϕD x 15mm H is **Part 16M-100120-15**.

A.N. TYPE U-CUPS

Series 16M (Metric Sizes)



GROOVE WIDTH (mm)

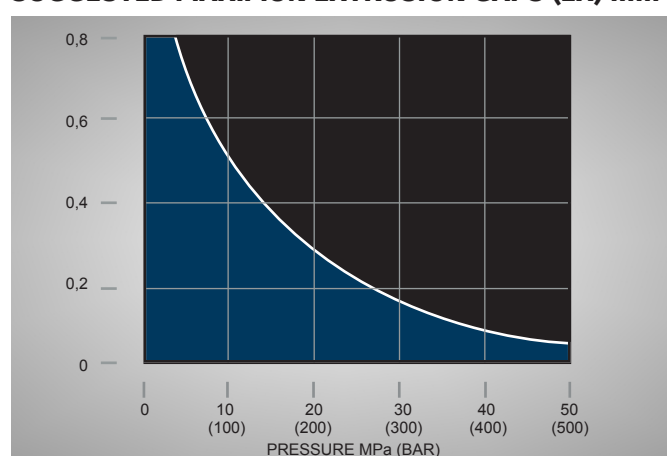
H	4,0	4,5	5,0	5,1	5,5	5,8	6,0	6,8	7,0	7,2	7,5	8,0	8,5	9,0	9,5	9,6	10,0	10,5
L +0,4 -0,0	4,5	5,0	5,5	5,6	6,0	6,3	6,5	7,8	8,0	8,2	8,5	9,0	9,5	10,0	10,5	10,6	11,0	11,5

H	11,0	11,5	11,8	12,0	12,5	13,0	13,5	14,0	15,0	15,5	16,0	17,0	18,0	18,5	20,0	22,0	25,0	26,0
L +0,4 -0,0	12,0	12,5	12,8	13,0	13,5	14,0	14,5	15,0	16,0	16,5	17,0	18,0	19,0	19,5	21,0	23,0	26,0	27,0

GROOVE DEPTH (mm)

C/S (Nominal Groove Depth)	Diametrical Tolerances			
	Rod Applications		Piston Applications	
	Rod. Dia.	Groove Dia.	Cyl. Dia.	Groove Dia.
3,0	+0,0 -0,03	+0,05 -0,0	+0,05 -0,0	+0,0 -0,05
3,5	+0,0 -0,03	+0,05 -0,0	+0,05 -0,0	+0,0 -0,05
4,0	+0,0 -0,03	+0,05 -0,0	+0,05 -0,0	+0,0 -0,05
5,0	+0,0 -0,05	+0,05 -0,0	+0,05 -0,0	+0,0 -0,05
6,0	+0,0 -0,05	+0,08 -0,0	+0,08 -0,0	+0,0 -0,08
7,5	+0,0 -0,05	+0,09 -0,0	+0,08 -0,0	+0,0 -0,09
10,0	+0,0 -0,05	+0,13 -0,0	+0,10 -0,0	+0,0 -0,13
12,5	+0,0 -0,06	+0,17 -0,0	+0,12 -0,0	+0,0 -0,17
15,0	+0,0 -0,08	+0,22 -0,0	+0,15 -0,0	+0,0 -0,22

SUGGESTED MAXIMUM EXTRUSION GAPS (EX) mm



The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges. Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

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A.N. TYPE U-CUPS

SERIES 16M (Metric Sizes)

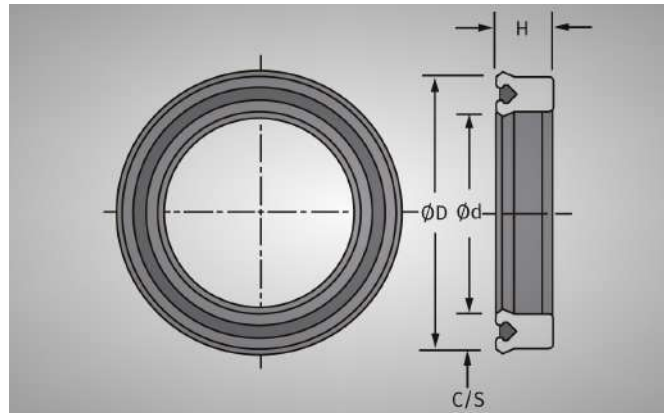
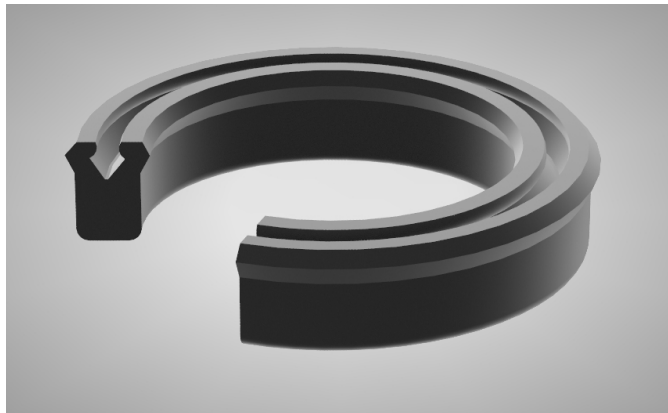
U-PACKS

Series 30M (Metric Sizes)

27

U-CUPS & U-PACKS





CHARACTERISTICS

The new U-Pack loaded lip style U-Cup combines the latest design technology together with the superior field- tested physical characteristics of a liquid cast polyurethane to produce the best all purpose seal for use in standard hydraulic fluids. Thermosetting Unithane 292 A is a Moca cured liquid cast polyurethane which outperforms injection molded grades of polyurethane in all aspects including cut strength, abrasion, resistance, compression set, and temperature range.

The inner elastomeric spring element of nitrile rubber is designed and strategically positioned to create the necessary lip interference without excessive friction. This energizer is securely held inside the Unithane outer shell so that it will not become disengaged when severely distorted as is sometimes necessary when installing U-Packs on rod seal applications. The nitrile spring element is split prior to assembly to avoid trapped pressure from forcing the spring element outward into the seal cavity during rapid or severe fluctuations of system pressure. The nitrile spring also enhances low temperature sealing characteristics down to -40°C, insures superior low pressure sealing performance and compensates for the gradual wear associated with normal cylinder cycling thereby providing longer service life.

The sealing lips of Series N°. 30M U-Packs are knife trimmed to eliminate all moulding flash and to provide complete circumferential lip contact which also helps to insure maximum low pressure sealing performance.

MATERIAL

- Seal: Unithane 292 A, Liquid Cast Polyurethane, Duro 92 A
- Energizer: Nitrile Rubber, Duro 70 A
- Fluid Compatibility: See Material Specifications: Technical Bulletin USM-03

ORDERING INFORMATION

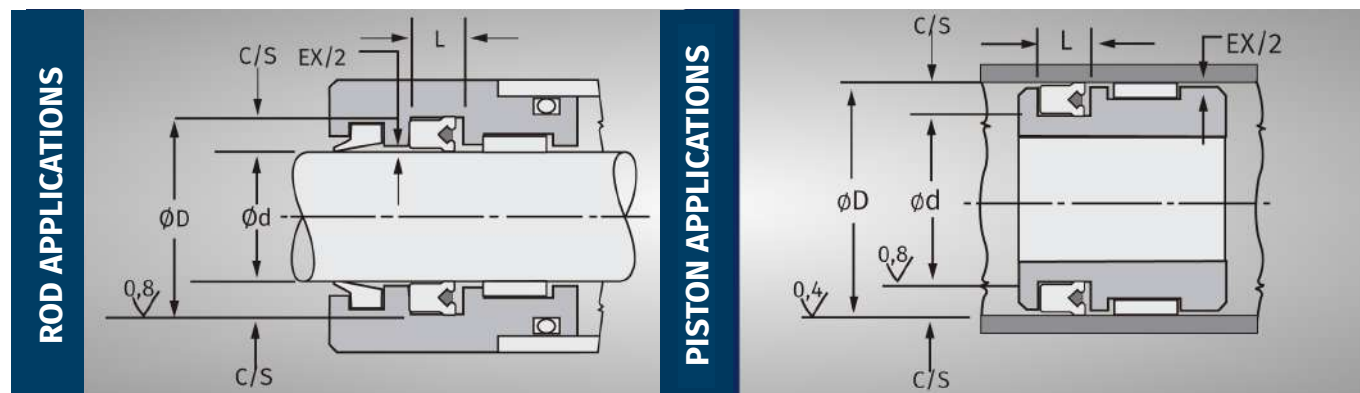
Please enquire about tooling availability before ordering.

Nominal tooling charges may apply for some sizes.

Refer to the Part Number List (Technical Bulletin UNM-03) and find the 'Dash Number' corresponding to the nominal dimensions (shown at right) of the seal required.

Add Prefix Number '**30M**' to signify a Metric U-Pack.

e.g. A **U-Pack** 100mm ϕ d x 120mm ϕ D x 15mm H is PartN°. **30M-100120-15.**



GROOVE WIDTH (mm)

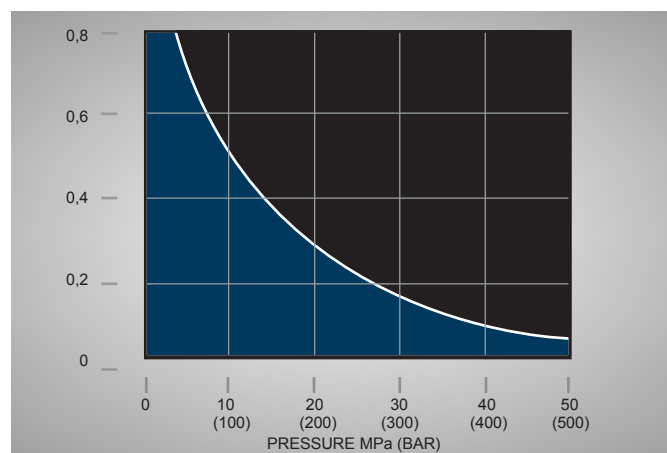
H	4,0	4,5	5,0	5,1	5,5	5,8	6,0	6,8	7,0	7,2	7,5	8,0	8,5	9,0	9,5	9,6	10,0	10,5
L +0,4 -0,0	4,5	5,0	5,5	5,6	6,0	6,3	6,5	7,8	8,0	8,2	8,5	9,0	9,5	10,0	10,5	10,6	11,0	11,5

H	11,0	11,5	11,8	12,0	12,5	13,0	13,5	14,0	15,0	15,5	16,0	17,0	18,0	18,5	20,0	22,0	25,0	26,0
L +0,4 -0,0	12,0	12,5	12,8	13,0	13,5	14,0	14,5	15,0	16,0	16,5	17,0	18,0	19,0	19,5	21,0	23,0	26,0	27,0

GROOVE DEPTH (mm)

C/S (Nominal Groove Depth)	Diametrical Tolerances			
	Rod Applications		Piston Applications	
	Rod. Dia.	Groove Dia.	Cyl. Dia.	Groove Dia.
3,0	+0,0 -0,03	+0,05 -0,0	+0,05 -0,0	+0,0 -0,05
3,5	+0,0 -0,03	+0,05 -0,0	+0,05 -0,0	+0,0 -0,05
4,0	+0,0 -0,03	+0,05 -0,0	+0,05 -0,0	+0,0 -0,05
5,0	+0,0 -0,05	+0,05 -0,0	+0,05 -0,0	+0,0 -0,05
6,0	+0,0 -0,05	+0,08 -0,0	+0,08 -0,0	+0,0 -0,08
7,5	+0,0 -0,05	+0,09 -0,0	+0,08 -0,0	+0,0 -0,09
10,0	+0,0 -0,05	+0,13 -0,0	+0,10 -0,0	+0,0 -0,13
12,5	+0,0 -0,06	+0,17 -0,0	+0,12 -0,0	+0,0 -0,17
15,0	+0,0 -0,08	+0,22 -0,0	+0,15 -0,0	+0,0 -0,22

SUGGESTED MAXIMUM EXTRUSION GAPS (EX) mm



The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges. Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

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U-PACKS

SERIES 30M (Metric Sizes)

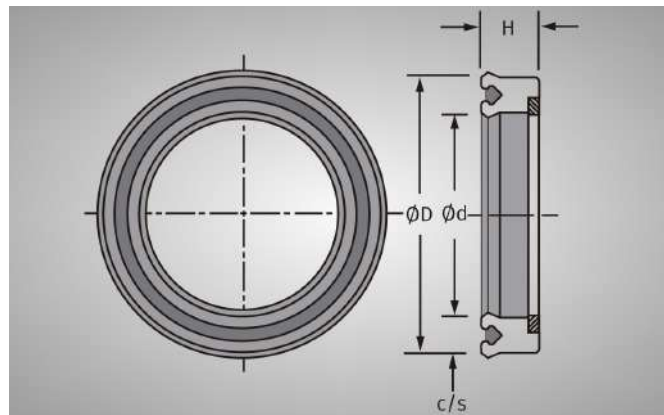
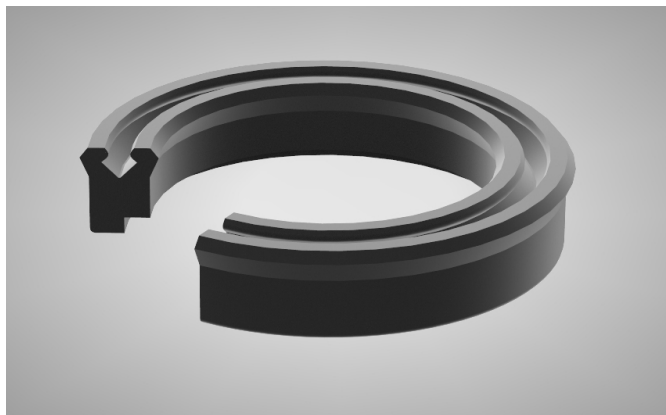
HIGH PRESSURE U-PACKS

Series 31M (Metric Sizes)

28

U-CUPS & U-PACKS





CHARACTERISTICS

The High Pressure U-Pack is a heavy duty rod seal, which incorporates a 75 shore D polyurethane Anti-extrusion ring. This allows the seal to be used in higher pressure applications or cylinders with wider extrusion gaps.

Refer to the extrusion gap chart on page 27(2) to determine the maximum pressure for this seal in your application. The seal material is thermoset polyurethane and the energizer is nitrile rubber, especially formulated for low compression set. The energizer profile is the unique Universal Seal diamond section.

MATERIAL

- Seal: Unithane 292 A, Liquid Cast Polyurethane, Duro 92 A
- Energizer: Nitrile Rubber, Duro 70 A
- Anti-extrusion Ring: Unithane 475 D, Liquid Cast Polyurethane, Duro 75 D
- Fluid Compatibility: See Material Specifications: Technical Bulletin USM-03

ORDERING INFORMATION

Please enquire about tooling availability before ordering.

Nominal tooling charges may apply for some sizes.

Refer to the Part Number List (Technical Bulletin UNM-03) and find the 'Dash Number' corresponding to the nominal dimensions (shown at right) of the seal required.

Add Prefix Number '31M' to signify a Metric High Pressure U-Pack.

e.g. A **High Pressure U-Pack** 100mm ϕd x 120mm ϕD x 15mm H is Part N°. **31M-100120-15**.

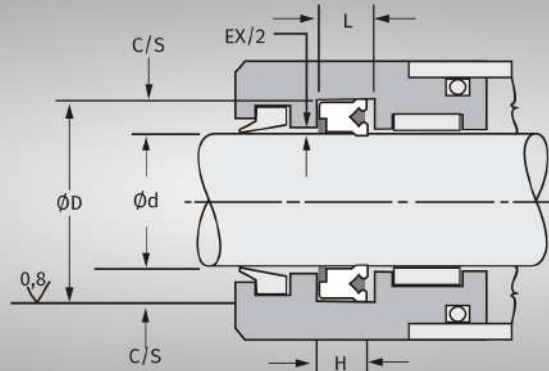


HIGH PRESSURE U-PACKS

Series 31M (Metric Sizes)



HIGH PRESSURE U-PACKS



GROOVE WIDTH (mm)

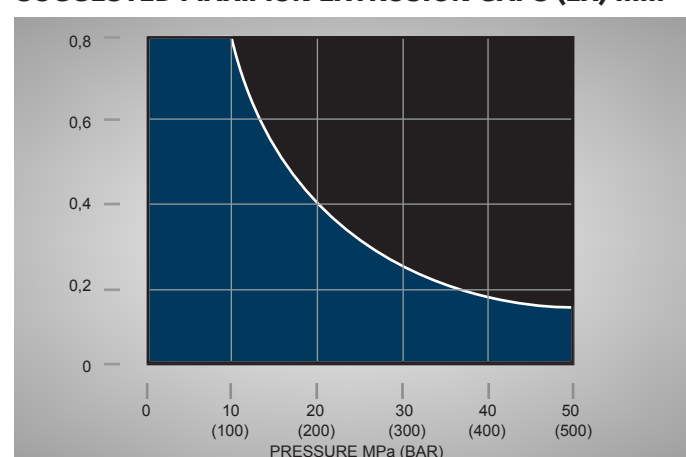
H	4,0	4,5	5,0	5,1	5,5	5,8	6,0	6,8	7,0	7,2	7,5	8,0	8,5	9,0	9,5	9,6	10,0	10,5
L +0,4 -0,0	4,5	5,0	5,5	5,6	6,0	6,3	6,5	7,8	8,0	8,2	8,5	9,0	9,5	10,0	10,5	10,6	11,0	11,5

H	11,0	11,5	11,8	12,0	12,5	13,0	13,5	14,0	15,0	15,5	16,0	17,0	18,0	18,5	20,0	22,0	25,0	26,0
L +0,4 -0,0	12,0	12,5	12,8	13,0	13,5	14,0	14,5	15,0	16,0	16,5	17,0	18,0	19,0	19,5	21,0	23,0	26,0	27,0

GROOVE DEPTH (mm)

C/S (Nominal-Groove Depth)	Diametrical Tolerances	
Frac	Cyl. Dia.	Groove Dia.
3,0	+0,0 -0,03	+0,05 -0,0
3,5	+0,0 -0,03	+0,05 -0,0
4,0	+0,0 -0,03	+0,05 -0,0
5,0	+0,0 -0,05	+0,05 -0,0
6,0	+0,0 -0,05	+0,08 -0,0
7,5	+0,0 -0,05	+0,09 -0,0
10,0	+0,0 -0,05	+0,13 -0,0
12,5	+0,0 -0,06	+0,17 -0,0
15,0	+0,0 -0,08	+0,22 -0,0

SUGGESTED MAXIMUM EXTRUSION GAPS (EX) mm

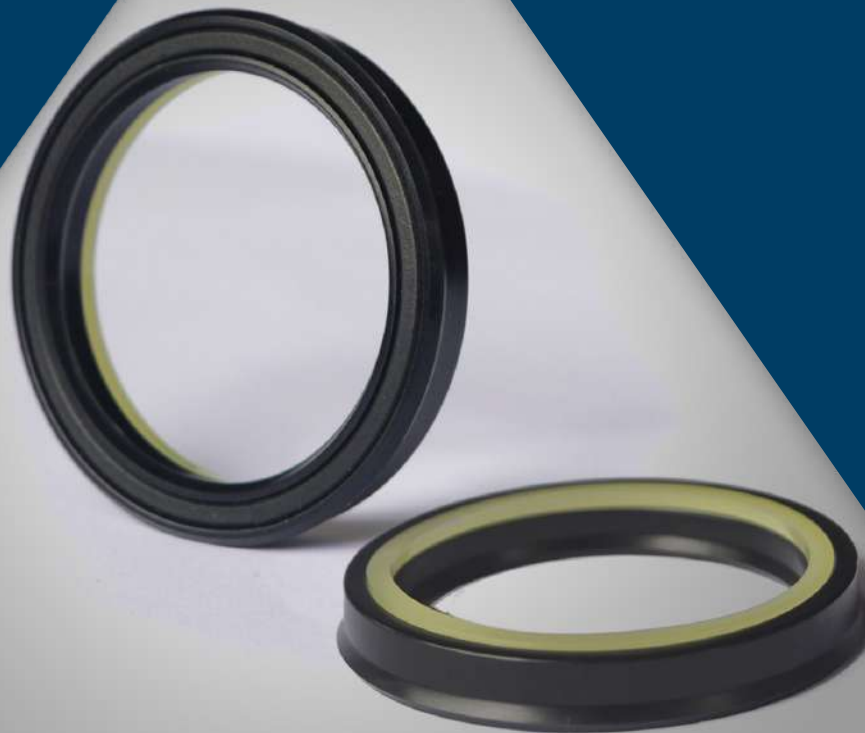


The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges. Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

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HIGH PRESSURE U-PACKS

SERIES 31M (Metric Sizes)

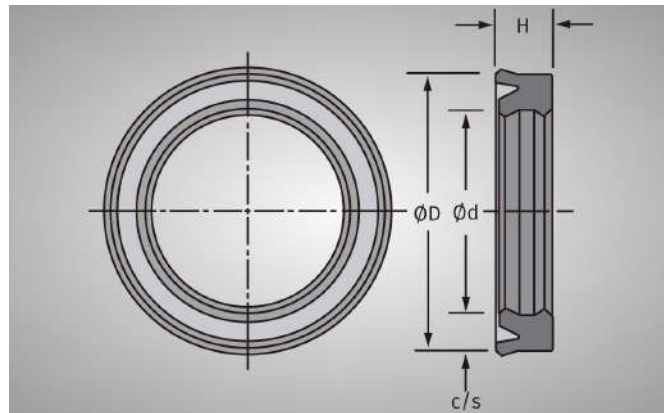
TRIPLE LIP RO. U-CUPS

Series 33M (Metric Sizes)

29

U-CUPS & U-PACKS





CHARACTERISTICS

The Triple Lip RO. U-Cup is a development of the series 13 RO. U-Cup. Like the series 13 it has an asymmetrical section and an interference fit on the outside diameter.

It also has the additional feature of a third lip on the inside heel. This extra lip offers the following benefits:

- Improved stability of the seal within the groove.
- Secondary sealing capability and protection of the primary lip.
- Improved lubrication due to the lubrication pocket created between the primary and secondary lips.
- The secondary lip's profile maintains boundary lubrication, allowing it to return to the system.

MATERIAL

- Type: Unithane 292 A, Liquid Cast Polyurethane
- Hardness: Durometer 92 A
- Fluid Compatibility: See Material Specifications: Technical Bulletin USM-03

ORDERING INFORMATION

Please enquire about tooling availability before ordering.

Nominal tooling charges may apply for some sizes.

Refer to the Part Number List (Technical Bulletin UNM-03) and find the 'Dash Number' corresponding to the nominal dimensions (shown at right) of the seal required.

Add Prefix Number '33M' to signify an **Triple Lip RO. U-Cup** in a Metric size.

e.g. An **Triple Lip RO. U-Cup** 100mm ϕd x 120mm ϕD x 15mm H is **Part N°. 33M-100120-15**.

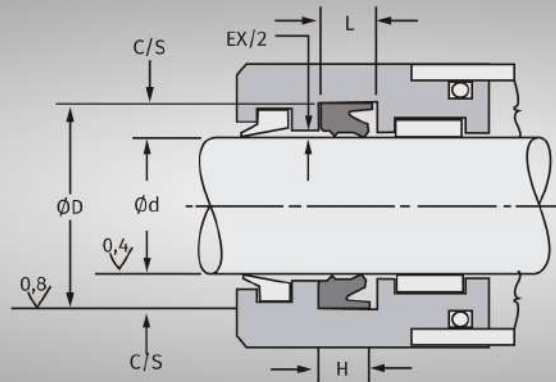


TRIPLE LIP RO. U-CUPS

Series 33M (Metric Sizes)



TRIPLE LIP RO. U-CUPS



GROOVE WIDTH (mm)

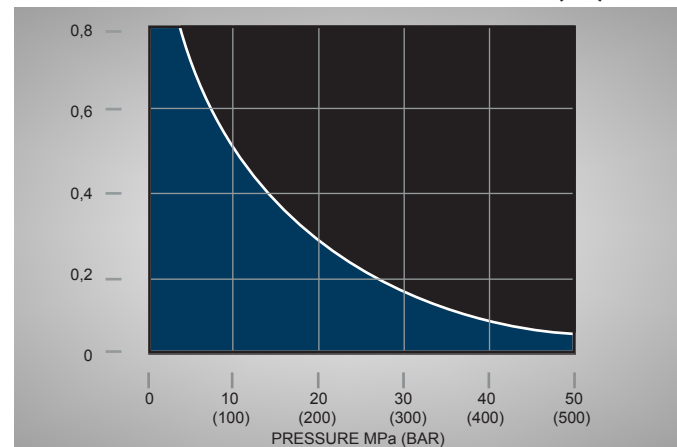
H	4,0	4,5	5,0	5,1	5,5	5,8	6,0	6,8	7,0	7,2	7,5	8,0	8,5	9,0	9,5	9,6	10,0	10,5
L +0,4 -0,0	4,5	5,0	5,5	5,6	6,0	6,3	6,5	7,8	8,0	8,2	8,5	9,0	9,5	10,0	10,5	10,6	11,0	11,5

H	11,0	11,5	11,8	12,0	12,5	13,0	13,5	14,0	15,0	15,5	16,0	17,0	18,0	18,5	20,0	22,0	25,0	26,0
L +0,4 -0,0	12,0	12,5	12,8	13,0	13,5	14,0	14,5	15,0	16,0	16,5	17,0	18,0	19,0	19,5	21,0	23,0	26,0	27,0

GROOVE DEPTH (mm)

C/S (Nominal-Groove Depth)	Diametrical Tolerances	
Frac	Cyl. Dia.	Groove Dia.
3,0	+0,0 -0,03	+0,05 -0,0
3,5	+0,0 -0,03	+0,05 -0,0
4,0	+0,0 -0,03	+0,05 -0,0
5,0	+0,0 -0,05	+0,05 -0,0
6,0	+0,0 -0,05	+0,08 -0,0
7,5	+0,0 -0,05	+0,09 -0,0
10,0	+0,0 -0,05	+0,13 -0,0
12,5	+0,0 -0,06	+0,17 -0,0
15,0	+0,0 -0,08	+0,22 -0,0

SUGGESTED MAXIMUM EXTRUSION GAPS (EX) mm



The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges. Eccentricity, ovality, bearing clearance, and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

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TRIPLE LIP RO. U-CUPS

SERIES 33M (Metric Sizes)

O-PACK

Series 35 (Metric Sizes)

30



CHARACTERISTICS

The O-Pack – 35 series is a U-cup with an O-ring inserted inside of it.

A nitrile rubber O-Ring is loaded into a Universal seal U-cup to create our O-pack 35 series.

The U-cup has the superior physical characteristics of a liquid cast polyurethane.

This combination produces an excellent seal for use in standard hydraulic fluids.

It is comparable to all loaded U-cups.

ADVANTAGES

1. No embedded Air Bubbles
2. Knife trimmed lips
3. No tooling on standard sizes
4. Price Competitive - Price advantage on first orders over our Loaded U-Pack





O-PACK

SERIES 35 (METRIC SIZES)



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O-PACK

SERIES 35 (INCH SIZES)

PART NUMBER LIST

FOR SERIES 13M, 14M, 15M, 16M, 30M,
31M and 33M (METRIC SIZES)

31

U-CUPS & U-PACKS



The Dash Numbers contained in this list define the nominal inside and outside diameters and height of seal only. When ordering, to be sure to add the correct Series Number in front of the Dash Number. The Series Number designates the specific seal design.

e.g. A Symmetrical U-Cup (Series 15M) 100mm $\varnothing$ d x 120mm $\varnothing$ D x 15mm H, is Part N°. 15M-100120-15.

3mm Cross Section

Dash N°	Nominal Size, mm		
	$\varnothing$ d	$\varnothing$ D	H
-008014-04	8	14	4
-008014-06	8	14	6
-010016-04	10	16	4
-010016-05	10	16	5
-010016-06	10	16	6
-012018-04	12	18	4
-012018-05	12	18	5
-012018-06	12	18	6
-014020-04	14	20	4
-016022-04	16	22	4
-016022-05	16	22	5
-016022-06	16	22	6
-016022-10	16	22	10
-018024-04	18	24	4
-018024-05	18	24	5
-020026-05	20	26	5
-022028-05	22	28	5
-022028-08	22	28	8
-024030-05	24	30	5
-039045-04	39	45	4
-040046-04	40	46	4
-050056-08	50	56	8
-074080-08	74	80	8

3,5mm Cross Section

Dash N°	Nominal Size, mm		
	$\varnothing$ d	$\varnothing$ D	H
-012019-5,1	12	19	5,1
-014021-5,1	14	21	5,1
-016023-5,1	16	23	5,1
-018025-5,1	18	25	5,1
-022029-5,1	22	29	5,1

4mm Cross Section

Dash N°	Nominal Size, mm		
	$\varnothing$ d	$\varnothing$ D	H
-008016-04	8	16	4
-008016-06	8	16	6
-008016-08	8	16	8
-009017-06	9	17	6
-010018-05	10	18	5
-010018-08	10	18	8
-012020-04	12	20	4
-012020-04,5	12	20	4,5
-012020-05,5	12	20	5,5
-012020-08	12	20	8
-014022-04	14	22	4
-014022-04,5	14	22	4,5
-014022-06	14	22	6
-014022-08	14	22	8
-016024-04	16	24	4
-016024-05,5	16	24	5,5

PART NUMBER LIST

FOR SERIES 13M, 14M, 15M, 16M, 30M, 31M and 33M (METRIC SIZES)



4mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-016024-05,8	16	24	5,8
-017025-04,5	17	25	4,5
-017025-05,5	17	25	5,5
-017025-09,5	17	25	9,5
-017025-10	17	25	10
-018026-04	18	26	4
-018026-05,5	18	26	5,5
-018026-05,8	18	26	5,8
-020028-04	20	28	4
-020028-05,8	20	28	5,8
-020028-06	20	28	6
-020028-08	20	28	8
-022030-04,5	22	30	4,5
-022030-05,8	22	30	5,8
-022030-06	22	30	6
-022030-10	22	30	10
-024032-04	24	32	4
-024032-05,5	24	32	5,5
-024032-06	24	32	6
-024032-07	24	32	7
-025033-04,5	25	33	4,5
-025033-05,5	25	33	5,5
-025033-05,8	25	33	5,8
-025033-07	25	33	7
-025033-10	25	33	10
-027035-10	27	35	10
-028036-05,8	28	36	5,8
-028036-06	28	36	6
-032040-04	32	40	4
-032040-06	32	40	6
-032040-07	32	40	7
-032040-08	32	40	8
-036044-05,8	36	44	5,8
-037045-09	37	45	9
-040048-08	40	48	8
-040048-11	40	48	11
-042050-06	42	50	6
-042050-10	42	50	10
-045053-05,8	45	53	5,8
-045053-10	45	53	10
-045053-12	45	53	12
-048056-12	48	56	12
-060068-08	60	68	8
-060068-12,5	60	68	12,5
-062070-08	62	70	8
-070078-12	70	78	12

4mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-072080-12	72	80	12
-078086-08	78	86	8
-095103-12	95	103	12
-097105-08	97	105	8
-100108-12	100	108	12

5mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-008018-08	8	18	8
-008018-09	8	18	9
-010020-08	10	20	8
-010022-05	12	22	5
-010022-07	12	22	7
-012022-08	12	22	8
-014024-08	14	24	8
-015025-05	15	25	5
-015025-08	15	25	8
-016026-05	16	26	5
-016026-08	16	26	8
-018028-08	18	28	8
-020030-08	20	30	8
-020030-10	20	30	10
-022032-05	22	32	5
-022032-08	22	32	8
-022032-110	22	32	10
-024034-05	24	34	5
-025035-05	25	35	5
-025035-07	25	35	7
-025035-08	25	35	8
-025035-10	25	35	10
-028038-05	28	38	5
-028038-07,2	28	38	7,2
-028038-08	28	38	8
-028038-10	28	38	10

5mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-028038-20	28	38	20
-030040-05	30	40	5
-030040-07	30	40	7
-030040-10	30	40	10
-032042-05,8	32	42	5,8
-032042-07	32	42	7
-032042-07,2	32	42	7,2
-032042-10	32	42	10
-033043-06	33	43	6
-034044-11	34	44	11
-035045-06	35	45	6
-035045-08	35	45	8
-035045-09	35	45	9
-035045-10	35	45	10
-036046-06	36	46	6
-036046-07	36	46	7
-036046-07,2	36	46	7,2
-036046-10	36	46	10
-040050-05	40	50	5
-040050-06	40	50	6
-040050-07	40	50	7
-040050-07,2	40	50	7,2
-040050-08	40	50	8
-040050-10	40	50	10
-045055-06	45	55	6
-045055-07	45	55	7
-045055-07,2	45	55	7,2
-045055-10	45	55	10
-050060-06	50	60	6
-050060-07	50	60	7
-050060-07,2	50	60	7,2
-050060-10	50	60	10
-050060-12	50	60	12
-052062-06	52	62	6
-052062-12	52	62	12
-053063-06	53	63	6
-053063-07	53	63	7
-053063-12	53	63	12
-055065-05	55	65	5
-055065-05	55	65	10
-055065-12	55	65	12
-055065-13,5	55	65	13,5
-056066-06,8	56	66	6,8
-056066-07	56	66	7
-056066-10	56	66	10
-058068-10,5	58	68	10,5

5mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-060070-07	60	70	7
-060070-10	60	70	10
-060070-12	60	70	12
-060070-13,5	60	70	13,5
-063073-07	63	73	7
-063073-12	63	73	12
-065075-12	65	75	12
-065075-13,5	65	75	13,5
-066076-10	66	76	10
-068078-10	68	78	10
-070080-06,8	70	80	6,8
-070080-07	70	80	7
-070080-11	70	80	11
-070080-12	70	80	12
-075085-12	75	85	12
-075085-13,5	75	85	13,5
-080090-06,8	80	90	6,8
-080090-07	80	90	7
-080090-10	80	90	10
-080090-12	80	90	12
-080090-13,5	80	90	13,5
-080090-14	80	90	14
-090100-04,5	90	100	4,5
-090100-06,8	90	100	6,8
-090100-07	90	100	7
-090100-10,5	90	100	10,5
-090100-11,8	90	100	11,8
-090100-14	90	100	14
-100110-05	100	110	5
-100110-07	100	110	7
-100110-14	100	110	14
-110120-13,5	110	120	13,5
-115125-14	115	125	14
-120130-13,5	120	130	13,5
-125135-13,5	125	135	13,5
-130140-13,5	130	140	13,5
-140150-11,8	140	150	11,8
-140150-14	140	150	14
-150160-13,5	150	160	13,5

PART NUMBER LIST

FOR SERIES 13M, 14M, 15M, 16M, 30M, 31M and 33M (METRIC SIZES)



6mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-008020-08	8	20	8
-010022-06	10	22	6
-010022-08	10	22	8
-012024-06	12	24	6
-012024-09	12	24	9
-012024-10	12	24	10
-016028-06	16	28	6
-018030-06	18	30	6
-018030-08	18	30	8
-018030-10	18	30	10
-020032-08	20	32	8
-020032-10	20	32	10
-022034-06	22	34	6
-022034-10	22	34	10
-023035-10	23	35	10
-026038-06	26	38	6
-028040-09	28	40	9
-028040-10	28	40	10
-030042-10	30	42	10
-032044-06	32	44	6
-036048-06	36	48	6
-038050-06	38	50	6
-038050-09	38	50	9
-040052-08	40	52	8
-045057-06	45	57	6
-048060-06	48	60	6
-048060-09	48	60	9
-050062-06	50	62	6
-050062-09	50	62	9
-051063-06	51	63	6
-053065-06	53	65	6
-053065-10	53	65	10
-056068-08,5	56	68	8,5
-058070-06	58	70	6
-058070-08,5	58	70	8,5
-060072-06	60	72	6
-060072-08,5	60	72	8,5
-061073-06	61	73	6
-062074-13	62	74	13
-063075-08,5	63	75	8,5
-068080-08,5	68	80	8,5
-068080-12	68	80	12
-070082-08,5	70	82	8,5
-070082-12	70	82	12
-072084-06	72	84	6
-080092-08,5	80	92	8,5

6mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-086098-12	86	98	12
-088100-06	88	100	6
-090102-08,5	90	102	8,5
-100112-16	100	112	16
-106118-12	106	118	12
-113125-08,5	113	125	8,5
-148160-15,5	148	160	15,5
-238250-14	238	250	14
-288300-14	288	300	14

7,5mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-010025-06	10	25	6
-010025-08	10	25	8
-010025-10	10	25	10
-015030-08	15	30	8
-015030-10	15	30	10
-017032-10	17	32	10
-019034-08	19	34	8
-020035-10	20	35	10
-020035-11	20	35	11
-025040-06	25	40	6
-025040-10	25	40	10
-025040-11	25	40	11
-028043-10	28	43	10
-030045-10	30	45	10
-035050-08	35	50	8
-035050-10	35	50	10
-036051-10	36	51	10
-040055-10	40	55	10
-045060-10	45	60	10
-048063-12	48	63	12
-050065-10	50	65	10
-050065-12	50	65	12
-055070-07,5	55	70	7,5
-055070-10	55	70	10
-055070-12	55	70	12
-056071-08,5	56	71	8,5

7,5mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-056071-10	56	71	10
-056071-11,5	56	71	11,5
-056071-12	56	71	12
-060075-10	60	75	10
-060075-11,5	60	75	11,5
-060075-12	60	75	12
-063078-08,5	63	78	8,5
-063078-10	63	78	10
-063078-11,5	63	78	11,5
-063078-12	63	78	12
-065080-07,5	65	80	7,5
-065080-08,5	65	80	8,5
-065080-10	65	80	10
-065080-11	65	80	11
-065080-11,5	65	80	11,5
-065080-12	65	80	12
-070085-07,5	70	85	7,5
-070085-08,5	70	85	8,5
-070085-10	70	85	10
-070085-11,5	70	85	11,5
-070085-12	70	85	12
-075090-07,5	75	90	7,5
-075090-10	75	90	10
-075090-11,5	75	90	11,5
-075090-12	75	90	12
-080095-07,5	80	95	7,5
-080095-08,5	80	95	8,5
-080095-10	80	95	10
-080095-11,5	80	95	11,5
-080095-12	80	95	12
-085100-07,5	85	100	7,5
-085100-08,5	85	100	8,5
-085100-11,5	85	100	11,5
-085100-12	85	100	12
-090105-07,5	90	105	7,5
-090105-08,5	90	105	8,5
-090105-11,5	90	105	11,5
-090105-12	90	105	12
-095110-07,5	95	110	7,5
-095110-11,5	95	110	11,5
-095110-12	95	110	12
-095110-15	95	110	15
-100115-10	100	115	10
-100115-12	100	115	12
-105120-08	105	120	8
-110125-07,5	110	125	7,5

7,5mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-110125-09,6	110	125	9,6
-110125-10	110	125	10
-110125-11	110	125	11
-110125-11,5	110	125	11,5
-110125-12	110	125	12
-110125-15	110	125	15
-120135-15	120	135	15
-125140-10	125	140	10
-125140-11	125	140	11
-125140-15	125	140	15
-135150-10	135	150	10
-140155-9,6	140	155	9,6
-140155-11	140	155	11
-140155-11,5	140	155	11,5
-143158-12	143	158	12
-145160-10	145	160	10
-215230-07,5	215	230	7,5
-215230-15	215	230	15

4mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-010030-10	10	30	10
-012032-10	12	32	10
-015035-10	15	35	10
-016036-10	16	36	10
-018038-10	18	38	10
-020040-10	20	40	10
-020040-11	20	40	11
-020040-12	20	40	12
-023043-10	23	43	10
-024044-10	24	44	10
-025045-10	25	45	10
-025045-12	25	45	12
-028048-10	28	48	10
-028048-12	28	48	12
-030050-10	30	50	10
-030050-12	30	50	12
-032052-10	32	52	10
-035055-10	35	55	10
-035055-12	35	55	12
-036056-12	36	56	12
-038058-10	38	58	10

PART NUMBER LIST

FOR SERIES 13M, 14M, 15M, 16M, 30M, 31M and 33M (METRIC SIZES)



10mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-038058-12	38	58	12
-040060-10	40	60	10
-040060-12	40	60	12
-040060-13	40	60	13
-042062-10	42	62	10
-042062-12	42	62	12
-042062-18	42	62	18
-043063-10	43	63	10
-045065-10	45	65	10
-045065-12	45	65	12
-042066-10	46	66	10
-048068-10	48	68	10
-048068-12	48	68	12
-050070-10	50	70	10
-050070-12	50	70	12
-050070-18	50	70	18
-052072-12	52	72	12
-055075-10	55	75	10
-055075-12	55	75	12
-060080-10	60	80	10
-060080-12	60	80	12
-060080-18	60	80	18
-062082-10	62	82	10
-063083-15	63	83	15
-065085-10	65	85	10
-065085-12	65	85	12
-070090-10	70	90	10
-070090-12	70	90	12
-070090-13	70	90	13
-070090-18	70	90	18
-075095-10	75	95	10
-075095-12	75	95	12
-080100-10	80	100	10
-080100-12	80	100	12
-080100-15	80	100	15
-085105-10	85	105	10
-085105-12	85	105	12
-085105-15	85	105	15
-085105-18	85	105	18
-090110-10	90	110	10
-090110-12	90	110	12
-090110-15	90	110	15
-090110-18	90	110	18
-095115-10	95	115	10
-095115-12	95	115	12
-095115-15	95	115	15

10mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-095115-18	95	115	18
-100120-10	100	120	10
-100120-12	100	120	12
-100120-15	100	120	15
-105125-10	105	125	10
-105125-11,5	105	125	11,5
-105125-15	105	125	15
-110130-10	110	130	10
-110130-12	110	130	12
-110130-14	110	130	14
-110130-15	110	130	15
-110130-18	110	130	18
-115133-15	115	135	15
-120140-10	120	140	10
-120140-12	120	140	12
-120140-15	120	140	15
-125145-10	125	145	10
-125145-12	125	145	12
-125145-14	125	145	14
-125145-15	125	145	15
-125145-18	125	145	18
-130150-10	130	150	10
-130150-12	130	150	12
-130150-15	130	150	15
-135155-15	135	155	15
-140160-12	140	160	12
-140160-14	140	160	14
-140160-15	140	160	15
-145165-15	145	165	15
-150170-10	150	170	10
-150170-15	150	170	15
-150170-18	150	170	18
-160180-14	160	180	14
-160180-15	160	180	15
-170190-15	170	190	15
-180200-10	180	200	10
-180200-14	180	200	14
-180200-15	180	200	15
-180200-18	180	200	18
-190210-15	190	210	15
-200220-15	200	220	15
-200220-18	200	220	18
-210230-15	210	230	15
-220240-15	220	240	15
-240260-15	240	260	15
-240260-17	240	260	17

10mm Cross Section

Dash N°	Nominal Size, mm		H
	Ød	ØD	
-250270-15	250	270	15
-270290-17	270	290	17
-280300-15	280	300	15
-310330-17	310	330	17

12,5mm Cross Section

Dash N°	Nominal Size, mm		H
	Ød	ØD	
-160185-18,5	160	185	18,5
-180205-18,5	180	205	18,5
-200225-18,5	200	225	18,5

15mm Cross Section

Dash N°	Nominal Size, mm		H
	Ød	ØD	
-040070-15	40	70	15
-055085-15	55	85	15
-060090-15	60	90	15
-063093-15	63	93	15
-065095-15	65	95	15
-070100-15	70	100	15
-075105-15	75	105	15
-080110-15	80	110	15
-085115-15	85	110	15
-090120-15	90	120	15
-090120-18	90	120	18
-100130-15	100	130	15
-100130-18	100	130	18
-110140-15	110	140	15
-110140-18	110	140	18
-115145-18	115	145	18
-120150-15	120	150	15
-120150-18	120	150	18
-125155-15	125	155	15
-125155-18	125	155	18
-130160-15	130	160	15
-130160-18	130	160	18
-135165-15	135	165	15
-135165-18	135	165	18
-140170-15	140	170	15
-140170-18	140	170	18
-140170-20	140	170	20
-140170-26	140	170	26
-145175-15	145	175	15
-145175-18	145	175	18
-145175-26	145	175	26
-150180-15	150	180	15
-150180-18	150	180	18
-150180-26	150	180	26
-155185-15	155	185	15
-155185-26	155	185	26
-160190-15	160	190	15
-160190-18	160	190	18
-160190-20	160	190	22
-165195-15	165	195	15
-165195-26	165	195	26
-170200-15	170	200	15
-170200-18	170	200	18
-170200-22	170	200	22
-170200-26	170	200	26
-175205-15	175	205	15

PART NUMBER LIST

FOR SERIES 13M, 14M, 15M, 16M, 30M, 31M and 33M (METRIC SIZES)



15mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-175205-20	175	205	20
-180210-15	175	210	15
-180210-22	175	210	22
-180210-26	180	210	26
-185215-15	185	215	15
-190220-15	190	220	15
-190220-18	190	220	18
-190220-22	190	220	22
-190220-26	190	220	26
-195225-15	195	225	15
-195225-26	195	225	26
-200230-15	200	230	15
-200230-17	200	230	17
-200230-18	200	230	18
-200230-22	200	230	22
-200230-26	200	230	26
-205235-18	205	235	18
-210240-18	210	240	18
-210240-20	210	240	20
-220250-15	220	250	15
-220250-18	220	250	18
-220250-26	220	250	26
-225255-15	225	255	15
-225255-26	225	255	26
-230260-22	230	260	22
-240270-18	240	270	18
-250280-18	250	280	18
-250280-22	250	280	22
-250280-25	250	280	25
-250280-26	250	280	26
-270300-15	270	300	15
-270300-18	270	300	18
-270300-22	270	300	22
-280310-15	280	310	15
-280310-18	280	310	18
-290320-20	290	320	20
-300330-16	300	330	16
-300330-22	300	330	22
-320350-16	320	350	16
-320350-20	320	350	20
-320350-22	320	350	22
-320350-26	320	350	26
-330360-20	330	360	20
-360390-20	360	390	20
-360390-22	360	390	22
-370400-20	370	400	20

15mm Cross Section

Dash N°	Nominal Size, mm		
	Ød	ØD	H
-400430-20	400	430	20
-400430-26	400	430	26
-420450-15	420	450	15



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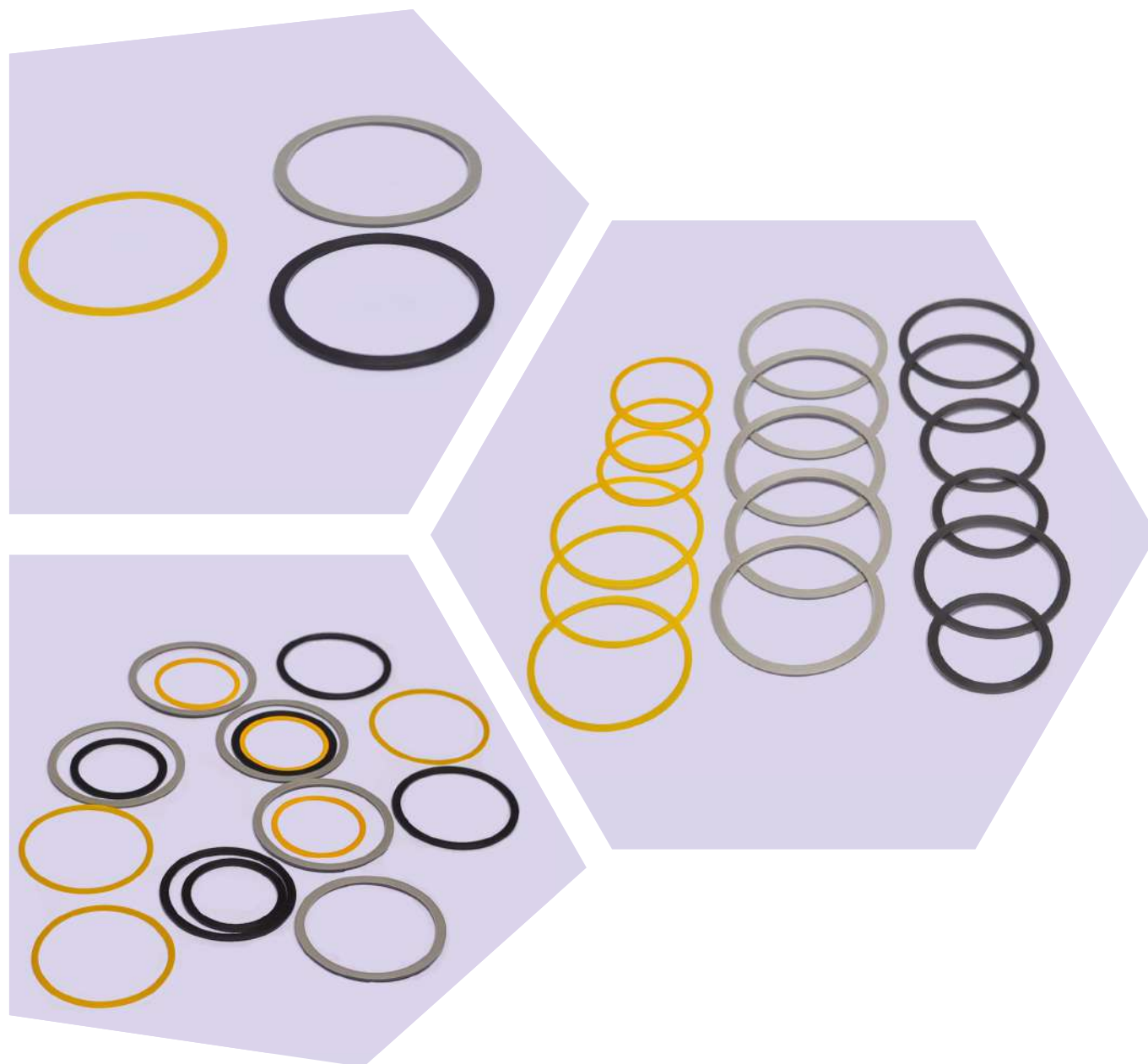
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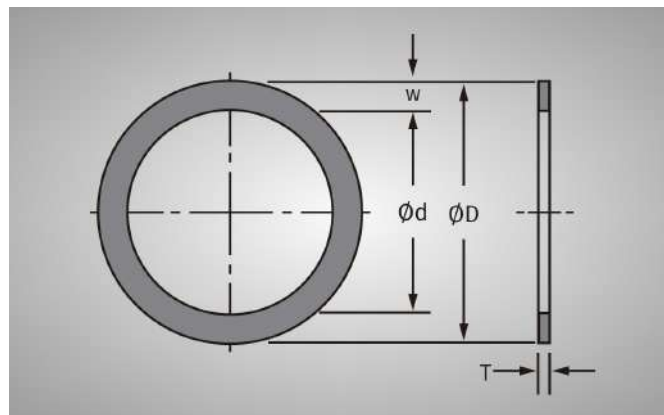
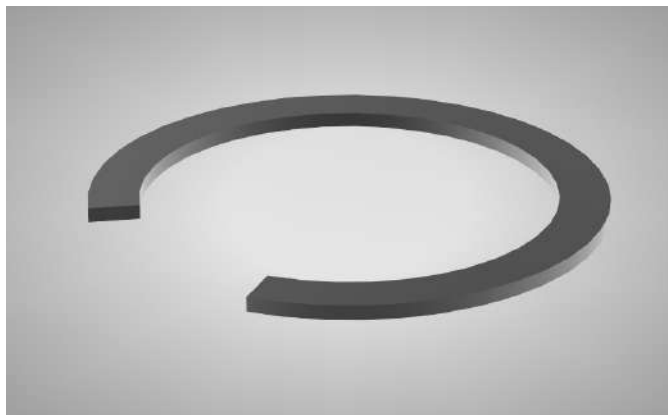
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BACK-UP WASHERS

Series 19M (Metric Sizes)

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CHARACTERISTICS

Back-Up Washers are used in conjunction with 'O'-Rings for both static and dynamic sealing applications. They prevent extrusion of the 'O'-Ring when it is subjected to high pressures, or when the extrusion gaps are excessive.

On double acting cylinders two Back-Up Washers should be used, one on each side of the 'O'-Ring.

All Series 19M Back-Up Washers are continuous one piece rings, so they will not pinch 'O'-Rings. The Polyurethane material used, allows the rings to be stretched over pistons for easy installation.

TYPE AVAILABLE

For general use (i.e. either for rod or piston): request Series 19M

RO. and PI. type Back-Up Washers are available upon request.

MATERIAL

Type: Unithane 395 A, Liquid Cast Polyurethane

Hardness: Durometer 95 A

Fluid Compatibility: See Material Specifications: Technical Bulletin USM-03

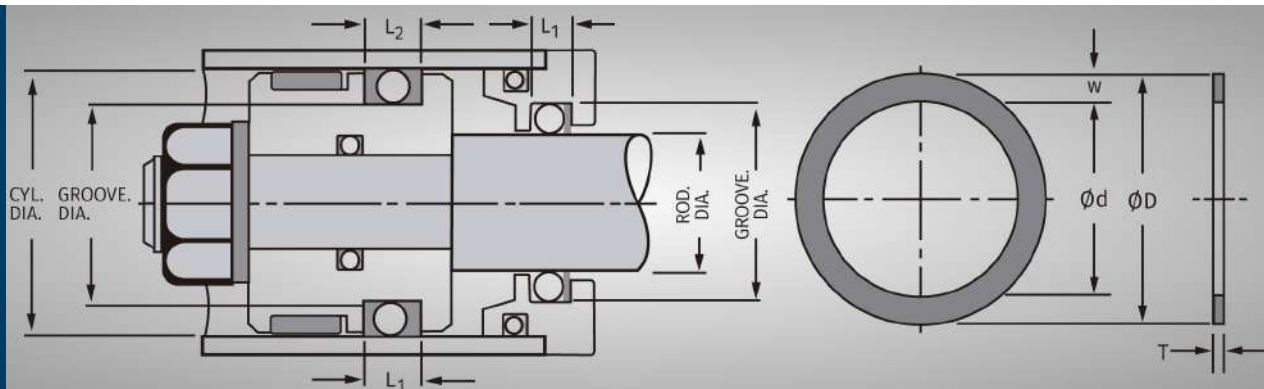


BACK-UP WASHERS

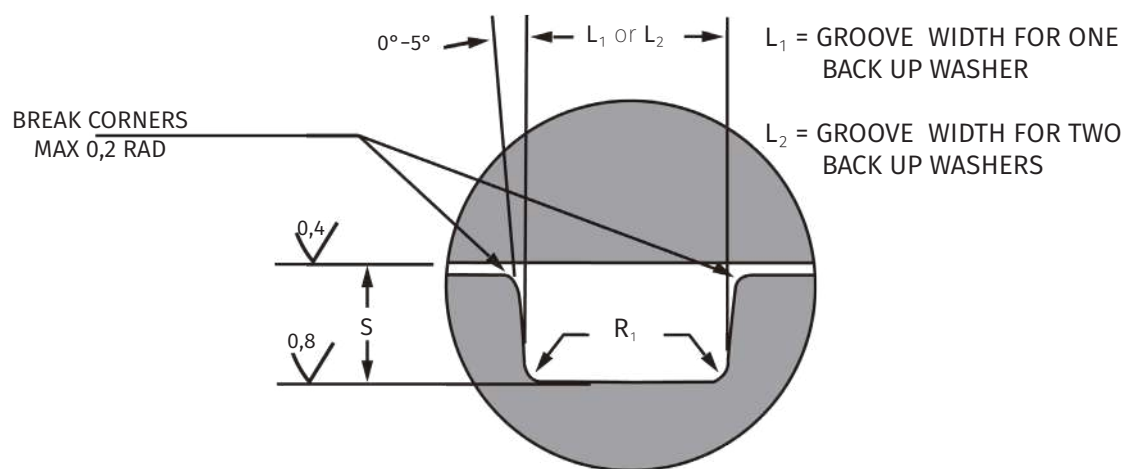
Series 19M (Metric Sizes)



BACK-UP WASHERS



GROOVE DETAIL



'O' - Ring C/S	Back-Up Washer			Groove Dimensions			
	W (Cross Section)	T* (Thickness)	L ₁ One Washer	L ₂ Two Washer	S		R ₁
					Dynamic	Static	
2,4	2,0 +0,0 -0,16	1,3 ±0,1	4,6 TO 4,8	6,0 TO 6,2	2,0	1,8	0,5
3,0	2,5 +0,0 -0,16	1,3 ±0,1	5,4 TO 5,6	6,8 TO 7,0	2,5	2,4	1,0
5,7	5,0 +0,0 -0,26	1,7 ±0,1	9,3 TO 9,5	11,1 TO 11,3	5,0	4,8	1,0
8,4	5,0 +0,0 -0,26	2,1 ±0,1	13,2 TO 13,4	15,4 TO 15,6	7,5	7,5	1,5

*OTHER THICKNESSES AVAILABLE ON REQUEST

2mm CROSS SECTION

Part N° 19M-	Nominal Dim.		T	Tol. ±	W	Tol. ±
	ød	DØ				
10/14 × 1,3	10	× 14	1,3	0,1	2,0	+0,0/-0,16
11/15 × 1,3	11	× 15	1,3	0,1	2,0	+0,0/-0,16
12/16 × 1,3	12	× 16	1,3	0,1	2,0	+0,0/-0,16
13/17 × 1,3	13	× 17	1,3	0,1	2,0	+0,0/-0,16
14/18 × 1,3	14	× 18	1,3	0,1	2,0	+0,0/-0,16
15/19 × 1,0	15	× 19	1,0	0,1	2,0	+0,0/-0,16
15/19 × 1,3	15	× 19	1,3	0,1	2,0	+0,0/-0,16
16/20 × 1,3	16	× 20	1,3	0,1	2,0	+0,0/-0,16
17/21 × 1,3	17	× 21	1,3	0,1	2,0	+0,0/-0,16
18/22 × 1,3	18	× 22	1,3	0,1	2,0	+0,0/-0,16
18/22 × 1,3	18	× 22	1,3	0,1	2,0	+0,0/-0,16
19/23 × 1,3	19	× 23	1,3	0,1	2,0	+0,0/-0,16
59/63 × 1,0	59	× 63	1,0	0,1	2,0	+0,0/-0,16

BACK-UP WASHERS

Series 19M (Metric Sizes)



2,5mm CROSS SECTION

Part N° 19M-	Nominal Dim.		T	Tol. ±	W	Tol. ±
	ød	Dø				
20/25 × 1,3	20	× 25	1,3	0,1	2,5	+0,0/-0,16
21/26 × 1,3	21	× 26	1,3	0,1	2,5	+0,0/-0,16
22/27 × 1,3	22	× 27	1,3	0,1	2,5	+0,0/-0,16
23/28 × 1,3	23	× 28	1,3	0,1	2,5	+0,0/-0,16
24/29 × 1,3	24	× 29	1,3	0,1	2,5	+0,0/-0,16
25/30 × 1,3	25	× 30	1,3	0,1	2,5	+0,0/-0,16
26/31 × 1,3	26	× 31	1,3	0,1	2,5	+0,0/-0,16
27/32 × 1,3	27	× 32	1,3	0,1	2,5	+0,0/-0,16
28/33 × 1,3	28	× 33	1,3	0,1	2,5	+0,0/-0,16
29/34 × 1,3	29	× 34	1,3	0,1	2,5	+0,0/-0,16
40/45 × 1,3	40	× 45	1,3	0,1	2,5	+0,0/-0,16
40/45 × 2,0	40	× 45	2,0	0,1	2,5	+0,0/-0,16
41/46 × 1,3	41	× 46	1,3	0,1	2,5	+0,0/-0,16
42/47 × 1,3	42	× 47	1,3	0,1	2,5	+0,0/-0,16
43/48 × 1,3	43	× 48	1,3	0,1	2,5	+0,0/-0,16
45/50 × 1,3	45	× 50	1,3	0,1	2,5	+0,0/-0,16
48,5/53,5 × 2,0	48,5	× 53,5	2,0	0,1	2,5	+0,0/-0,16
50/55 × 1,3	50	× 55	1,3	0,1	2,5	+0,0/-0,16
55/60 × 1,3	55	× 60	1,3	0,1	2,5	+0,0/-0,16
58/63 × 1,3	58	× 63	1,3	0,1	2,5	+0,0/-0,16
60/65 × 1,3	60	× 65	1,3	0,1	2,5	+0,0/-0,16
63/68 × 1,3	63	× 68	1,3	0,1	2,5	+0,0/-0,16
65/70 × 1,3	65	× 70	1,3	0,1	2,5	+0,0/-0,16
69/74 × 1,3	66	× 74	1,3	0,1	2,5	+0,0/-0,16
70/75 × 1,3	70	× 75	1,3	0,1	2,5	+0,0/-0,16
75/80 × 1,3	75	× 80	1,3	0,1	2,5	+0,0/-0,16
75/82,5 × 1,3	77,5	× 82,5	1,3	0,1	2,5	+0,0/-0,16
79/84 × 1,3	79	× 84	1,3	0,1	2,5	+0,0/-0,16
80/90 × 1,3	80	× 85	1,3	0,1	2,5	+0,0/-0,16
85/90 × 1,3	85	× 90	1,3	0,1	2,5	+0,0/-0,16
88/93 × 1,3	88	× 93	1,3	0,1	2,5	+0,0/-0,16
90/95 × 1,3	90	× 95	1,3	0,1	2,5	+0,0/-0,16
95/100 × 1,3	95	× 100	1,3	0,1	2,5	+0,0/-0,16
98/103 × 1,3	98	× 103	1,3	0,1	2,5	+0,0/-0,16
100/105 × 1,3	100	× 105	1,3	0,1	2,5	+0,0/-0,16
105/110 × 1,3	105	× 110	1,3	0,1	2,5	+0,0/-0,16
110/115 × 1,3	110	× 115	1,3	0,1	2,5	+0,0/-0,16
115/120 × 1,3	115	× 120	1,3	0,1	2,5	+0,0/-0,16
120/125 × 1,3	120	× 125	1,3	0,1	2,5	+0,0/-0,16
125/130 × 1,3	125	× 130	1,3	0,1	2,5	+0,0/-0,16
130/135 × 1,3	130	× 135	1,3	0,1	2,5	+0,0/-0,16
135/140 × 1,3	135	× 140	1,3	0,1	2,5	+0,0/-0,16
145/150 × 1,3	145	× 150	1,3	0,1	2,5	+0,0/-0,16
150/155 × 1,3	150	× 155	1,3	0,1	2,5	+0,0/-0,16
155/160 × 1,3	155	× 160	1,3	0,1	2,5	+0,0/-0,16

2,5mm CROSS SECTION

Part N° 19M-	Nominal Dim.		T	Tol. ±	W	Tol. ±
	ød	Dø				
165/170 x 1,3	165	170	1,3	0,1	2,5	+0.0/-0,16
170/175 x 1,3	170	175	1,3	0,1	2,5	+0.0/-0,16
175/180 x 1,3	175	180	1,3	0,1	2,5	+0.0/-0,16
180/185 x 1,3	180	185	1,3	0,1	2,5	+0.0/-0,16
185/190 x 1,3	185	190	1,3	0,1	2,5	+0.0/-0,16

5mm CROSS SECTION

Part N° 19M-	Nominal Dim.		T	Tol. ±	W	Tol. ±
	ød	Dø				
25/35 x 3,0	20	35	3,0	0,1	5,0	+0.0/-0,26
40/50 x 1,7	40	50	1,7	0,1	5,0	+0.0/-0,26
45/55 x 1,7	45	55	1,7	0,1	5,0	+0.0/-0,26
50/60 x 1,7	50	60	1,7	0,1	5,0	+0.0/-0,26
53/63 x 1,7	53	63	1,7	0,1	5,0	+0.0/-0,26
55/65 x 1,7	55	65	1,7	0,1	5,0	+0.0/-0,26
58/68 x 1,7	58	68	1,7	0,1	5,0	+0.0/-0,26
60/70 x 1,7	60	70	1,7	0,1	5,0	+0.0/-0,26
65/75 x 1,7	65	75	1,7	0,1	5,0	+0.0/-0,26
70/80 x 1,7	70	80	1,7	0,1	5,0	+0.0/-0,26
75/85 x 1,7	75	85	1,7	0,1	5,0	+0.0/-0,26
75/85 x 3,0	75	85	3,0	0,1	5,0	+0.0/-0,26
78/88 x 1,7	78	88	1,7	0,1	5,0	+0.0/-0,26
80/90 x 1,7	80	90	1,7	0,1	5,0	+0.0/-0,26
85/95 x 1,7	85	95	1,7	0,1	5,0	+0.0/-0,26
90/100 x 1,7	90	100	1,7	0,1	5,0	+0.0/-0,26
95/105 x 1,7	90	105	1,7	0,1	5,0	+0.0/-0,26
100/110 x 1,7	100	110	1,7	0,1	5,0	+0.0/-0,26
105/115 x 1,7	105	115	1,7	0,1	5,0	+0.0/-0,26
110/120 x 1,7	110	120	1,7	0,1	5,0	+0.0/-0,26
115/125 x 1,7	115	125	1,7	0,1	5,0	+0.0/-0,26
120/130 x 1,7	120	130	1,7	0,1	5,0	+0.0/-0,26
125/135 x 1,7	125	135	1,7	0,1	5,0	+0.0/-0,26
130/140 x 1,3	130	140	1,3	0,1	5,0	+0.0/-0,26
130/140 x 1,7	130	140	1,7	0,1	5,0	+0.0/-0,26
132/142 x 1,7	132	142	1,7	0,1	5,0	+0.0/-0,26
135/145 x 1,7	135	145	1,7	0,1	5,0	+0.0/-0,26

BACK-UP WASHERS

Series 19M (Metric Sizes)



5mm CROSS SECTION

Part N° 19M-	Nominal Dim.		T	Tol. ±	W	Tol. ±
	ød	Dø				
140/150 x 1,7	140	150	1,7	0,1	5,0	+0,0/-0,26
140/150 x 1,7	140	150	3,0	0,1	5,0	+0,0/-0,26
145/155 x 1,7	145	155	1,7	0,1	5,0	+0,0/-0,26
150/160 x 1,7	150	160	1,7	0,1	5,0	+0,0/-0,26
152/162 x 1,7	152	162	1,7	0,1	5,0	+0,0/-0,26
155/165 x 1,7	155	165	1,7	0,1	5,0	+0,0/-0,26
150/170 x 1,7	150	170	1,7	0,1	5,0	+0,0/-0,26
165/175 x 1,7	165	175	1,7	0,1	5,0	+0,0/-0,26
170/180 x 1,7	170	180	1,7	0,1	5,0	+0,0/-0,26
172/182 x 1,7	172	182	1,7	0,1	5,0	+0,0/-0,26
175/185 x 1,7	175	185	1,7	0,1	5,0	+0,0/-0,26
180/190 x 1,7	180	190	1,7	0,1	5,0	+0,0/-0,26
185/195 x 1,7	185	195	1,7	0,1	5,0	+0,0/-0,26
190/200 x 1,7	190	200	1,7	0,1	5,0	+0,0/-0,26
195/205 x 1,7	195	205	1,7	0,1	5,0	+0,0/-0,26
200/210 x 1,7	200	210	1,7	0,1	5,0	+0,0/-0,26
210/220 x 1,7	210	220	1,7	0,1	5,0	+0,0/-0,26
220/230 x 1,7	220	230	1,7	0,1	5,0	+0,0/-0,26
230/240 x 1,7	230	240	1,7	0,1	5,0	+0,0/-0,26
240/250 x 1,7	240	250	1,7	0,1	5,0	+0,0/-0,26
250/260 x 1,7	250	260	1,7	0,1	5,0	+0,0/-0,26

7,5mm CROSS SECTION

PART N° 19M-	NOMINAL DIM.		T	TOL. ±	W	TOL. ±
	ød	Dø				
145/160 X 2,1	145X160		2,1	0,1	7,5	+0,0/-0,30
150/165 X 2,1	150X165		2,1	0,1	7,5	+0,0/-0,30
155/170 X 2,1	155X170		2,1	0,1	7,5	+0,0/-0,30
160/175 X 2,1	160X175		2,1	0,1	7,5	+0,0/-0,30
165/180 X 2,1	165X180		2,1	0,1	7,5	+0,0/-0,30
170/185 X 2,1	170X185		2,1	0,1	7,5	+0,0/-0,30
175/190 X 2,1	175X190		2,1	0,1	7,5	+0,0/-0,30
180/195 X 2,1	180X195		2,1	0,1	7,5	+0,0/-0,30
185/200 X 2,1	185X200		2,1	0,1	7,5	+0,0/-0,30
190/205 X 2,1	190X205		2,1	0,1	7,5	+0,0/-0,30
220/235 X 2,1	220X235		2,1	0,1	7,5	+0,0/-0,30
225/240 X 2,1	225X240		2,1	0,1	7,5	+0,0/-0,30
230/245 X 2,1	230X245		2,1	0,1	7,5	+0,0/-0,30
235/250 X 2,1	235X250		2,1	0,1	7,5	+0,0/-0,30
240/255 X 2,1	240X255		2,1	0,1	7,5	+0,0/-0,30
245/260 X 2,1	245X260		2,1	0,1	7,5	+0,0/-0,30
250/265 X 2,1	250X265		2,1	0,1	7,5	+0,0/-0,30

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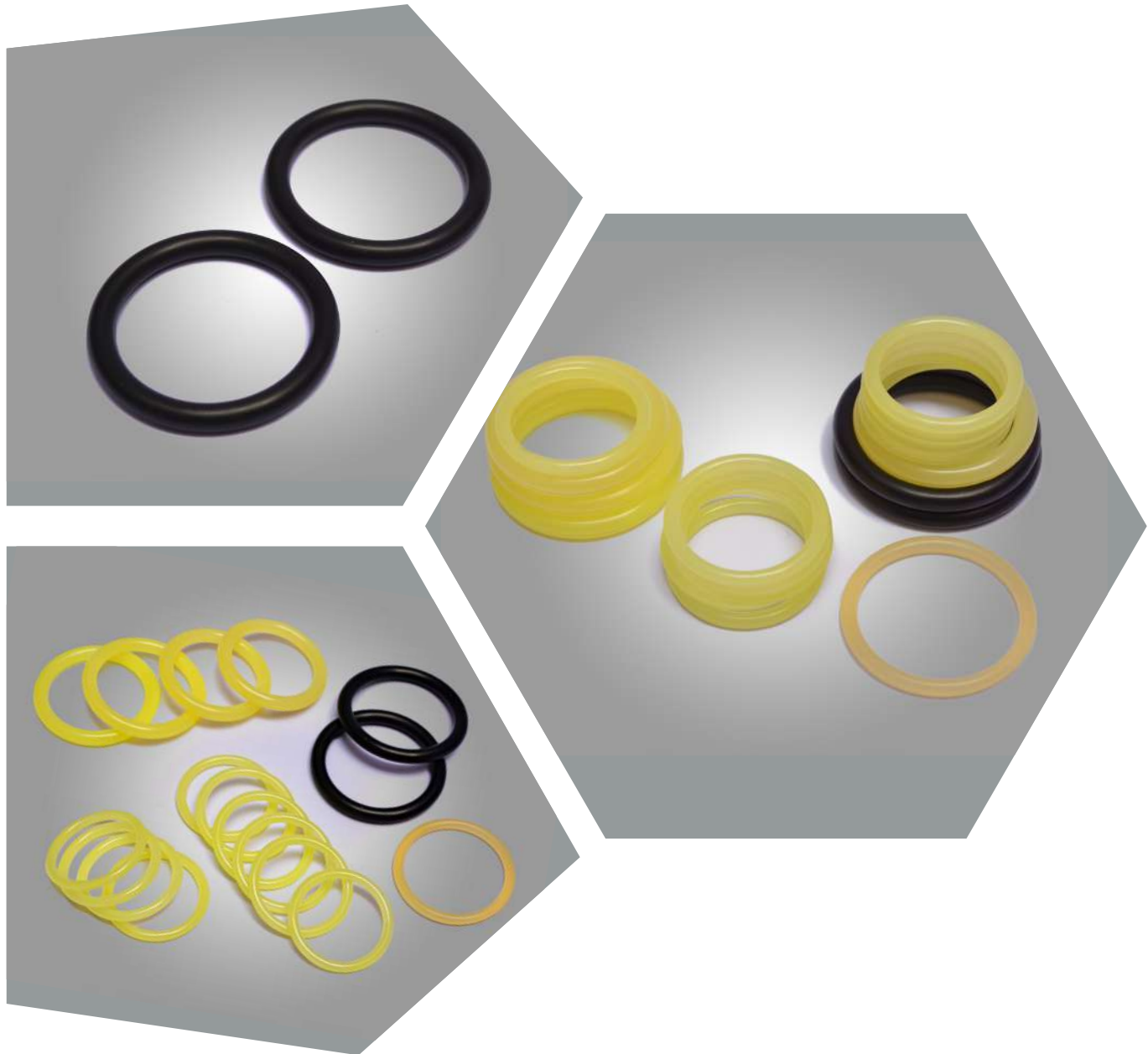
BACK UP WASHERS

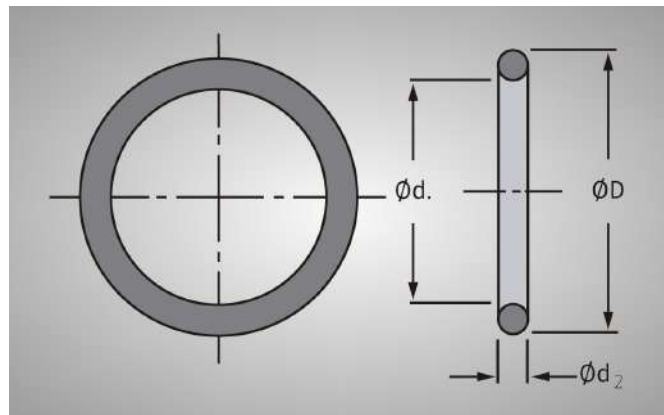
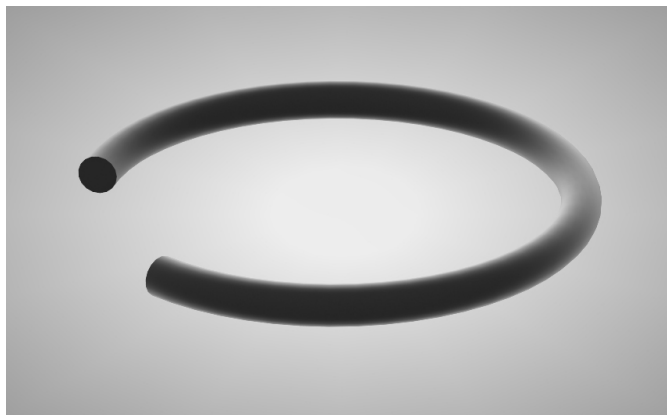
SERIES 19 (Metric Sizes)

'O'-RINGS

Series 20M (Metric Sizes)

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CHARACTERISTICS

Series 20M polyurethane 'O'-Rings are rugged, versatile seals, suitable for both dynamic and static sealing applications. They are manufactured from thermosetting liquid cast polyurethane of 92 A Durometer, and have exceptionally good abrasion resistant and extrusion resistant qualities. Polyurethane normally gives up to 10 times the service of nitrile rubber.

Their consistent quality exceeds the standard recommended for 'O'-Rings by the American "Rubber Manufacturers Association".

The suggested temperature and pressure limits are: -40°C to +90°C and 0-35 MPa(350 Bar) respectively.

DYNAMIC SEALING APPLICATIONS

'O'-Rings are often used as rod or piston seals in hydraulic and pneumatic cylinders. The 'O'-Ring must be installed in a rectangular groove with the correct radial squeeze (see Table 1, overleaf).

NOTE:

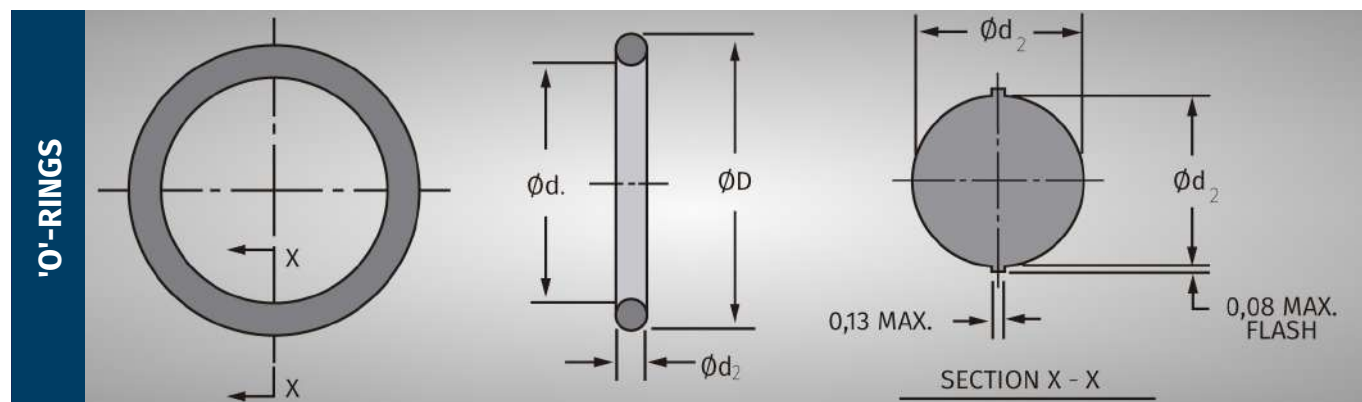
For static face seal applications see also Series 11M Flange seals, Technical Bulletin UFSM-03

STATIC SEALING APPLICATIONS

'O'-Rings may also be used as static seals, in flange connections, covers, pins, bolts, etc. The hard polyurethane material makes these 'O'-Rings especially suitable for applications with high or pulsating pressures. Correct gland dimensions are important for effective sealing (see Table 2, overleaf).

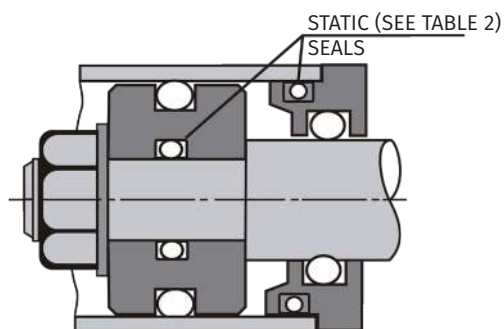
MATERIAL

- Type: Unithane 292 A, Liquid Cast Polyurethane
- Hardness: Durometer 92 A
- Fluid Compatibility: See Material Specifications: Technical Bulletin USM-03



RADIAL SQUEEZE SEALS

INDUSTRIAL RECIPROCATING 'O'-RING GLANDS



GROOVE DETAIL

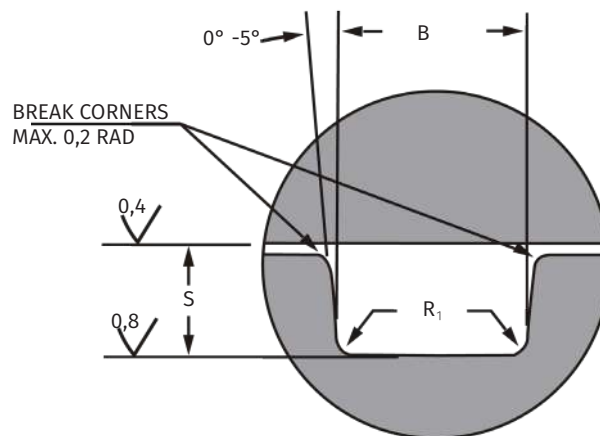
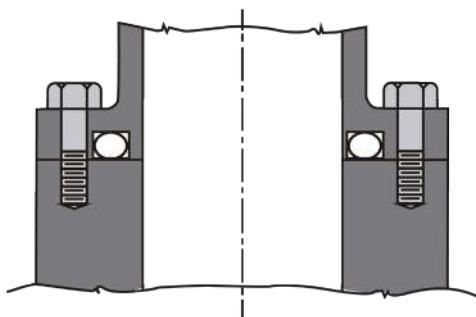


TABLE 1

ϕd_2 'O'-Ring Cross Section	S Groove Depth	Squeeze		B Groove Width	R ₁ Groove Radius
		mm	%		
2,4 ± 0,08	2,0	0,32-0,48	14-19	3,2-3,4	0,5
3,0 ± 0,1	2,5	0,4-0,6	14-19	4,0-4,2	1,0
5,7 ± 0,13	5,0	0,57-0,83	10-14	7,5-7,7	1,0
8,4 ± 0,15	7,5	0,75-1,05	9-12	11,0-11,2	1,5

AXIAL SQUEEZE SEALS

INDUSTRIAL STATIC SEAL 'O'-RING GLANDS



GROOVE DETAIL

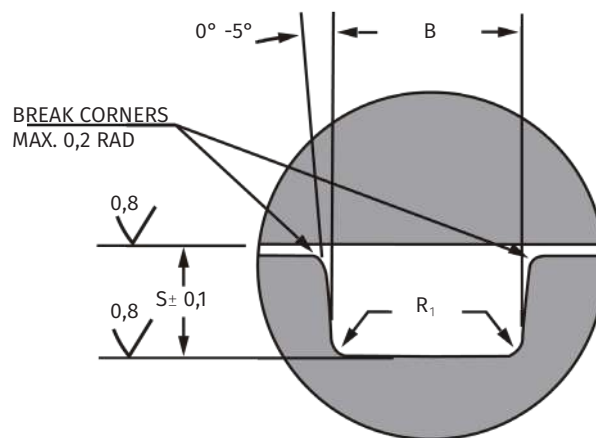


TABLE 2

Ød ₂ 'O'-Ring Cross Section	S Groove Depth		Squeeze				B Groove Width		R ₁ Groove Radius
			Radial		Axial				
	Radial	Axial	mm	%	mm	%	Radial	Axial	
2,4 ± 0,08	1,8	1,7	0,52-0,68	22-27	0,62-0,78	26-31	3,1-3,3	3,2-3,4	0,5
3,0 ± 0,1	2,4	2,2	0,5-0,7	17-23	0,7-0,9	24-29	3,7-3,9	4,0-4,2	1,0
5,7 ± 0,13	4,8	4,4	0,77-1,03	14-18	1,77-1,43	21-25	6,8-7,0	7,5-7,7	1,0
8,4 ± 0,15	7,5	6,6	0,75-1,05	9-12	1,65-1,95	20-23	9,0-9,2	10,0-10,2	1,5

Part N° 20M-	Actual Dimensions				
	Ø d	Tol ±	Ø d ₂	Tol ±	Ø D (Ref.)
3,3 x 2,4	3,3	0,15	2,4	0,08	8,1
4,3 x 2,4	4,3	0,15	2,4	0,08	9,1
5,3 x 2,4	5,3	0,15	2,4	0,08	10,1
6,3 x 2,4	6,3	0,15	2,4	0,08	11,1
7,3 x 2,4	7,3	0,17	2,4	0,08	12,1
8,3 x 2,4	8,3	0,17	2,4	0,08	13,1
9,3 x 2,4	9,3	0,17	2,4	0,08	14,1
9,8 x 2,4	9,8	0,17	2,4	0,08	14,6
10,3 x 2,4	10,3	0,2	2,4	0,08	15,1
10,8 x 2,4	10,8	0,2	2,4	0,08	15,6
11,0 x 2,4	11,0	0,2	2,4	0,08	15,8
11,3 x 2,4	11,3	0,2	2,4	0,08	16,1
11,6 x 2,4	11,6	0,2	2,4	0,08	16,4
11,8 x 2,4	11,8	0,2	2,4	0,08	16,6
12,3 x 2,4	12,3	0,2	2,4	0,08	17,1
12,8 x 2,4	12,8	0,2	2,4	0,08	17,6
13,3 x 2,4	13,3	0,2	2,4	0,08	18,1
13,8 x 2,4	13,8	0,2	2,4	0,08	18,6
14,3 x 2,4	14,3	0,2	2,4	0,08	19,1
14,8 x 2,4	14,8	0,2	2,4	0,08	19,6
15,3 x 2,4	15,3	0,2	2,4	0,08	20,1
15,8 x 2,4	15,8	0,2	2,4	0,08	20,6
16,3 x 2,4	16,3	0,25	2,4	0,08	21,1
16,6 x 2,4	16,6	0,25	2,4	0,08	21,4
16,8 x 2,4	16,8	0,25	2,4	0,08	21,6
17,3 x 2,4	17,3	0,25	2,4	0,08	22,1
17,8 x 2,4	17,8	0,25	2,4	0,08	22,6
18,8 x 2,4	18,8	0,25	2,4	0,08	23,6
19,8 x 2,4	19,8	0,25	2,4	0,08	24,6
20,8 x 2,4	20,8	0,25	2,4	0,08	25,6
21,8 x 2,4	21,8	0,25	2,4	0,08	26,6
30,3 x 2,4	30,3	0,32	2,4	0,08	34,8

'O'-RINGS

Series 20M (Metric Sizes)



Part N° 20M-	Actual Dimensions				
	Ø d	Tol ±	Ø d ₂	Tol ±	Ø D (Ref.)
33,3 x 2,4	33,3	0,32	2,4	0,08	38,1
52,8 x 2,4	52,8	0,5	2,4	0,08	57,6
17,0 x 3,0	17,0	0,25	3,0	0,1	23,0
19,0 x 3,0	19,0	0,25	3,0	0,1	25,0
19,2 x 3,0	19,2	0,25	3,0	0,1	25,2
20,0 x 3,0	20,0	0,25	3,0	0,1	26,0
22,0 x 3,0	22,0	0,25	3,0	0,1	28,0
22,2 x 3,0	22,2	0,25	3,0	0,1	28,2
24,0 x 3,0	24,0	0,25	3,0	0,1	30,0
24,2 x 3,0	24,2	0,25	3,0	0,1	30,2
26,2 x 3,0	26,2	0,32	3,0	0,1	32,2
27,0 x 3,0	27,0	0,32	3,0	0,1	33,0
29,2 x 3,0	29,2	0,32	3,0	0,1	35,2
32,2 x 3,0	32,2	0,32	3,0	0,1	38,2
34,2 x 3,0	34,2	0,4	3,0	0,1	40,2
36,2 x 3,0	36,2	0,4	3,0	0,1	42,2
39,2 x 3,0	39,2	0,4	3,0	0,1	45,2
42,2 x 3,0	42,2	0,4	3,0	0,1	48,2
44,2 x 3,0	44,2	0,5	3,0	0,1	50,2
45,0 x 3,0	45,0	0,5	3,0	0,1	51,0
55,2 x 3,0	55,2	0,6	3,0	0,1	61,2
65,2 x 3,0	65,2	0,6	3,0	0,1	71,0
98,0 x 3,0	98,0	0,9	3,0	0,1	104,0
109,5 x 3,0	109,5	1,1	3,0	0,1	115,5
44,2 x 5,7	44,2	0,5	5,7	0,13	55,6
44,2 x 5,7	44,2	0,5	5,7	0,13	55,6
47,6 x 5,7	47,6	0,5	5,7	0,13	59,0
49,2 x 5,7	49,2	0,5	5,7	0,13	60,6
49,6 x 5,7	49,6	0,5	5,7	0,13	61,0
51,6 x 5,7	51,6	0,5	5,7	0,13	63,0
52,6 x 5,7	52,6	0,5	5,7	0,13	64,0
54,2 x 5,7	54,2	0,5	5,7	0,13	65,6
54,6 x 5,7	54,6	0,5	5,7	0,13	66,0
55,6 x 5,7	55,6	0,6	5,7	0,13	67,0
57,6 x 5,7	57,6	0,6	5,7	0,13	69,0
59,2 x 5,7	59,2	0,6	5,7	0,13	70,6
59,3 x 5,7	59,3	0,6	5,7	0,13	70,7
59,6 x 5,7	59,6	0,6	5,7	0,13	71,0
61,6 x 5,7	61,6	0,6	5,7	0,13	73,0
62,6 x 5,7	62,6	0,6	5,7	0,13	74,0
64,2 x 5,7	64,2	0,6	5,7	0,13	75,6
64,6 x 5,7	64,6	0,6	5,7	0,13	76,0
66,6 x 5,7	66,6	0,6	5,7	0,13	78,0
69,2 x 5,7	69,2	0,75	5,7	0,13	80,6
69,6 x 5,7	69,6	0,75	5,7	0,13	81,0
70,6 x 5,7	70,6	0,75	5,7	0,13	82,0

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O'RINGS

Series 20M (Metric Sizes)

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METRIC ROD WIPERS

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34. MEDIUM DUTY ROD WIPERS

Series 50M (Metric Sizes)

35. HEAVY DUTY ROD WIPERS

Series 52M (Metric Sizes)





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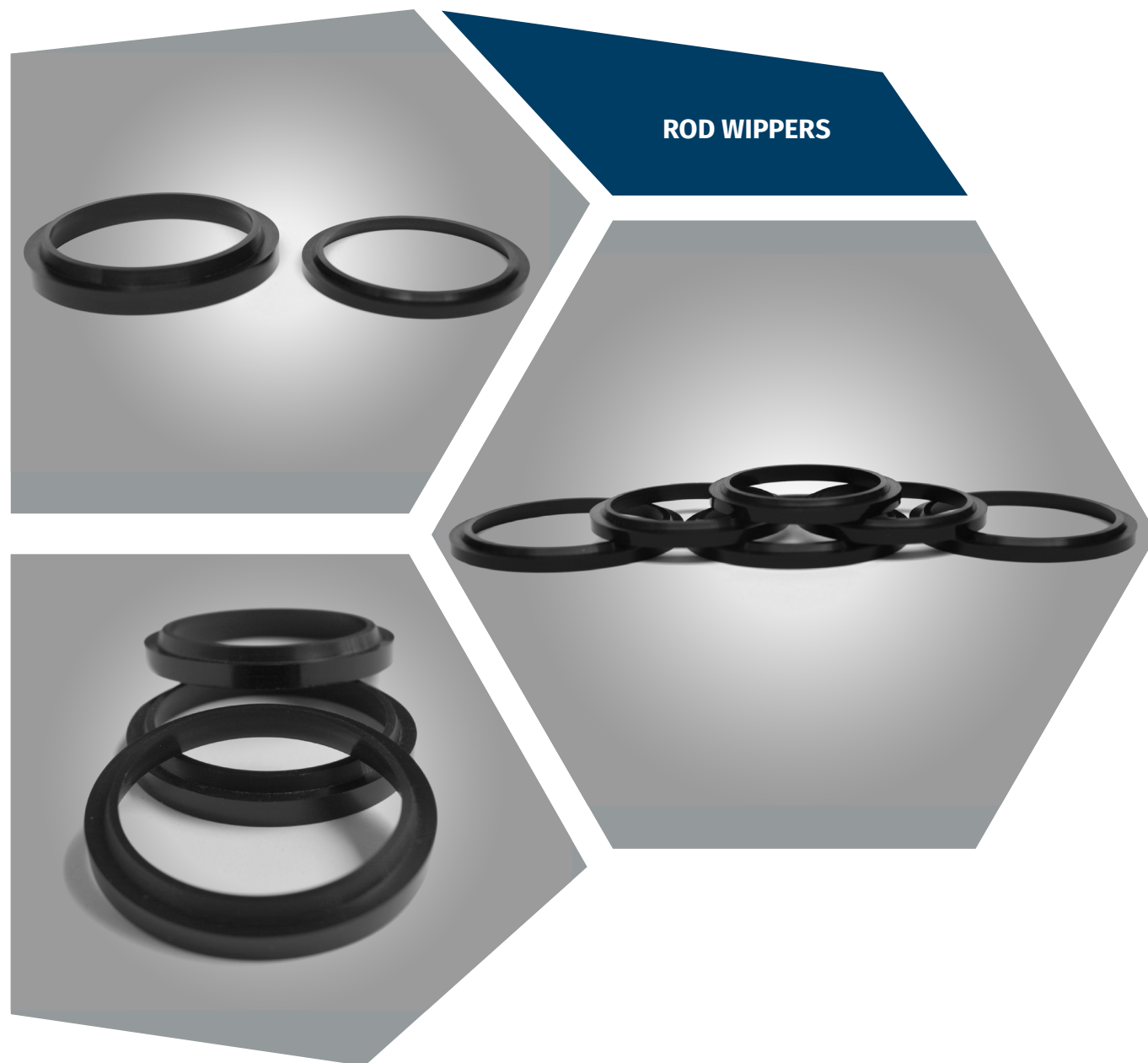
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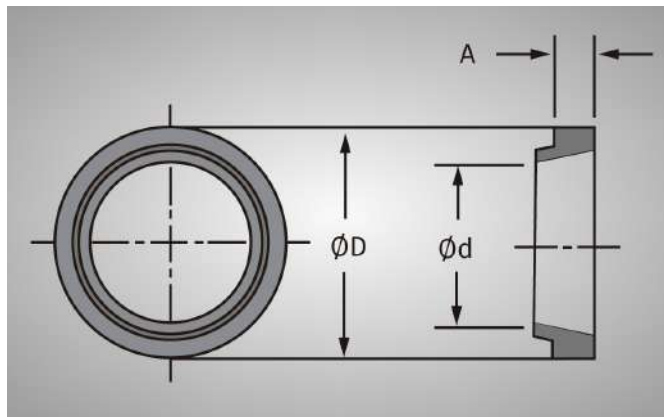
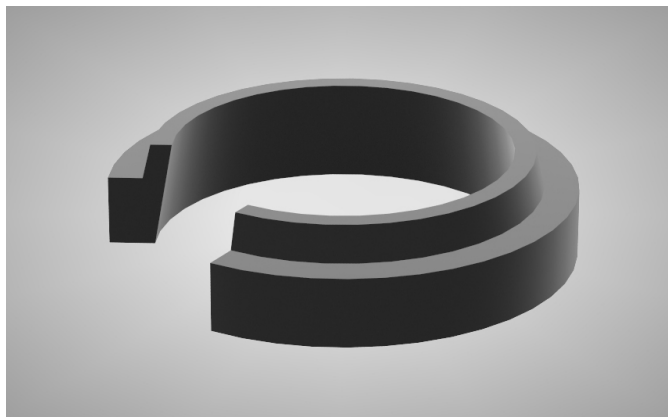
MEDIUM DUTY ROD WIPERS

Series 50M (Metric Sizes)

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ROD WIPPERS





CHARACTERISTICS

Rod Wipers or Exclusion Seals, prevent the drawing of foreign matter into the cylinder on the ingoing stroke.

Abrasive particles adhering to the rod will cause rapid wear to the Gland Seal if they are not effectively excluded. The Series 50M Medium Duty Rod Wiper has proved itself over many years of service in a variety of industrial and farm equipment applications.

It is manufactured from 95 A Durometer, Liquid Cast Polyurethane. The exceptional abrasion resistant qualities of this material ensure over five times the service life of most rubber wipers.

The cross sectional profile is designed to provide a clean wiping action with a light preload condition for long life.

Installation of the wiper is just a matter of snapping into a simple groove.

NOTE:

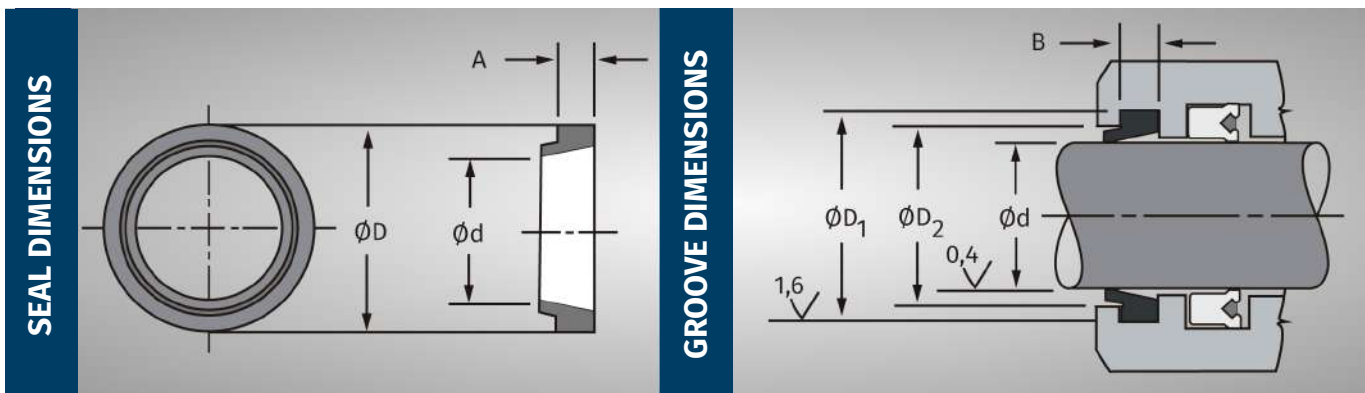
For Heavy Duty applications refer to Technical Bulletin UHWM-03, Series 52M Heavy Duty Rod Wipers.

MATERIAL

- Type: Unithane 395 Liquid Cast Polyurethane
- Hardness: Durometer 95 A
- Fluid Compatibility: See Material Specifications: Technical Bulletin USM-03

MEDIUM DUTY ROD WIPERS

Series 50M (Metric Sizes)



PART N° 50M-	ød Rod Dia.	Seal Dimensions		Groove Dimensions		
		øD Nom	A Nom	øD ₁ +0,1 -0,0	B +0,1 -0,0	øD ₂ +0,1 -0,0
-1	12	20	5	20,0	5,0	17,5
-2	14	22	5	22,0	5,0	19,5
-3	16	24	5	24,0	5,0	21,5
-4	18	26	5	26,0	5,0	23,5
-5	20	28	5	28,0	5,0	25,5
-6	22	30	5	30,0	5,0	27,5
-7	25	33	5	33,0	5,0	30,5
-8	28	36	5	36,0	5,0	33,5
-9	30	38	4	38,0	4,0	36,0
-10	32	40	4	40,0	4,0	38,0
-11	32	40	5	40,0	5,0	37,5
-12	35	43	4	43,0	4,0	41,0
-13	36	44	4	44,0	4,0	42,0
-14	36	44	5	44,0	5,0	41,5
-15	38	46	4	46,0	4,0	44,0
-16	40	48	4	48,0	4,0	46,0
-17	40	48	5	48,0	5,0	45,5
-18	42	50	4	50,0	4,0	48,0
-19	45	53	4	53,0	4,0	51,0
-20	45	53	5	53,0	5,0	50,5
-21	48	56	4	56,0	4,0	54,0
-22	50	58	4	58,0	4,0	56,0
-23	50	58	5	58,0	5,0	55,5
-24	52	60	4	60,0	4,0	58,0
-25	55	63	4	63,0	4,0	61,0
-26	56	64	4	64,0	4,0	62,5
-27	56	66	6,3	66,0	6,3	63,0
-28	60	68	4	68,0	4,0	66,5
-29	62	70	4	70,0	4,0	68,0

PART N° 50M-	ød Rod Dia.	Seal Dimensions		Groove Dimensions		
		øD Nom	A Nom	øD ₁ +0,1 -0,0	B +0,1 -0,0	øD ₂ +0,1 -0,0
-30	63	71	4	71,0	4,0	69,0
-31	63	73	6,3	73,0	6,3	70,0
-32	65	73	4	73,0	4,0	71,0
-33	70	78	4	78,0	4,0	76,0
-34	70	80	6,3	80,0	6,3	77,0
-35	75	83	4	83,0	4,0	81,0
-36	80	88	4	88,0	4,0	86,0
-37	80	90	6,3	90,0	6,3	87,0
-38	85	93	4	93,0	4,0	91,0
-39	90	98	4	98,0	4,0	96,0
-40	90	100	6,3	100,0	6,3	97,0
-41	95	103	4	103,0	4,0	101,0
-42	100	108	4	108,0	4,0	106,0
-43	100	115	9,5	115,0	9,5	110,0
-44	105	117	5,5	117,0	5,5	114,0
-45	110	122	5,5	122,0	5,5	119,0
-46	110	125	9,5	125,0	9,5	120,0
-47	120	132	5,5	132,0	5,5	129,0
-48	125	137	5,5	137,0	5,5	134,0
-49	125	140	9,5	140,0	9,5	135,0
-50	140	155	9,5	155,0	9,5	150,0
-51	160	175	9,5	175,0	9,5	170,0
-52	180	195	9,5	195,0	9,5	190,0
-53	200	215	9,5	215,0	9,5	210,0
-54	220	240	12,5	240,0	12,5	233,5
-55	250	270	12,5	270,0	12,5	263,5
-56	280	300	12,5	300,0	12,5	293,5
-57	320	340	12,5	340,0	12,5	333,5
-58	360	380	12,5	380,0	12,5	373,5

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MEDIUM DUTY ROD WIPERS

SERIES 50M (Metric Sizes)

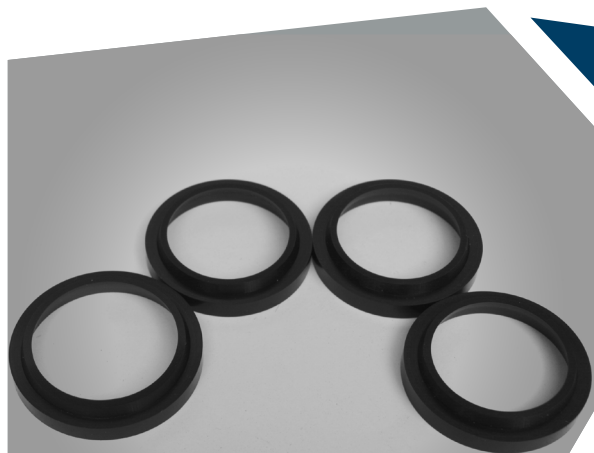


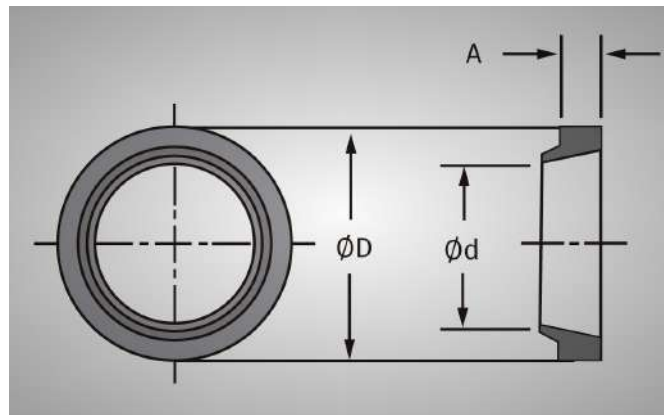
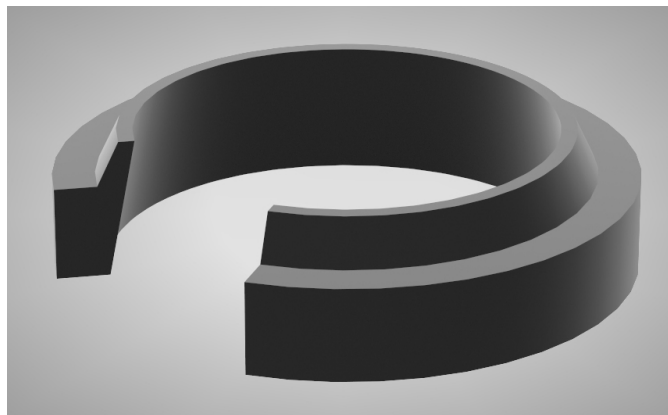
HEAVY DUTY ROD WIPERS

Series 52M (Metric Sizes)

35

ROD WIPPERS





CHARACTERISTICS

This Heavy Duty Wiper/Scraper is designed to remove the more aggressive contaminants encountered by heavy outdoor machinery such as earth moving equipment.

Its solid Cross section profile and thick set lip good interference on the rod, are its main features.

Combining these characteristics with the proven abrasion resistant qualities of liquid cast polyurethane, and the result is a tough durable wiper able to handle the most service conditions.

This wiper is available in a full range of sizes. it is installed by springing into a simple groove.

NOTE

For Medium Duty applications refer to Technical Bulletin UMWM-03 Series 50M Medium Duty Rod Wipers.

MATERIAL

Type: Unithane 395 A, Liquid Cast Polyurethane

Hardness: Durometer 95 A

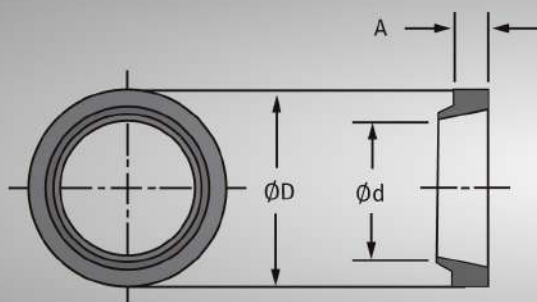
Fluid Compatibility: See Material Specifications: Technical Bulletin USM-03

HEAVY DUTY ROD WIPERS

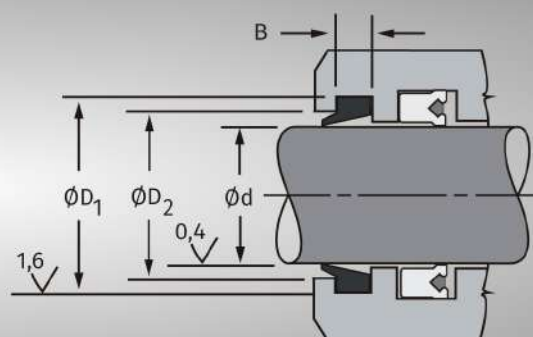
Series 52M (Metric Sizes)



SEAL DIMENSIONS



GROOVE DIMENSIONS



Part N° 52M-	Ød Rod Dia.	Seal Dimensions		Groove Dimensions		
		ØD Nom	A Nom	ØD ₁ +0,15 -0,0	B +0,10 -0,0	ØD ₂ +0,25 -0,0
-012	12	20	4	20,0	4,0	16,0
-012/C	12	18	4	18,0	4,0	14,5
-014	14	22	4	22,0	4,0	18,0
-014/C	14	20	4	20,0	4,0	16,5
-015	15	23	4	23,0	4,0	19,0
-016	16	24	4	24,0	4,0	20,0
-018	18	26	4	26,0	4,0	22,0
-018/C	18	24	4	24,0	4,0	20,5
-020	20	28	4	28,0	4,0	24,0
-021	21	29	4	29,0	4,0	25,0
-022	22	30	4	30,0	4,0	26,0
-022/C	22	28	4	28,0	4,0	24,5
-024	24	32	4	32,0	4,0	28,0
-025	25	33	4	33,0	4,0	29,0
-026	26	34	4	34,0	4,0	30,0
-028	28	36	4	36,0	4,0	32,0
-028/C	28	36	5	36,0	5,0	31,0
-030	30	42	6	42,0	6,0	36,0
-032	32	44	6	44,0	6,0	38,0
-035	35	47	6	47,0	6,0	41,0
-036	36	48	6	48,0	6,0	42,0
-036/C	36	44	5	44,0	5,0	39,0
-038	38	50	6	50,0	6,0	44,0
-040	40	52	6	52,0	6,0	46,0
-042	42	54	6	54,0	6,0	48,0
-045	45	57	6	57,0	6,0	51,0
-045/C	45	53	5	53,0	5,0	48,0
-048	48	60	6	60,0	6,0	54,0
-050	50	62	6	62,0	6,0	56,0
-052	52	64	6	64,0	6,0	58,0
-055	55	67	6	67,0	6,0	61,0

Part N° 52M-	Ød Rod Dia.	Seal Dimensions		Groove Dimensions		
		ØD Nom	A Nom	ØD ₁ +0,15 -0,0	B +0,10 -0,0	ØD ₂ +0,25 -0,0
-056	56	68	6	68,0	6,0	62,0
-056/C	56	66	6	66,0	6,0	59,0
-060	60	72	6	72,0	6,0	66,0
-062	62	74	6	74,0	6,0	68,0
-063	63	75	6	75,0	6,0	69,0
-065	65	77	6	77,0	6,0	71,0
-070	70	82	6	82,0	6,0	76,0
-070/C	70	80	6	80,0	6,0	73,0
-075	75	87	6	87,0	6,0	81,0
-080	80	96	8	96,0	8,0	88,0
-085	85	101	8	101,0	8,0	93,0
-090	90	106	8	106,0	8,0	98,0
-090/C	90	100	6	100,0	6,0	93,0
-095	95	111	8	111,0	8,0	103,0
-100	100	116	8	116,0	8,0	108,0
-105	105	121	8	121,0	8,0	113,0
-110	110	126	8	126,0	8,0	118,0
-110/C	110	125	8,5	125,0	8,5	114,0
-115	115	131	8	131,0	8,0	123,0
-120	120	136	8	136,0	8,0	128,0
-125	125	141	8	141,0	8,0	133,0
-130	130	146	8	146,0	8,0	138,0
-135	135	151	8	151,0	8,0	143,0
-140	140	156	8	156,0	8,0	148,0
-140/C	140	155	8,5	155,0	8,5	144,0
-150	150	166	8	166,0	8,0	158,0
-160	160	176	8	176,0	8,0	168,0
-170	170	186	8	186,0	8,0	178,0
-180	180	200	10	200,0	10,0	190,0
-190	190	210	10	210,0	10,0	200,0
-200	200	220	10	220,0	10,0	210,0

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HEAVY DUTY ROD WIPERS

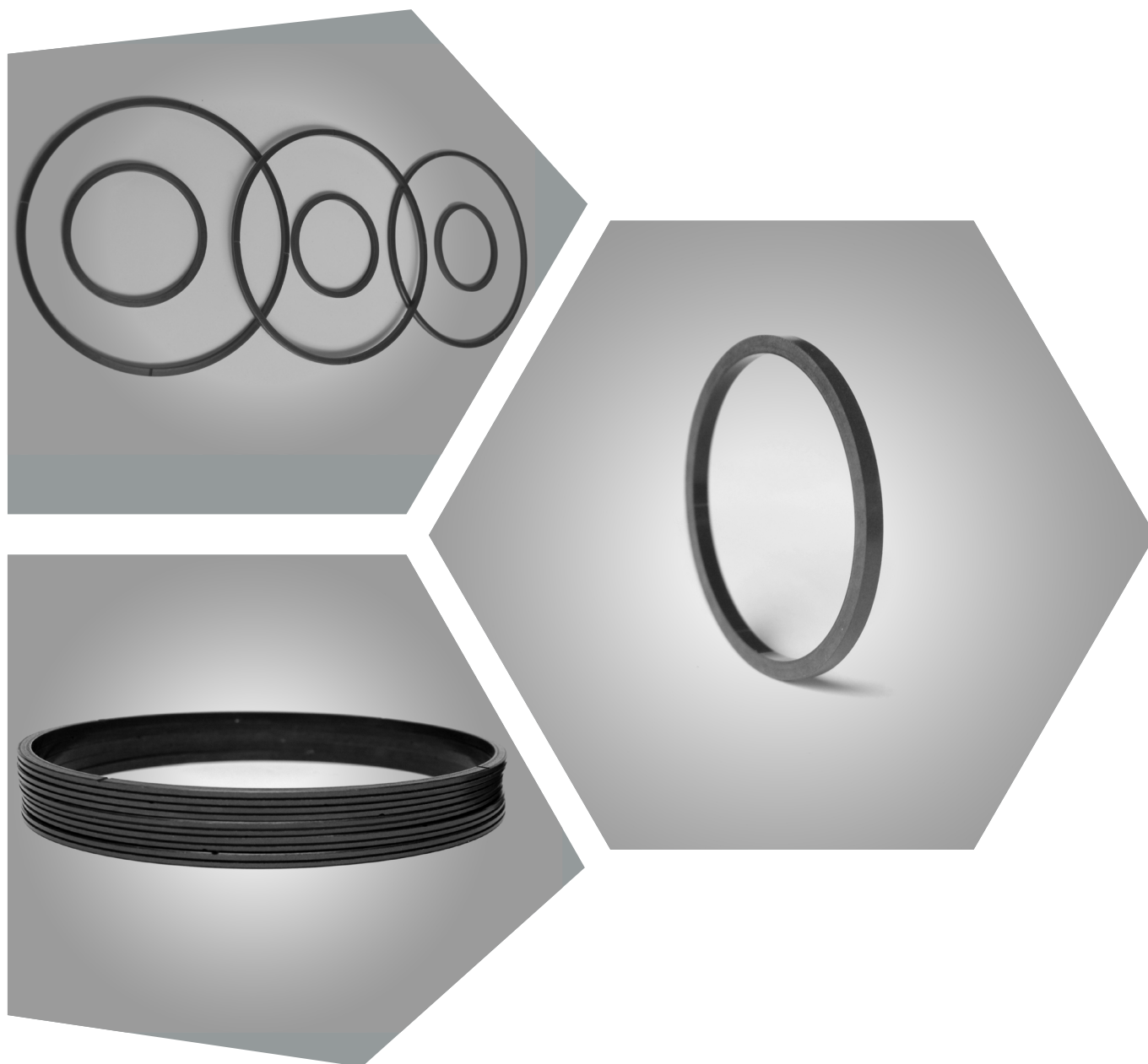
SERIES 52M (Metric Sizes)

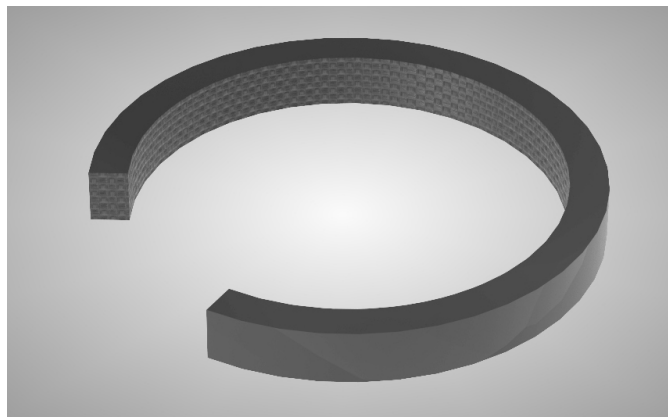


PISTON RINGS

Series 77M (Metric Sizes)

36





CHARACTERISTICS

Universal Seal Piston Rings were developed specifically to be totally interchangeable with the TFE piston rings currently available, and to provide a product which can be more readily installed on the pistons and provide longer field service life.

Polyurethane Piston Rings are manufactured from Unithane 460D material with an outer wear layer containing a concentration of Molybdenum Disulfide (MSO_2). The purpose being to provide a low friction surface during the initial break-in period of the hydraulic cylinder. Series 77M Piston Rings can be manufactured from alternate materials to meet specific design requirements.

Series N°.77M Piston Rings provide many advantages as seals.

1. Unithane piston rings expand readily to fit over the major piston diameter and recover quickly to permit immediate installation of the piston into the cylinder bore. No expensive expanding arbors or re-sizing dies are required. This results in a reduction of assembly time and eases field replacement.
2. The superior cut strength of Unithane 460 D material in combination with an ultimate elongation of 430% insures that fewer rings are scrapped during assembly. This also helps to avoid cylinder rework by eliminating damaged rings, which become broken, cut or nicked while being installed on the piston.

3. Unithane piston rings resist field failures attributed to minor scoring or galling of the cylinder bore which will cause rapid failure of piston rings made from other less abrasion and cut resistant materials.
4. The inherent elastic memory exhibited by Unithane piston rings insures instantaneous response to rapidly varying system pressures and eliminates the objectionable compression set or "cold flow" characteristic commonly associated with TFE materials.

Unithane piston rings will operate effectively in hydraulic cylinders with pressures up to 20 MPa (200 Bar) and with radial clearances as great as 0,2mm. The cylinder bore should be finished not to exceed 20 RMS for maximum service life although somewhat higher limits can be accepted depending on pressure and frequency of cycling.

The standard bore diameter and the corresponding groove diameter for normal application of Unithane piston rings is as shown on page 35(2).

MATERIAL

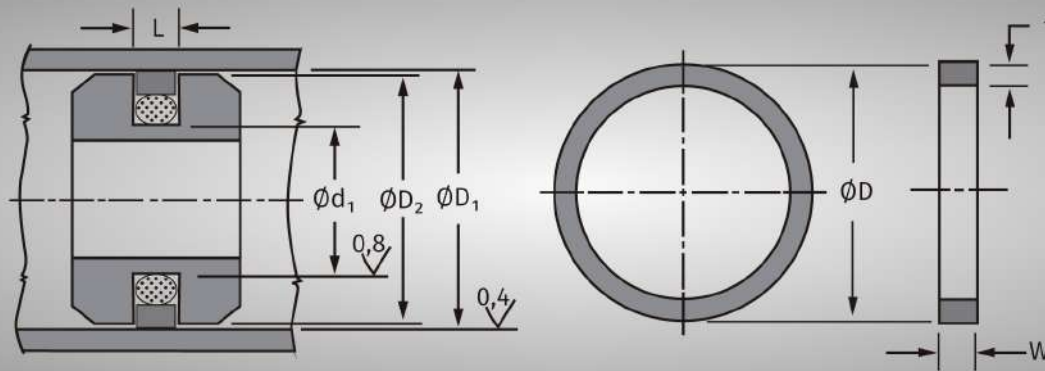
- Type:
Unithane 460 D, Liquid Cast Polyurethane
- Hardness:
Durometer 65 D
- Fluid Compatibility:
See Material Specifications:
Technical Bulletin USM-03

PISTON RINGS

Series 77M (Metric Sizes)



PISTON RINGS



Part N° 77M-	Bore Dia ϕD_1	Piston Dia ϕD_2	Groove Dia ϕd_2	Groove Width L	Ring Dia ϕD	Ring Thickness T	Ring Width W	'O' Ring Size
- 12/ 7,0 x 2,2	12+0,04/-0	11,8+0/-0,05	7,0+0/0,04	2,2+0,2/-0	12,1	1,15	2,0	6,75 x 1,78
- 14/ 9,0 x 2,2	14+0,04/-0	13,8+0/-0,05	9,0+0/0,04	2,2+0,2/-0	14,1	1,15	2,0	8,73 x 1,78
- 15/ 10,0 x 2,2	15+0,04/-0	14,7+0/-0,05	10,0+0/0,04	2,2+0,2/-0	15,1	1,15	2,0	9,25 x 1,78
- 15/ 7,5 x 3,2	15+0,04/-0	14,7+0/-0,05	7,5+0/0,04	3,2+0,2/-0	15,1	1,65	3,0	7,3 x 2,62
- 16/ 11,0 x 2,2	16+0,04/-0	15,8+0/-0,05	11,0+0/0,04	2,2+0,2/-0	16,1	1,15	2,0	10,82 x 1,78
- 16/ 8,5 x 3,2	16+0,04/-0	15,8+0/-0,05	8,5+0/0,04	3,2+0,2/-0	16,1	1,65	3,0	7,59 x 2,62
- 18/ 10,0 x 3,2	18+0,04/-0	17,8+0/-0,05	10,5+0/0,04	3,2+0,2/-0	18,2	1,65	3,0	9,92 x 2,62
- 20/12,5 x 3,2	20+0,05/-0	19,8+0/-0,05	12,5+0/0,04	3,2+0,2/-0	20,2	1,65	3,0	11,91 x 2,62
- 22/14,5 x 3,2	22+0,05/-0	21,8+0/-0,05	14,5+0/0,04	3,2+0,2/-0	22,2	1,65	3,0	13,95 x 2,62
- 25/17,5 x 3,2	25+0,05/-0	24,8+0/-0,05	17,5+0/0,04	3,2+0,2/-0	25,2	1,65	3,0	17,13 x 2,62
- 28/20,5 x 3,2	28+0,05/-0	27,8+0/-0,05	20,5+0/0,05	3,2+0,2/-0	28,2	1,65	3,0	20,24 x 2,62
- 30/22,5 x 3,2	30+0,05/-0	29,8+0/-0,05	22,5+0/0,05	3,2+0,2/-0	30,2	1,65	3,0	21,89 x 2,62
- 32/24,5 x 3,2	32+0,06/-0	31,8+0/-0,05	24,5+0/0,05	3,2+0,2/-0	32,2	1,65	3,0	23,81 x 2,62
- 35/27,5 x 3,2	35+0,06/-0	34,8+0/-0,05	27,5+0/0,05	3,2+0,2/-0	35,2	1,65	3,0	26,64 x 2,62
- 36/28,5 x 3,2	36+0,06/-0	36,8+0/-0,05	28,5+0/0,05	3,2+0,2/-0	36,2	1,65	3,0	28,25 x 2,62
- 36/25,0 x 4,2	36+0,06/-0	35,8+0/-0,05	25,0+0/0,05	4,2+0,2/-0	36,2	2,7	3,9	23,81 x 3,53
- 40/32,5 x 3,2	40+0,06/-0	39,8+0/-0,05	32,5+0/0,06	3,2+0,2/-0	40,2	1,65	3,0	31,42 x 2,62
- 40/29,0 x 4,2	40+0,06/-0	39,7+0/-0,05	29,5+0/0,05	4,2+0,2/-0	40,2	2,7	3,9	28,17 x 3,53
- 45/37,5 x 3,2	45+0,06/-0	44,8+0/-0,05	37,5+0/0,05	3,2+0,2/-0	45,2	1,65	3,0	36,17 x 2,62
- 45/34,0 x 4,2	45+0,06/-0	44,7+0/-0,05	34,0+0/0,06	4,2+0,2/-0	45,2	2,7	3,9	32,93 x 3,53
- 50/42,5 x 3,2	50+0,06/-0	49,8+0/-0,05	42,5+0/0,06	3,2+0,2/-0	50,2	1,65	3,0	40,95 x 2,62
- 50/39,0 x 4,2	50+0,06/-0	49,7+0/-0,05	39,0+0/0,06	4,2+0,2/-0	50,2	2,7	3,9	37,39 x 3,53
- 55/47,5 x 3,2	55+0,07/-0	54,8+0/-0,05	47,5+0/0,06	3,2+0,2/-0	55,2	1,65	3,0	45,69 x 2,62
- 55/44,0 x 4,2	55+0,07/-0	54,7+0/-0,05	44,0+0/0,06	4,2+0,2/-0	55,2	2,7	3,9	42,86 x 3,53
- 56/45,0 x 4,2	56+0,07/-0	55,7+0/-0,05	45,0+0/0,06	4,2+0,2/-0	56,2	2,7	3,9	44,04 x 3,53
- 60/49,0 x 4,2	60+0,07/-0	59,7+0/-0,05	49,5+0/0,06	4,2+0,2/-0	60,3	2,7	3,9	47,63 x 3,53
- 65/54,0 x 4,2	65+0,07/-0	64,7+0/-0,05	54,0+0/0,07	4,2+0,2/-0	65,3	2,7	3,9	53,56 x 3,53
- 70/59,0 x 4,2	70+0,07/-0	69,7+0/-0,05	59,5+0/0,07	4,2+0,2/-0	75,3	2,7	3,9	57,15 x 3,53
- 75/64,0 x 4,2	75+0,07/-0	74,7+0/-0,05	64,0+0/0,07	4,2+0,2/-0	75,3	2,7	3,9	63,5 x 3,53
- 80/69,0 x 4,2	80+0,07/-0	79,7+0/-0,05	69,0+0/0,07	4,2+0,2/-0	80,3	2,7	3,9	68,26 x 3,53
- 85/74,0 x 4,2	85+0,09/-0	84,7+0/-0,05	74,5+0/0,07	4,2+0,2/-0	85,3	2,7	3,9	72,56 x 3,53
- 90/79,0 x 4,2	90+0,09/-0	89,7+0/-0,05	79,0+0/0,07	4,2+0,2/-0	90,3	2,7	3,9	75,79 x 3,53
- 95/84,0 x 4,2	95+0,09/-0	94,7+0/-0,05	84,5+0/0,09	4,2+0,2/-0	95,3	2,7	3,9	82,56 x 3,53
- 100/89,0 x 4,2	100+0,09/-0	99,7+0/-0,05	89,0+0/0,09	4,2+0,2/-0	100,3	2,7	3,9	88,49 x 3,53

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PISTON RINGS

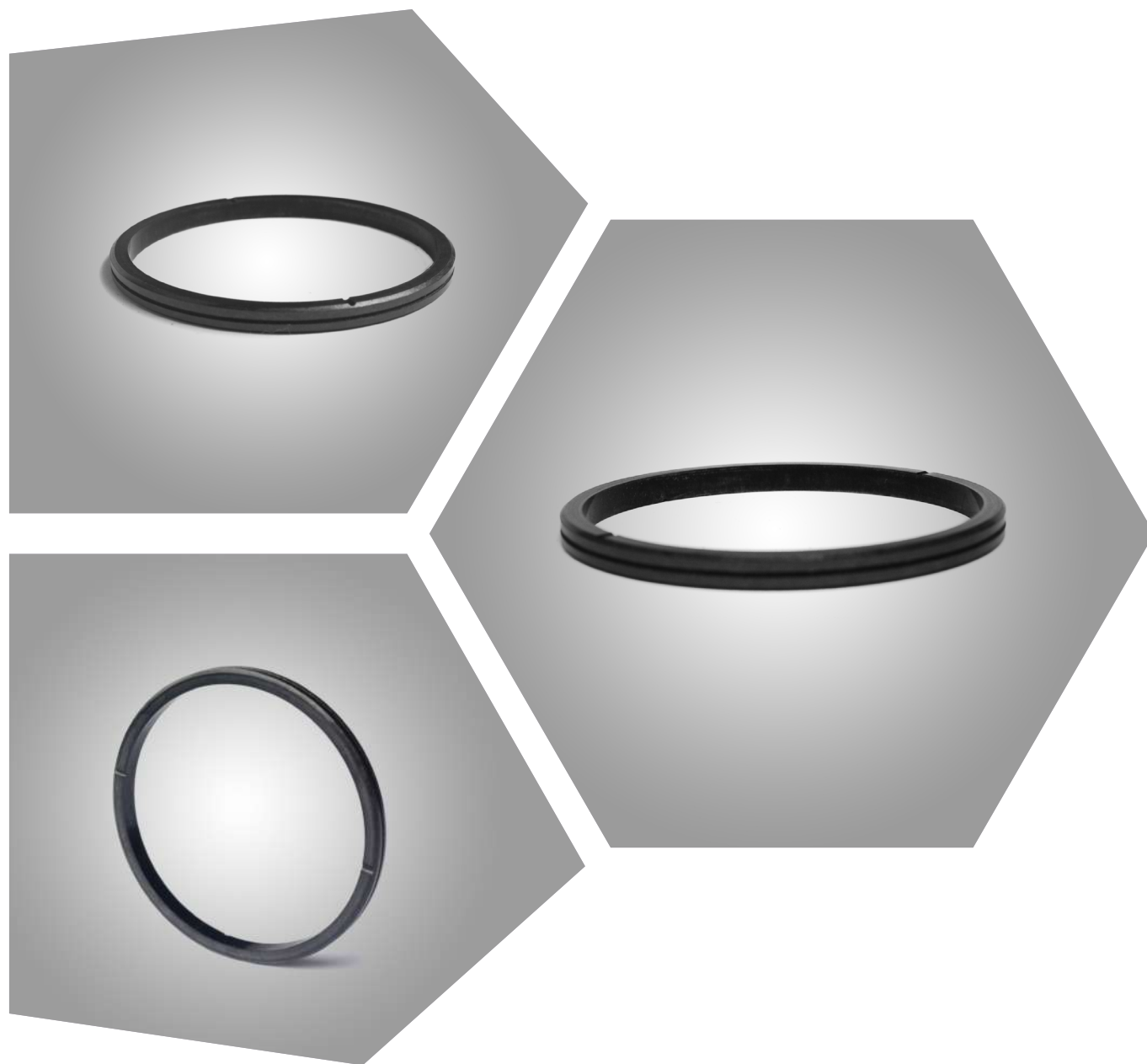
SERIES 77M (Metric Sizes)

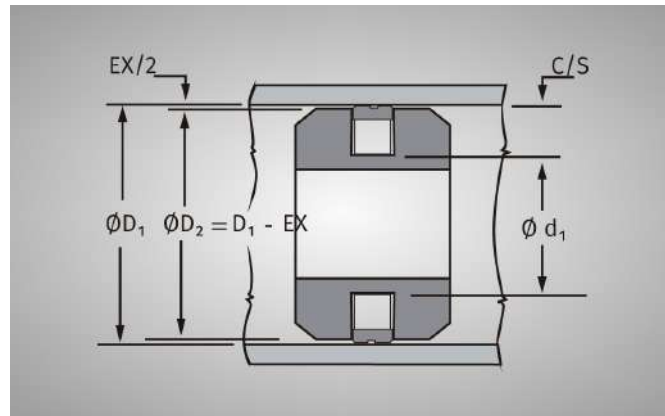


PISTON GLIDE RINGS

Series 88M (Metric Sizes)

37





CHARACTERISTICS

Piston Glide Rings are used in conjunction with square section nitrile rubber energizers. The square section ensures the ring stability under varying pressures and speeds.

The Glide Ring material is a hard (65 shore D) thermoset polyurethane with a modulus to resist extrusion.

The dynamic surface is impregnated with molybdenum disulfide (MSO_2) to reduce friction.

In addition to the standard sizes shown, which interchange with PTFE rings, tooling is available for most other metric sizes. Unlike PTFE rings, the elastic properties of the polyurethane make installation easy, without the need for special tooling.

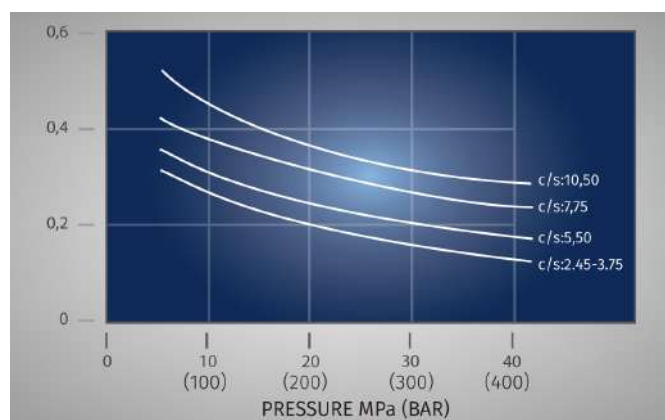
MATERIALS

Type: Unithane 460 D, Liquid Cast Polyurethane

Hardness: Durometer 65 D

Fluid Compatibility: See Material Specifications: Technical Bulletin USM-03

SUGGESTED MAXIMUM EXTRUSION GAPS(EX) mm



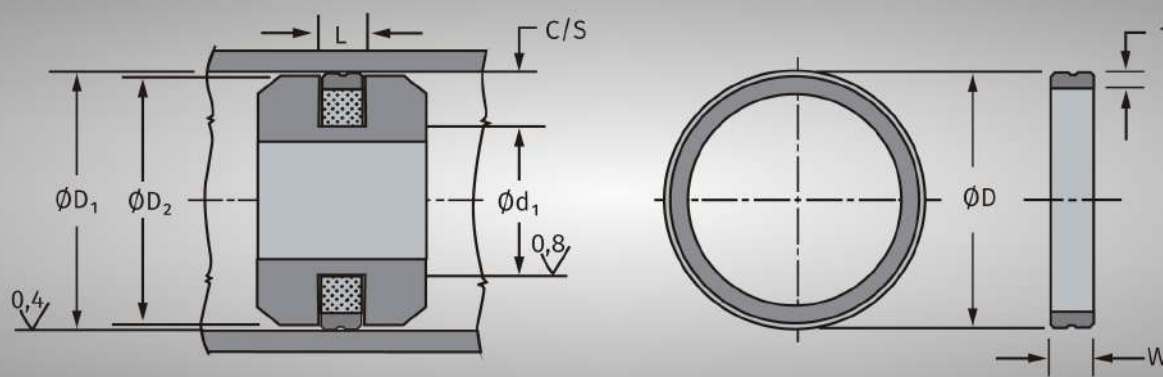
The EXTRUSION GAP CHART provides recommendations for the maximum acceptable extrusion gap at various pressure ranges. Eccentricity, ovality, bearing clearance and normal wear of the mating parts must be considered when calculating the extrusion gap. This chart is intended as a guide and each application should be thoroughly tested.

PISTON GLIDE RINGS

Series 88M (Metric Sizes)



PISTON GLIDE RINGS



Part N° 88M-	Bore Dia ϕD_1	Groove Dia ϕd_1	Groove Width L	Ring Dia ϕD	Ring Thickness T	Ring Width W	Square 'O'-Ring Size
- 25,1 × 1,5 × 2,9	25+0,05/-0	17,5 + 0/-0,04	3,2+0,2/-0	25,1	1,15	2,9	17,12 × 2,51
- 32,1 × 1,5 × 2,9	32+0,06/-0	24,5 + 0/-0,05	3,2+0,2/-0	32,1	1,15	2,9	23,47 × 2,51
- 40,3 × 2,0 × 5,9	40+0,06/-0	27,0 + 0/-0,05	6,3+0,2/-0	40,3	2,0	5,9	26,34 × 5,16
- 40,3 × 2,6 × 3,9	40+0,06/-0	29,0 + 0/-0,05	4,2+0,2/-0	40,3	2,6	3,9	28,17 × 3,40
- 45,3 × 2,6 × 3,9	45+0,06/-0	34,0 + 0/-0,06	4,2+0,2/-0	45,3	2,6	3,9	32,92 × 3,40
- 50,3 × 3,2 × 5,9	50+0,06/-0	34,5 + 0/-0,06	6,3+0,2/-0	50,3	3,2	5,9	34,29 × 5,16
- 50,3 × 2,0 × 5,9	50+0,06/-0	37,0 + 0/-0,06	6,3+0,2/-0	50,3	2,0	5,9	37,47 × 5,16
- 50,3 × 2,6 × 3,9	50+0,06/-0	39,0 + 0/-0,06	4,2+0,2/-0	50,3	2,6	3,9	37,69 × 3,40
- 55,3 × 2,6 × 3,9	55+0,07/-0	44,0 + 0/-0,06	4,2+0,2/-0	55,3	2,6	3,9	44,04 × 3,40
- 60,3 × 3,2 × 5,9	60+0,07/-0	44,5 + 0/-0,06	6,3+0,2/-0	60,3	3,2	5,9	43,82 × 5,16
- 60,3 × 2,6 × 3,9	60+0,07/-0	49,0 + 0/-0,06	4,2+0,2/-0	60,3	2,6	3,9	47,22 × 3,40
- 60,3 × 3,2 × 5,9	60+0,07/-0	47,5 + 0/-0,06	6,3+0,2/-0	60,3	3,2	5,9	46,99 × 5,16
- 60,3 × 2,6 × 3,9	60+0,07/-0	52,0 + 0/-0,06	4,2+0,2/-0	60,3	2,6	3,9	50,39 × 3,40
- 65,3 × 3,2 × 5,9	65+0,07/-0	49,5 + 0/-0,06	6,3+0,2/-0	65,3	3,2	5,9	50,17 × 5,16
- 65,3 × 2,6 × 3,9	65+0,07/-0	54,0 + 0/-0,06	4,2+0,2/-0	65,3	2,6	3,9	53,57 × 3,40
- 70,3 × 3,2 × 5,9	70+0,07/-0	54,5 + 0/-0,06	6,3+0,2/-0	70,3	3,2	5,9	53,34 × 5,16
- 70,3 × 2,0 × 5,9	70+0,07/-0	57,0 + 0/-0,07	6,3+0,2/-0	70,3	2,0	5,9	56,52 × 5,16
- 70,3 × 2,6 × 3,9	70+0,07/-0	59,0 + 0/-0,07	4,2+0,2/-0	70,3	2,6	3,9	56,74 × 3,40
- 75,3 × 2,0 × 5,9	75+0,07/-0	69,0 + 0/-0,07	6,3+0,2/-0	75,3	2,0	5,9	59,69 × 5,16
- 75,3 × 2,6 × 3,9	75+0,07/-0	64,0 + 0/-0,07	4,2+0,2/-0	75,3	2,6	3,9	63,09 × 3,40
- 80,3 × 3,2 × 5,9	80+0,07/-0	64,5 + 0/-0,07	6,3+0,2/-0	80,3	3,2	5,9	62,87 × 5,16
- 80,3 × 2,2 × 5,9	80+0,07/-0	66,5 + 0/-0,07	6,3+0,2/-0	80,3	2,2	5,9	66,04 × 5,16
- 85,3 × 3,2 × 5,9	85+0,09/-0	69,5 + 0/-0,07	6,3+0,2/-0	85,3	3,2	5,9	69,22 × 5,16
- 90,3 × 3,2 × 5,9	90+0,09/-0	74,5 + 0/-0,07	6,3+0,2/-0	90,3	3,2	5,9	72,39 × 5,16
- 95,3 × 3,2 × 5,9	95+0,09/-0	79,5 + 0/-0,07	6,3+0,2/-0	95,3	3,2	5,9	78,74 × 5,16

Part N° 88M-	Bore Dia Ø D ₁	Groove Dia Ø d ₁	Groove Width L	Ring Dia Ø D	Ring Thickness T	Ring Width W	Square 'O'-Ring Size
-100,3 × 4,5 × 7,7	100 + 0,09/-0	79,0+0/-0,07	8,1+0,2/-0	100,3	4,5	7,7	78,74 × 6,73
-100,3 × 3,2 × 5,9	100 + 0,09/-0	84,5+0/-0,09	6,3+0,2/-0	100,3	3,2	5,9	81,92 × 5,16
-105,3 × 3,2 × 5,9	105 + 0,09/-0	89,5+0/-0,09	6,3+0,2/-0	105,3	3,2	5,9	88,27 × 5,16
-110,3 × 3,2 × 5,9	110 + 0,09/-0	94,5+0/-0,09	6,3+0,2/-0	110,3	3,2	5,9	94,62 × 5,16
-115,3 × 3,2 × 5,9	115 + 0,09/-0	99,5+0/-0,09	6,3+0,2/-0	115,3	3,2	5,9	97,79 × 5,16
-120,3 × 3,2 × 5,9	120 + 0,09/-0	104,5+0/-0,09	6,3+0,2/-0	120,3	3,2	5,9	104,14 × 5,16
-125,3 × 4,5 × 7,7	125 + 0,1/-0	104,0+0/-0,09	8,1+0,2/-0	125,3	4,5	7,7	104,14 × 6,73
-125,3 × 3,2 × 5,9	125 + 0,1/-0	109,5+0/-0,09	6,3+0,2/-0	125,3	3,2	5,9	107,32 × 5,16
-130,3 × 4,5 × 7,7	130 + 0,1/-0	109,0+0/-0,09	8,1+0,2/-0	130,3	4,5	7,7	107,32 × 6,73
-130,3 × 3,2 × 5,9	130 + 0,1/-0	114,0+0/-0,09	6,3+0,2/-0	130,3	3,2	5,9	113,67 × 5,16
-135,3 × 4,5 × 7,7	135 + 0,1/-0	114,0+0/-0,09	8,1+0,2/-0	135,3	4,5	7,7	113,67 × 6,73
-140,3 × 4,5 × 7,7	140 + 0,1/-0	119,0+0/-0,09	8,1+0,2/-0	140,3	4,5	7,7	116,67 × 6,73
-145,3 × 4,5 × 7,7	145 + 0,1/-0	124,0+0/-0,1	8,1+0,2/-0	145,3	4,5	7,7	123,89 × 6,73
-150,3 × 4,5 × 7,7	150 + 0,1/-0	129,0+0/-0,1	8,1+0,2/-0	150,3	4,5	7,7	126,37 × 6,73
-155,3 × 4,5 × 7,7	155 + 0,1/-0	134,0+0/-0,1	8,1+0,2/-0	155,3	4,5	7,7	132,72 × 6,73
-160,3 × 4,5 × 7,7	160 + 0,1/-0	139,0+0/-0,1	8,1+0,2/-0	160,3	4,5	7,7	139,07 × 6,73
-160,3 × 3,2 × 5,9	160 + 0,1/-0	159,0+0/-0,1	6,3+0,2/-0	160,3	3,2	5,9	142,24 × 5,16
-170,3 × 4,5 × 7,7	170 + 0,1/-0	149,0+0/-0,1	8,1+0,2/-0	170,3	4,5	7,7	123,89 × 6,73
-180,3 × 4,5 × 7,7	180 + 0,1/-0	159,0+0/-0,1	8,1+0,2/-0	180,3	4,5	7,7	158,12 × 6,73
-180,3 × 3,2 × 5,9	180 + 0,1/-0	164,5+0/-0,1	6,3+0,2/-0	180,3	3,2	5,9	164,47 × 5,16
-190,3 × 4,5 × 7,7	190 + 0,12/-0	169,0+0/-0,1	8,1+0,2/-0	190,3	4,5	7,7	164,47 × 6,73
-200,3 × 4,5 × 7,7	200 + 0,12/-0	179,0+0/-0,1	8,1+0,2/-0	200,3	4,5	7,7	177,17 × 6,73
-220,3 × 4,5 × 7,7	220 + 0,12/-0	199,0+0/-0,12	8,1+0,2/-0	220,3	4,5	7,7	196,22 × 6,73
-250,3 × 4,5 × 7,7	250 + 0,12/-0	229,0+0/-0,12	8,1+0,2/-0	250,3	4,5	7,7	227,97 × 6,73
-280,3 × 4,5 × 7,7	280 + 0,13/-0	259,0+0/-0,13	8,1+0,2/-0	280,3	4,5	7,7	253,37 × 6,73
-320,3 × 4,5 × 7,7	320 + 0,14/-0	229,0+0/-0,13	8,1+0,2/-0	320,3	4,5	7,7	291,47 × 6,73



PISTON GLIDE RINGS

Series 88M (Metric Sizes)



UNIVERSAL SEAL INC.

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PISTON GLIDE RINGS

SERIES 88M (Metric Sizes)



PIP SEAL

(Metric Sizes)

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CHARACTERISTICS

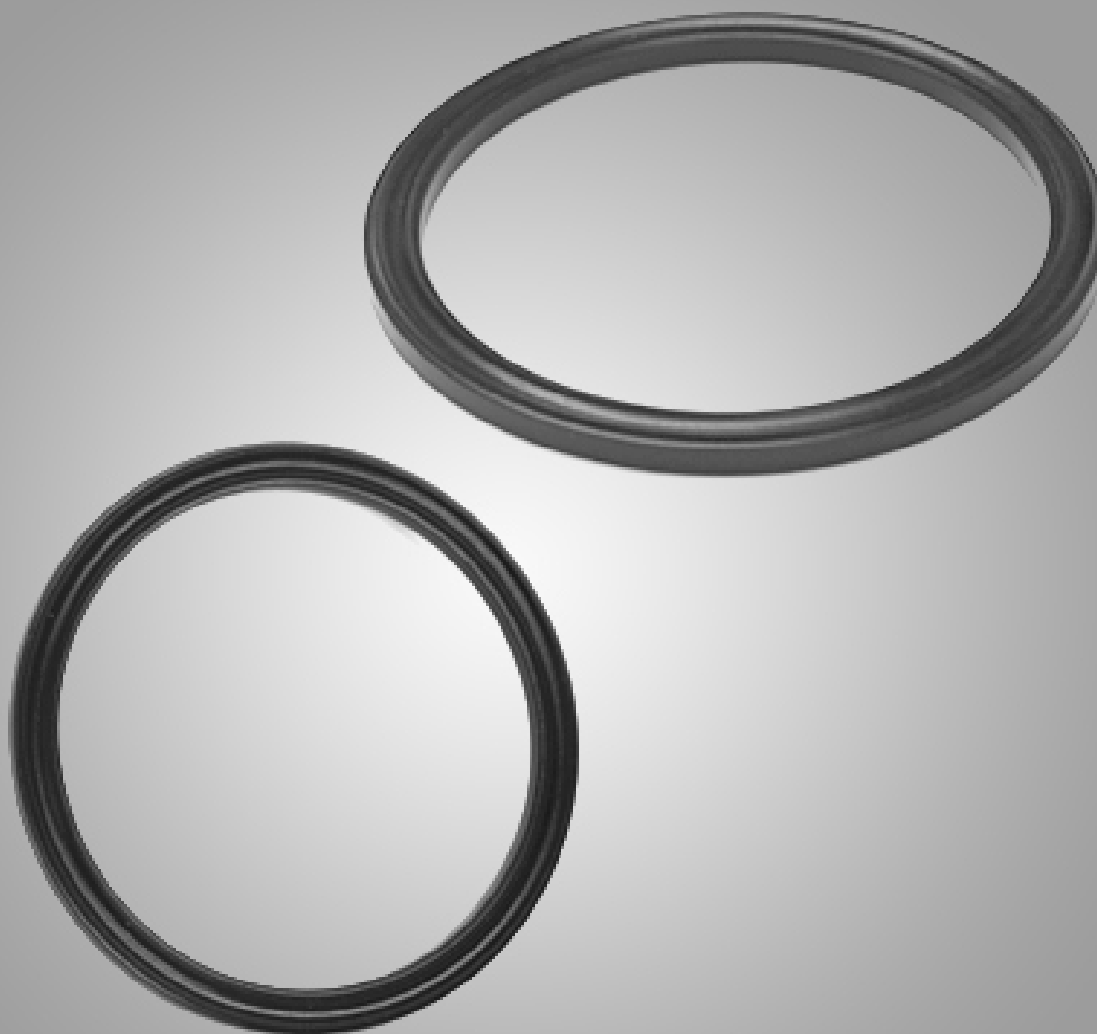
The PIP Seal combined with our Loaded U-Cup (O-Pack) will convert the O-Pack seal into a bi-directional device.

The PIP Seal needs only a single groove and can be installed on one-piece pistons in most cases, thus reducing the number of piston components.

The PIP seal replaces two U-Pack or O-Pack at a considerable savings in seal costs and machining two grooves.

ADVANTAGES:

1. 60D hardness
2. Centrifugally moulded- no embedded air
3. Knife trimmed – No injection points
4. Any colour any size





PIP SEAL



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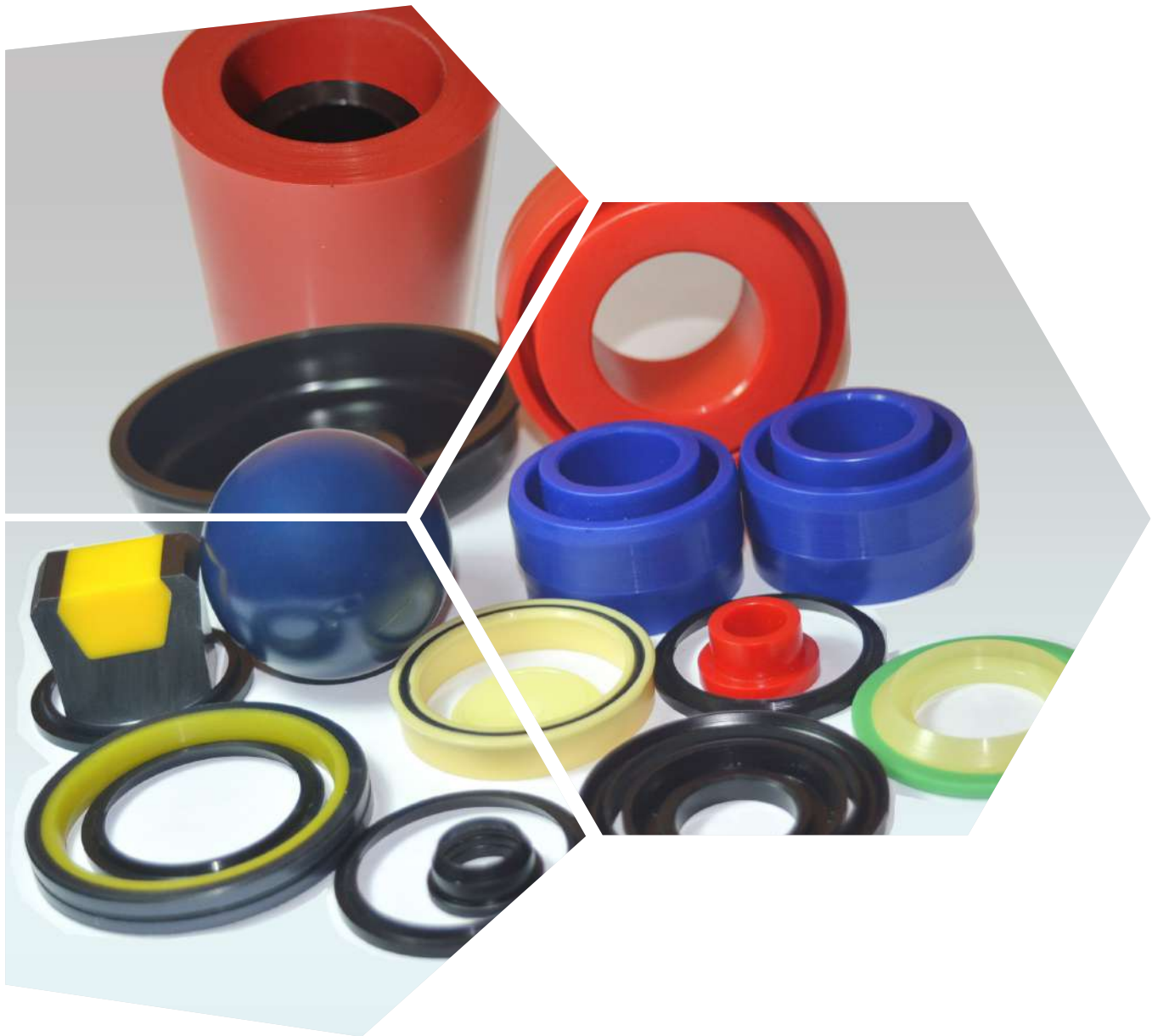


PIP SEAL

Universal Seal INC.

MATERIAL SPECIFICATIONS & COMPATIBILITY CHART

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The materials used for Universal Seal Inc. products are all Thermosetting Liquid Cast Polyurethanes.

Each material is selected after thorough testing to ensure that its mechanical properties match or exceed the specific requirements of its intended use.

The main properties considered during selection are: abrasion resistance, compression set, tear strength and resilience.

Our material testing program is on-going and we reserve the right to change materials should we conclude that another material is superior in one or more of its critical properties.

Polymer Type	Unithane 157A	Unithane 160A	Unithane 180A
DUROMETER	59A	60A	84A
Standard Applications	— Activation lamina of "Unirings" — Sealing lamina of flange seals	— Yellow Jacket expanders	— Special 'O' Rings — Custom Moulded Products

Unithane 292A	Unithane 395A	Unithane 460D	Unithane 475D
92A	95A	65D	75D
— 'U' — Cups — 'U' Packs — 'O' Rings — Piston Cups	— Rod Wipers — Back-up Washers — Anti-extrusion lamina of Flange Seal	— Piston Rings — Dynamic sealing lamina of "Unirings" — Modular back-ups	— Anti-extrusion Rings

MATERIAL SPECIFICATIONS

ELASTOMER PROPERTIES -ENGLISH UNITS



Property	Units	Astm Test Method	Material						
			157A	160A	180A	292A	395A	460D	
Hardness	Shore A	D 2240	59	60	84	92	95	-	-
Hardness	Shore D	D 2240	-	-	32	-	48	65	75
100% Modulus	psi	D 412	229	229	800	1400	2100	3250	5300
200% Modulus	psi	D 412	-	-	-	-	-	4800	5900
300% Modulus	psi	D 412	477	-	1470	2600	4300	5646	-
Tensile Strength	psi	D 412	2334	452	5500	5800	6500	6328	7100
Elongation	%	D 412	488	154	490	420	380	313	230
Split Tear	lb/in	D 470	24	7.3	40	100	120	154	140
Die C Tear	lb/in	D 624	-	-	-	430	-	600	900
Compression Set	%	D 395 B	8.7	<1	20	24	30	32	-
Bashore Rebound	%	D2632	60	46	58	45	40	-	-
Compresion Modulus,									
5% Defection	psi	D 575	-	-	-	355	-	1000	2150
10% Defection	psi	D 575	-	-	-	590	-	1650	3700
15% Defection	psi	D 575	-	-	-	820	-	2300	4700
20% Defection	psi	D 575	-	-	-	1130	-	3100	6000
25% Defection	psi	D 575	-	-	-	1550	-	4000	7250
Brittle Temperature	°F	D748	-	-	-	-94	-	-94	-94
Specific Gravity	-	D792	1.07	-	-	1.11	-	1.16	1.20

GENERAL TEMPERATURE LIMITATIONS

Minimum Usable Temperature	-40° F.
Maximum Usable Temperature	195° F.
Maximum Short Exposure Temperature	250° F.

Property	Units	Astm Test Method	Material						
			157A	160A	180A	292A	395A	460D	475D
Hardness	Shore A	D 2240	59	60	84	92	95	-	-
Hardness	Shore D	D 2240	-	-	32	-	48	65	75
100% Modulus	MPa	D 412	1.6	2.1	5.5	9.7	14.5	22.4	36.5
200% Modulus	MPa	D 412	-	-	-	-	-	33.1	40.7
300% Modulus	MPa	D 412	3.3	-	10.1	17.9	29.6	38.9	-
Tensile Strength	MPa	D 412	16.1	3.1	37.9	40.0	44.8	43.6	48.9
Elongation	%	D 412	488	154	490	420	380	313	230
Split Tear	kN/m	D 470	4.2	1.3	7.0	17.5	21.0	20.2	24.6
Die C Tear	kN/m	D 624	-	-	-	75.4	-	105.3	157.9
Compression Set	%	D 395 B	8.7	<1	20	24	30	32	-
Bashore Rebound	%	D 2632	60	46	58	45	40	-	-
Compresion Modulus,									
5% Defection	MPa	D 575	-	-	-	2.5	-	6.9	14.8
10% Defection	MPa	D 575	-	-	-	4.1	-	11.4	25.5
15% Defection	MPa	D 575	-	-	-	5.7	-	15.9	32.4
20% Defection	MPa	D 575	-	-	-	7.8	-	21.4	14.4
25% Defection	MPa	D 575	-	-	-	10.7	-	27.6	50.0
Brittle Temperature	°C	D748	-	-	-	-70	-	-70	-70
Specific Gravity	-	D792	1.07	-	-	1.11	-	1.16	1.20

General Temperature Limitations

Minimum Usable Temperature	-40° C
Maximum Usable Temperature	90° C
Maximum Short Exposure Temperature	120° C

COMPATIBILITY CHART



The compatibility chart is intended as a use guide only. We recommend that the user conduct tests under actual service conditions to determine the suitability of the Unithane compounds for the intended application.

The chart applies to all Unithane compounds, and was prepared from the results of tests in which samples were immersed for seven days at 25°C.

The rating is based on volume change according to the following key:

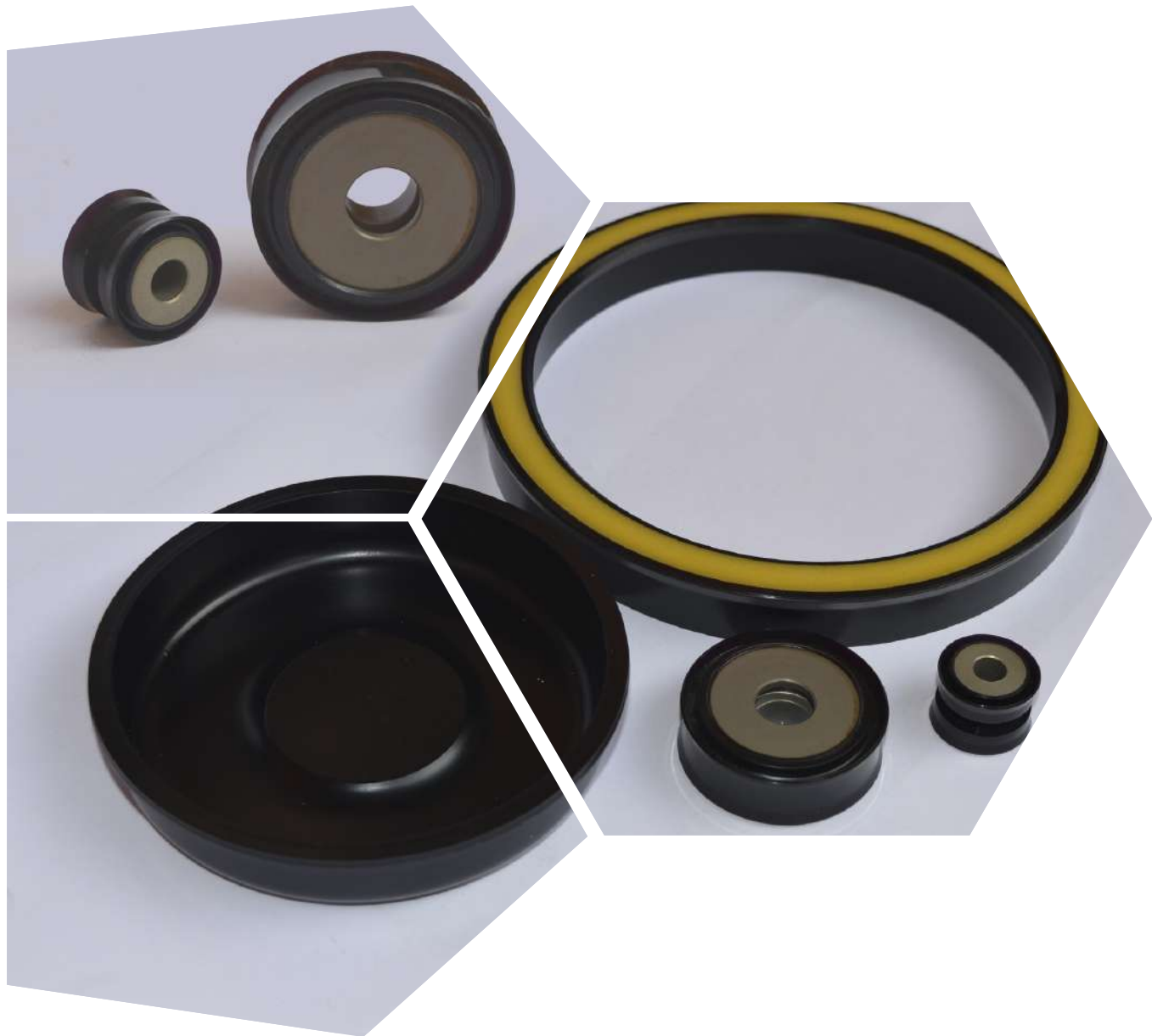
- 1- Excellent (0-3%)
- 2- Good (4-15%)
- 3- Fair (16 - 35%)
- 4- Poor (36% Up)

Fluid	Rating	Fluid	Rating
Acetic Acid	2-3	Butyl Acetate	4
Acetic Anhydride	4	Calcium Chloride	1
Acetone	4	Calcium Hydroxide	1
Aluminum Chloride	2	Carbon Dioxide	1
Aluminum Sulphate	2	Carbon Monoxide	1
Ammonia	2	Carbon Tetrachloride	3
Ammonium Hydroxide	1-2	Castor Oil	1-2
Ammonium Sulfate	2	Chlorine	2-3
Amyl Acetate	4	Chlorascetic Acid	3-4
Amyl Alcohol	3	Chloroform	4
ASTM Oil N°. 1	1-2	Chromic Acid	3-4
ASTM Oil N°. 2	2	Citric Acid	2
ASTM Oil N°. 3	2	Cottonseed Oil	1
ASTM Reference Fuel A	1	Cresol (Meta)	4
ASTM Reference Fuel B	2	Cyclohexane	2
Atlantic Oil	1	Dibutyl Phthalate	3-4
Barium Hydroxide	1	Diester Oil	2
Benzene	4	DTE Oil (Heavy, Medium)	2
Benzene (Gasoline, Aromatic)	2-3	Ethyl Acetate	4
Boric Acid	1	Ethyl Alcohol (Ethanol)	3
Bromine	2-3	Ethyl Chloride	3
Bunker Oil	1-2	Ethylene Glycol	2
Butane	1	Esso # 90 Lube Oil	1

Fluid	Rating	Fluid	Rating
Farric Chloride	2	Napthalene	2
Formaldehyde	3	Natural Gas	2
Formic Acid	3-4	Nitric Acid	4
Freon, 12 or 113	1	Nitrobenzene	4
Fuel Oil	2	Oleic Acid	1-2
Gasoline	2	Palmitic Acid	1
Glycerine (Glycerol)	1	Perchloroethylene	3-4
Greases	1-2	Petroleum	1-2
Hexane	1	Phenol (Carbolic Acid)	4
Hydraulic Oil	1	Phosphoric Acid (Dil)	2-3
Hydrochloric Acid 20%	2	Phosphoric Acid (Conc.)	3
Hydrogen	1-2	Potassium Salts	2
Hydrogen Peroxide	2	SAE # 10 Oil	1
Hydrogen Sulfide	3-4	Skydrol Oil (500)	4
Isooctane	2	Soap	2-3
Isopropyl Alcohol	2-3	Sodium Dichromate	2
Isopropyl Ether	2	Sodium Hydroxide 45%	2
JP-4 Oil	2-3	Sodium Hypochlorite 5%	4
JP-5 & 6 Oil	4	Sperry Oil	2
Kerosene	2	Sulfur Dioxide	2
Lactic Acid	2	Sulfuric Acid, 10-50%	3-4
Linseed Oil	2	Tannic Acid	1
Lubricating Oil	2	Tartaric Acid	1
Magnesium Hydroxide	1	Toluene	4
Magnesium Salts	2	Transformer Oil	3-4
Mercury	1-2	Trichloroethylene	4
Methyl Alcohol (Methanol)	4	Tricresyl Phosphate	3-4
Methyl Ethyl Ketone	4	Triethanol Amine	2
Methylene Chloride	4	Trisodium Phosphate	2
Mil -D-5606 Oil	3	Turpentine	3
Mil-L- 7808 Oil	1-2	Water	2
Mineral Oil	1	Xylene	3
Mobil Arctic Oil	1	Zinc Chloride	2

UNIQUE UNIVERSAL SEAL PRODUCTS

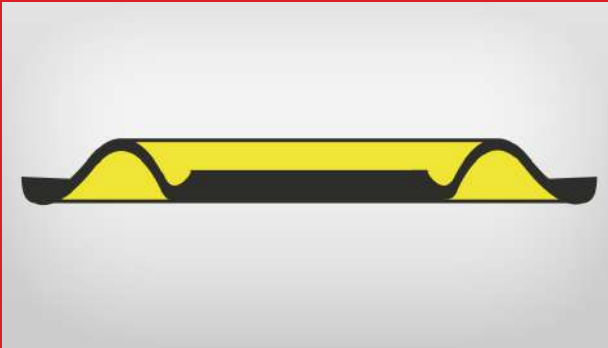
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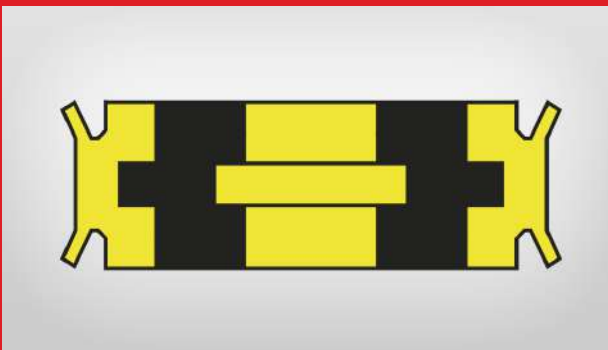
Yellow Jackets



Accumulator Diaphragms

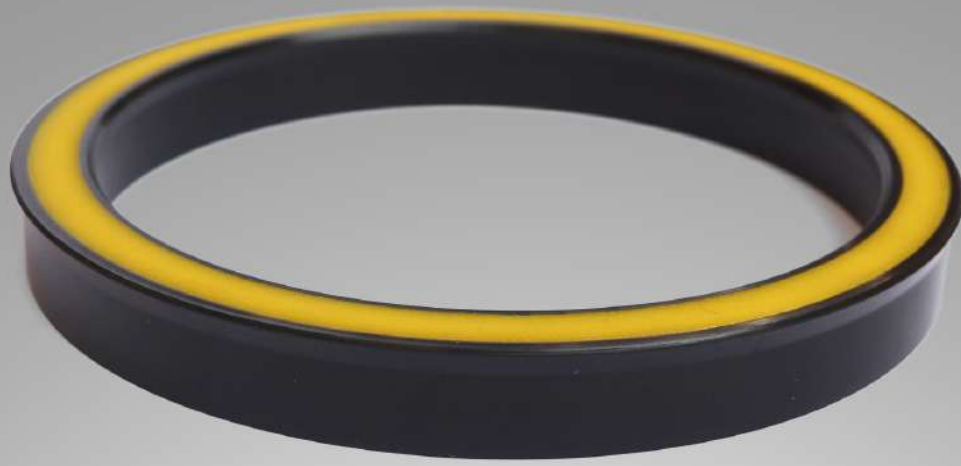


Unitized Pistons



ALSO:

- Polyurethane Bushings
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- Drive belts
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