Zurcon® U-Cup RU9

Single-acting U-Cup

New U-Cup Design

Material:
Zurcon®

U-Cup RU9

Introduction

Rod seals are particularly exposed to pressure and friction. A long service life is a specific requirement of piston rods. Features such as wear and extrusion resistance, media and temperature compatibility, low friction, compact Installation Dimensions and ease of assembly are also essential and require the introduction of new products and materials. It is against this background that we have developed the Zurcon® U-Cup RU9.

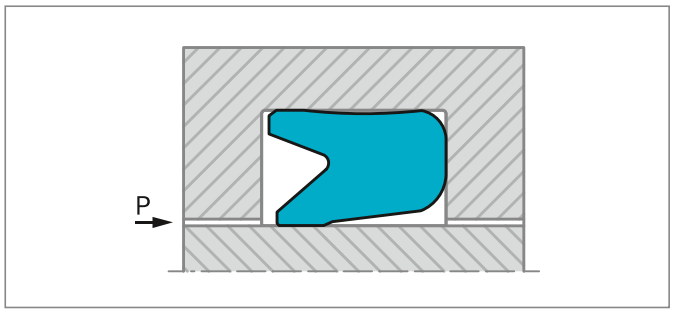

Figure 49: U-Cup, type RU9

DESCRIPTION

Due to its special design, behind the dynamic seal lip, the Zurcon® U-Cup RU9 with its structure of slide segments interspersed by back-pumping channels features excellent back-pumping ability across the entire pressure range. The dynamic seal slide segments also have a micro-structure with excellent tribological and sealing characteristics. As well as increasing the sealing ability of the U-Cup RU9, this also ensures a constant lubrication film underneath the seal sliding surface, reducing breakaway force even after prolonged periods of rest and reduces dynamic friction force.

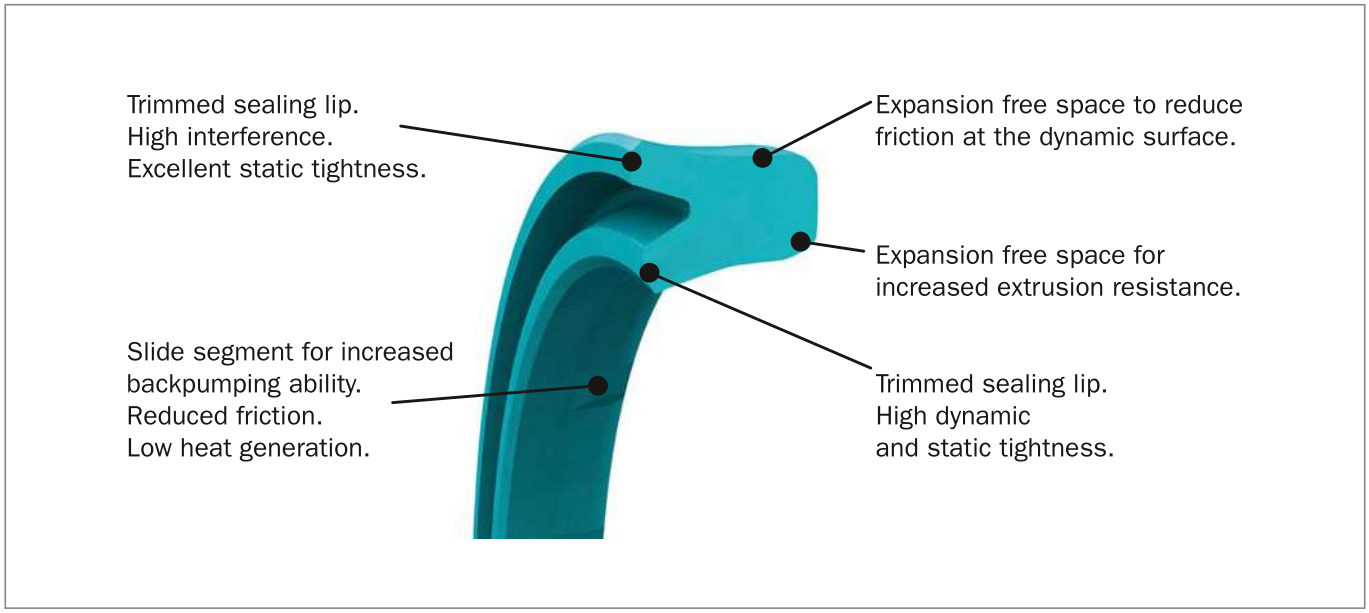

Figure 50: Zurcon® U-Cup RU9 design features

FRICTION

The friction force of U-Cups dramatically increases between 2.5 and 10 MPa. The Zurcon® U-Cup RU9 has a unique feature. As the system pressure increases, the contact surface between the U-Cup and the piston rod increases. Once a specific system pressure is reached, the seal deforms to such an extent that its entire friction-generating inside surface gets in contact with the piston rod. Due to the special design of Zurcon® U-Cup RU9 there is improved pressure distribution on the rod. The resulting tribological benefits restrict the increase in friction. When we compare the friction values of conventional U-Cups with those of the Zurcon® U-Cup RU9 the results are self-evident.

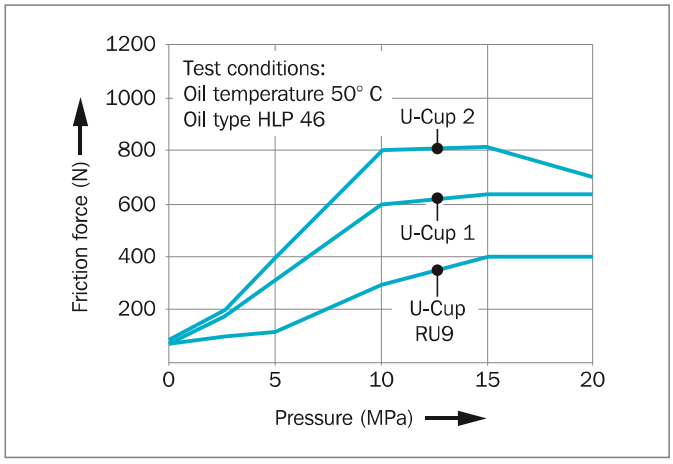

Figure 51: Friction dependent on pressure

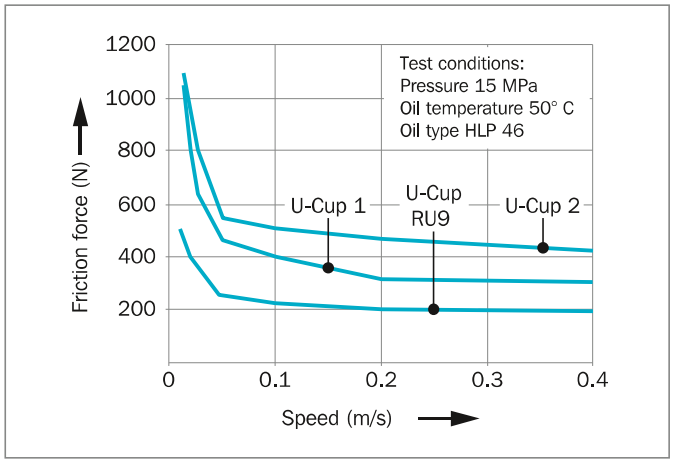

Figure 52: Friction dependent on speed

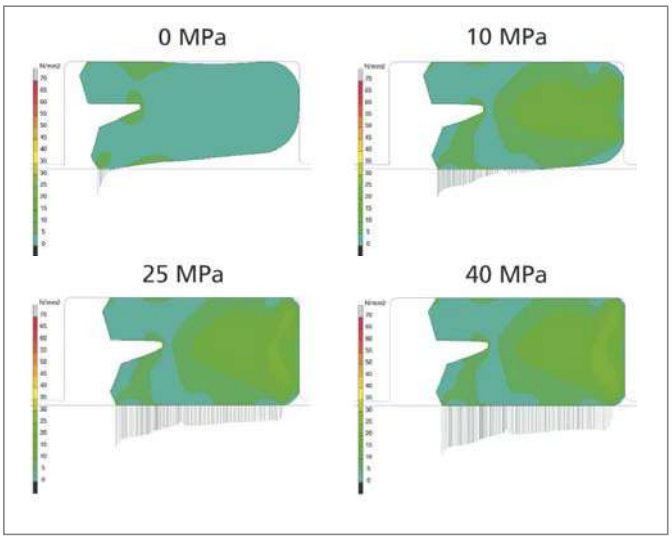

Figure 53: How the Zurcon® U-Cup RU9 performs underpressure

SEALING PERFORMANCE

The high sealing performance is achieved by:

- Interference fit at the external diameter
- Special shape of both trimmed seal lips
- Controlled pressure distribution and hydrodynamic backpumping ability over a wide pressure range

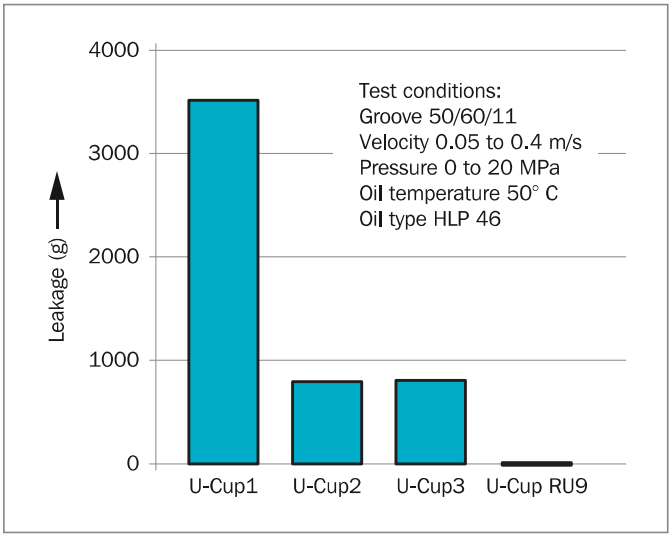

Figure 54: Leakage performance dependent on U-Cup type

RADIAL CLEARANCE

The new Zurcon® RU9 design combined with the special compound properties shows a better extrusion resistance compared to standard U-Cup under all working conditions. The hardware clearance can be increased significantly.

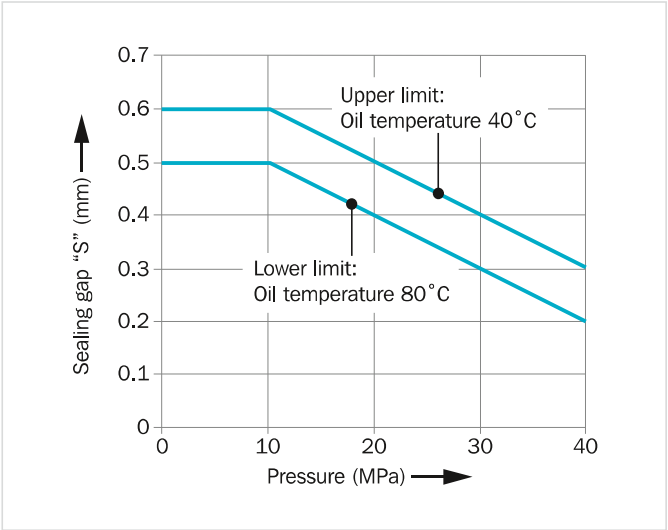

Figure 55: Radial clearance "S" as function of pressure

ADVANTAGES

- Lower friction than standard U-Cups
- Lower heat generation than standard U-Cups
- High extrusion resistance
- Excellent dynamic and static sealing
- Optimum environment protection
- Back pumping ability over the entire pressure range achieved by grooved profile
- Suitable with the Zurcon® Buffer Seal as secondary seal in "tandem design"
- Suitable for sealing systems with double scraper
- Seal stability within the groove

APPLICATION EXAMPLES

Zurcon® U-Cup RU9 can be used in all applications in whichpreviously a conventional U-Cup was applied, such as:

- Hydraulic cylinders
- Construction machinery
- Fork lifts
- Truck cranes
- Telescopic cylinders
- Agricultural machines
- Machine tools
- Injection molding machines
- Hydraulic presses
- Gas spring

In medium/heavy duty applications the preferred solution for tandem rod sealing systems is the combination with the Zurcon® Buffer Seal primary seal and Zurcon® U-Cup RU9 in conjunction with a double acting scraper.

MATERIALS

Zurcon® Z20 Standard polyurethane 93 Shore A
Temperature: -35 °C to +110 °C
Color: Turquoise

Zurcon® Z22 Premium polyurethane 93 Shore A
Temperature: -50 °C to +110 °C
Color: Dark petrol

Zurcon® Z25 Premium polyurethane 93 Shore A
Temperature: -35 °C to +130 °C
Color: Black

The Zurcon® polyurethane has high abrasion resistance, a low compression set, high extrusion resistance and a wide temperature range.

OPERATING CONDITIONS

Pressure:	Up to 40 MPa
Velocity:	Up to 0.5 m/s
Temperature:	
Zurcon® Z20 Standard:	-35 °C to +110 °C
Media:	
Hydraulic fluids based on mineral oil:	-35 °C to +110 °C
Synthetic and natural ester HEES, HETG:	Up to +60 °C
Flame-retardant hydraulic fluids HFA/HFB:	Up to +40 °C

IMPORTANT NOTE

The above stated limits for pressure and speed are maximum values individually. Friction heat generated by the combination of pressure and speed may cause local heat built-up. Care should be taken not to apply high values for pressure and speed at the same time.

Table 38: Materials

Material Code	Material Description	Temperature Range	Application
Zurcon® Z20	High performance Polyurethane 94 Shore A; standard grade for hydraulic	-35 °C to +110 °C	Excellent abrasion and extrusion resistance, minimal swelling in mineral oil, acceptable hydrolysis resistance.
Zurcon® Z22	High performance Polyurethane 93 Shore A; Premium grade for low temperature	-50 °C to +110 °C	Wide range of working temperatures with very good compression set performance at very low temperature. Excellent balance between swelling in mineral oil and hydrolysis resistance.
Zurcon® Z25	High performance Polyurethane 95 Shore A; Premium grade for high temperature	-35 °C to +130 °C	Wide range of working temperatures with excellent mechanical proprieties at high temperature. Products: Ideal for use in heavy duty cylinder and cylinders exposed to high-temperature painting processes.

Installation Recommendation

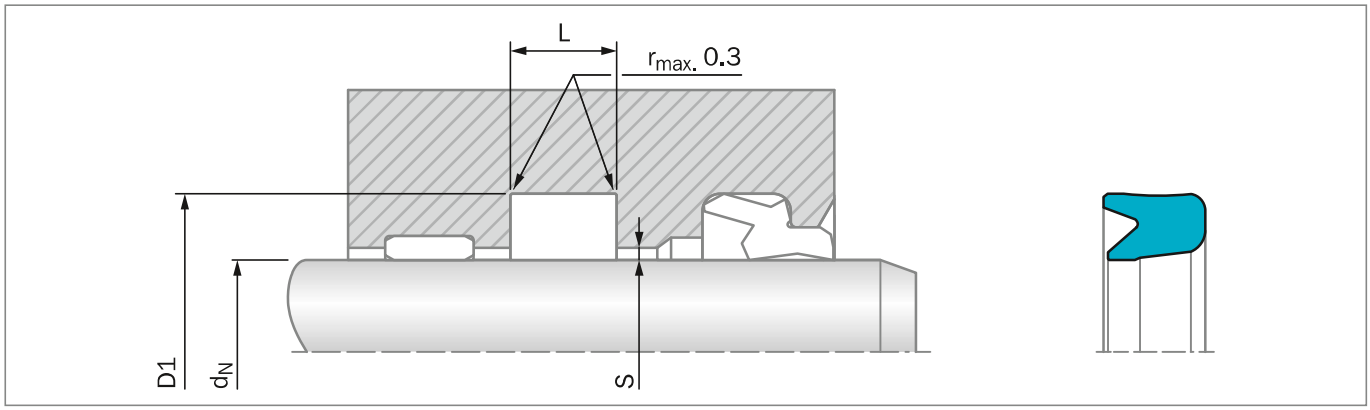

Figure 56: Installation Drawing, Dimension “S“ see Figure 55

ORDERING EXAMPLE (METRIC)

Zurcon® U-Cup Type RU9

Rod Diameter:	d_N = 20.0 mm
Groove Diameter:	D1 = 28.0 mm
Groove Width:	L = 6.3 mm
TSS Part No.:	RU9000200 -

TSS Article No. RU90 0 0200 - Z20

- TSS Series No.
- Type (Standard)
- Rod Diameter x 10
- Quality Index (Standard)
- Material Code

MATERIAL

Standard Zurcon® :	Z20
Special polyurethane:	93 Shore A
Color:	Turquoise

Table 39: Preferred Series / TSS Article No.

Rod Diameter	Groove Diameter	Groove Width	TSS Part No.
d_N f8/h9	D1 H10	L +0.25	
*6.0	14.0	6.3	RU9000060
***8.0**	**16.0**	**6.3**	**RU9000080**
12.0	19.0	6.0	RU9000120
15.0	20.0	5.0	RU9000150
*15.0	23.0	6.3	RU9100150
*16.0	22.0	6.0	RU9100160
*16.0	24.0	6.0	RU9200160
***16.0**	**24.0**	**6.3**	**RU9000160**
18.0	25.0	5.3	RU9100180
***18.0**	**26.0**	**6.3**	**RU9000180**
20.0	26.0	6.0	RU9100200
***22.0**	**30.0**	**6.3**	**RU9100220**

Rod Diameter	Groove Diameter	Groove Width	TSS Part No.
d_N f8/h9	D1 H10	L +0.25	
***20.0**	**28.0**	**5.0**	**RU9300200**
***20.0**	**30.0**	**8.0**	**RU9200200**
***20.0**	**28.0**	**6.3**	**RU9000200**
22.0	29.0	5.6	RU9200220
***22.0**	**30.0**	**6.3**	**RU9000220**
25.0	31.0	6.3	RU9100250
25.0	**33.0**	**6.3**	**RU9000250**
28.0	**36.0**	**6.3**	**RU9000280**
***28.0**	**38.0**	**8.0**	**RU9100280**
30.0	38.0	9.0	RU9100300
30.0	40.0	7.5	RU9200300
30.0	40.0	11.0	RU9000300
32.0	40.0	6.3	RU9200320
32.0	40.0	9.0	RU9100320
32.0	**42.0**	**8.0**	**RU9000320**
35.0	42.0	8.0	RU9100350
35.0	**45.0**	**8.0**	**RU9000350**
36.0	**44.0**	**6.3**	**RU9100360**
36.0	44.0	9.0	RU9000360
36.0	**46.0**	**8.0**	**RU9200360**
40.0	**50.0**	**8.0**	**RU9000400**
*45.0	53.0	8.5	RU9200450
45.0	**55.0**	**6.3**	**RU9100450**
45.0	**55.0**	**8.0**	**RU9000450**
50.0	**60.0**	**8.0**	**RU9000500**
50.0	60.0	11.0	RU9200500
50.0	**65.0**	**12.5**	**RU9100500**
55.0	65.0	8.0	RU9000550
56.0	68.0	11.0	RU9100560
56.0	**71.0**	**12.5**	**RU9000560**
60.0	68.0	7.0	RU9100600
60.0	70.0	8.0	RU9200600
60.0	**75.0**	**12.5**	**RU9000600**
63.0	75.0	13.0	RU9100630
63.0	**78.0**	**12.5**	**RU9000630**
65.0	75.0	8.0	RU9000650
65.0	85.0	12.5	RU9100650
70.0	82.0	9.6	RU9200700
70.0	**85.0**	**12.5**	**RU9000700**
75.0	83.0	7.0	RU9000750
80.0	93.0	12.5	RU9300800
80.0	95.0	10.0	RU9200800

Rod Diameter	Groove Diameter	Groove Width	TSS Part No.
d_N f8/h9	D1 H10	L +0.25	
80.0	**95.0**	**12.5**	**RU9100800**
80.0	100.0	12.5	RU9000800
85.0	100.0	10.0	RU9200850
85.0	100.0	12.5	RU9100850
90.0	100.0	7.5	RU9100900
90.0	102.0	9.6	RU9200900
90.0	**105.0**	**12.5**	**RU9000900**
95.0	110.0	10.0	RU9200950
95.0	110.0	12.5	RU9100950
95.0	115.0	13.0	RU9000950
100.0	108.0	12.0	RU9101000
100.0	115.0	13.0	RU9201000
100.0	**120.0**	**16.0**	**RU9001000**
105.0	120.0	12.5	RU9001050
110.0	120.0	11.0	RU9101100
110.0	125.0	12.0	RU9301100
110.0	125.0	12.5	RU9201100
110.0	**130.0**	**16.0**	**RU9001100**
115.0	125.0	11.0	RU9001150
120.0	135.0	12.5	RU9001200
125.0	**145.0**	**16.0**	**RU9001250**
130.0	140.0	7.5	RU9001300
130.0	145.0	13.0	RU9101300
140.0	**160.0**	**16.0**	**RU9001400**

Dimensions and TSS Part Numbers in bold according to ISO 5597. * splitted groove