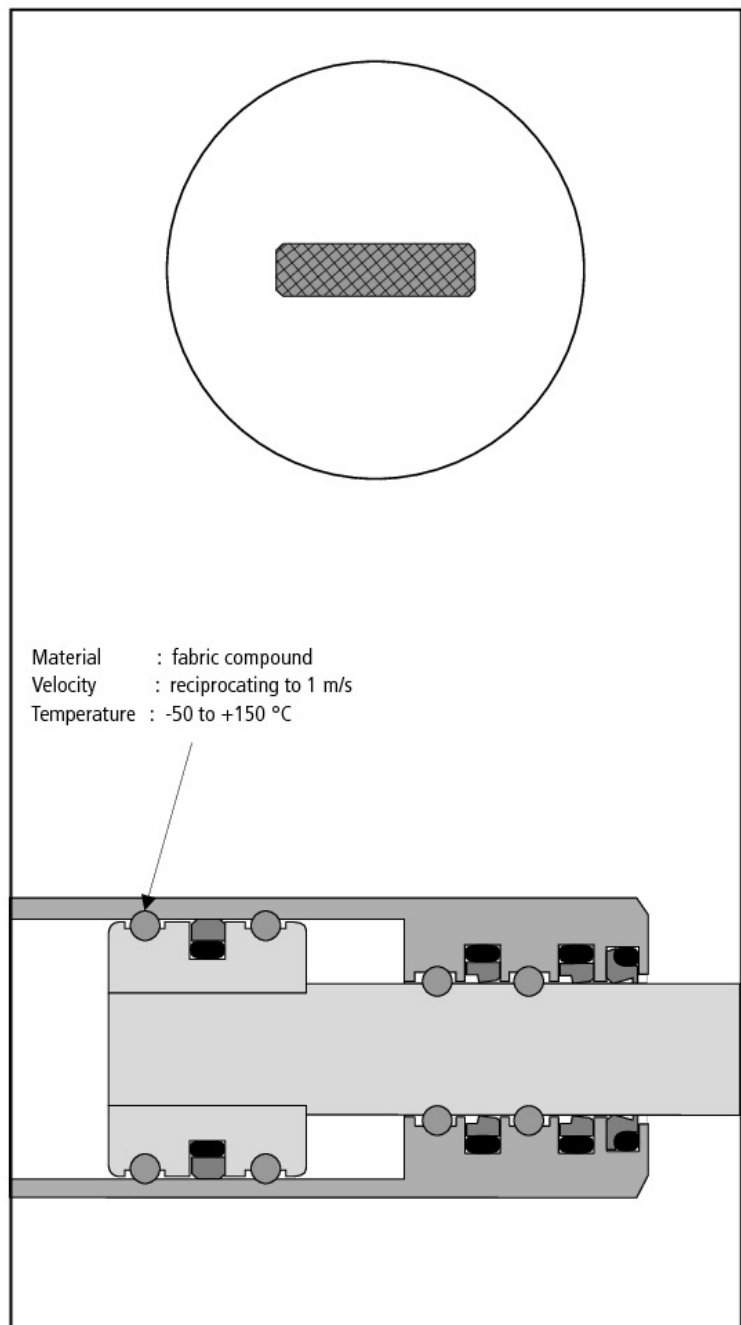


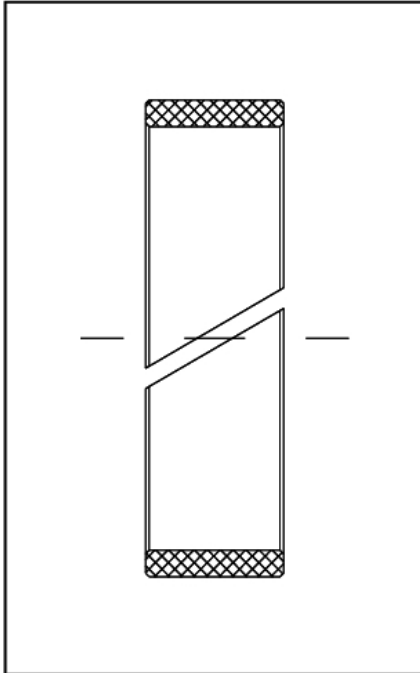
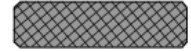
Slide rings are used in hydraulic and pneumatic cylinders. They serve for sliding between piston and rod, reduce metallic contact between sliding parts and absorb transverse forces. Metallic slides are being replaced by non-metallic slides (various plastics).

Non-metallic slides offer a series of advantages that contribute to and enhance functional security and service life.

Special Features:

- High compression strength, absorption of higher transverse forces
- High anti wear properties, long life
- No corrosion, plastic/metal combination
- Low friction, good resistance to galling
- Damping of mechanical vibrations
- Easy to assemble
- Cost convenient and available for all diameters.





Slide Ring

Slide rings have a rectangular cross-section and are chamfered at the corners to avoid excess edge pressures at groove corners. The chamfers also serve to simplify assembly.

The standard design has a bevel cut at the ring end. Slide rings can be used for every piston and rod diameter. The slit "m" is especially necessary for that function.

Materials Overview

400: Preformed slide ring from fabric cotton and phenolic resin reinforcement without auxiliary lubricant. Good shear characteristics, high compression and wear resistance. Meant for high loads in foodstuffs and pharmaceutical industry.

420: Preformed slide ring from fabric cotton and phenolic resin reinforcement with graphite as additional lubricant. Good shear characteristics and resistance to galling, high compression and wear resistance. Meant for heavy duty hydraulics and pneumatics.

440: Slide band from fine plastics fiber with additional lubricant. Very high compression resistance, high wear resistance and good shear characteristics. Meant for heavy duty hydraulics.

Material Data

		Type 440	Type 400 and 420
Compress. strength, stat.	N/mm ²	400	300
Compress. strength, dyn.	N/mm ²	110	90
Temperature range	°C	-50 to +150	-40 to +120
Water uptake	%	< 0,1	< 1,2

Calculations

Designing and sizing of slide ring for dynamic applications is dependent to a large extent on the radial force and the associated deformation of the slide material, slide gap and the service temperature. The value of dynamic compressive strength is to be considered taking the above factors into account. In practice, it is advantageous to include a factor of safety..

$$B_{min} \geq \frac{F_R \cdot S}{\sigma_{zul, dyn} \cdot D_n} [mm]$$

Where:

B_{min} = min. width of slide ring [mm]

F_R = max. radial load [N]

$\sigma_{zul, dyn}$ = permissible dynamic compression strength [N/mm²]

S = safety factor

Example:

$$B_{min} \geq \frac{40000 \cdot 2}{90 \cdot 63} \approx 14,1$$

Rod diameter D_n = 63 mm

max. radial load F_R = 40000 N

dyn. compr. strength (material 400) $\sigma_{zul, dyn}$ = 90 N/mm²

Safety factor S = 2

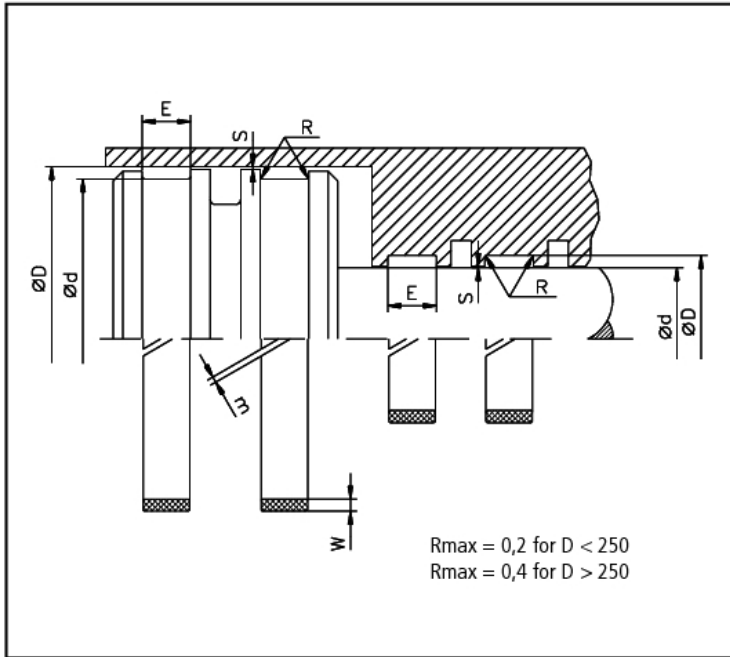
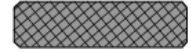
Non metallic materials are preferred to metals for use in slides for pistons and piston rods of hydraulic and pneumatic cylinders. This is specially true of applications like mining, building and heavy machinery engineering where exceptionally high or inadequately defined radial forces come into play.

In accordance with above calculations, a choice can be made as:

1 slide ring for groove width of 15.0 mm.

2 slide rings for groove width of 9.7 mm.

To achieve as much of a slide length as possible, incorporation of two slide rings is recommended.



Limitations on Use	
Velocity	: reciprocating to 1m/s
Temperature	: -50 to +150 °C (440)
	-40 to +120 °C (400 and 420)
Compress. strength, dyn.:	110 N/mm ² (440)
	90 N/mm ² (400 and 420)

Media for Use
Mineral oil based pressure fluids, flame resistant fluids (HFA, HFB, HFC), non-polluting pressure fluids (Bio Oils), water, air etc.

Split Sizes	
Radial split "s" is dependent on the included sealing variant.	
Ring split "m" for diameter	m
12 - 45	2 - 4 mm
50 - 145	3 - 6 mm
150 - 220	4 - 10 mm
über 230	15 - 45 mm

Piston Slides

D H9	d h8	E +0,2	W	Material 400 Part N°.	Material 420 Part N°.	Material 440 Part N°.
16,00	12,90	4,00	1,55	HF471 0129-12-400	HF471 0129-12-420	
16,00	11,00	5,60	2,50	HF470 0110-14-400	HF470 0110-14-420	HF470 0110-14-440
20,00	16,90	4,00	1,55	HF471 0169-12-400	HF471 0169-12-420	
20,00	15,00	5,60	2,50	HF470 0150-14-400	HF470 0150-14-420	HF470 0150-14-440
22,00	17,00	5,60	2,50	HF470 0170-14-400	HF470 0170-14-420	HF470 0170-14-440
25,00	21,90	4,00	1,55	HF471 0219-12-400	HF471 0219-12-420	
25,00	20,00	5,60	2,50	HF470 0200-14-400	HF470 0200-14-420	HF470 0200-14-440
32,00	28,90	4,00	1,55	HF471 0289-12-400	HF471 0289-12-420	
32,00	27,00	5,60	2,50	HF470 0270-14-400	HF470 0270-14-420	HF470 0270-14-440
40,00	35,00	5,60	2,50	HF470 0350-14-400	HF470 0350-14-420	HF470 0350-14-440
50,00	45,00	5,60	2,50	HF470 0450-14-400	HF470 0450-14-420	HF470 0450-14-440
63,00	58,00	5,60	2,50	HF470 0580-14-400	HF470 0580-14-420	HF470 0580-14-440
63,00	58,00	9,70	2,50	HF470 0580-16-400	HF470 0580-16-420	HF470 0580-16-440
80,00	75,00	5,60	2,50	HF470 0750-14-400	HF470 0750-14-420	HF470 0750-14-440
80,00	75,00	9,70	2,50	HF470 0750-16-400	HF470 0750-16-420	HF470 0750-16-440
100,00	95,00	5,60	2,50	HF470 0950-14-400	HF470 0950-14-420	HF470 0950-14-440
100,00	95,00	9,70	2,50	HF470 0950-16-400	HF470 0950-16-420	HF470 0950-16-440
125,00	120,00	5,60	2,50	HF470 1200-14-400	HF470 1200-14-420	HF470 1200-14-440
125,00	120,00	9,70	2,50	HF470 1200-16-400	HF470 1200-16-420	HF470 1200-16-440
140,00	135,00	9,70	2,50	HF470 1350-16-400	HF470 1350-16-420	HF470 1350-16-440
140,00	135,00	15,00	2,50	HF470 1350-18-400	HF470 1350-18-420	HF470 1350-18-440
160,00	155,00	9,70	2,50	HF470 1550-16-400	HF470 1550-16-420	HF470 1550-16-440
160,00	155,00	15,00	2,50	HF470 1550-18-400	HF470 1550-18-420	HF470 1550-18-440
180,00	175,00	9,70	2,50	HF470 1750-16-400	HF470 1750-16-420	HF470 1750-16-440
180,00	175,00	15,00	2,50	HF470 1750-18-400	HF470 1750-18-420	HF470 1750-18-440
200,00	195,00	9,70	2,50	HF470 1950-16-400	HF470 1950-16-420	HF470 1950-16-440
200,00	195,00	15,00	2,50	HF470 1950-18-400	HF470 1950-18-420	HF470 1950-18-440
220,00	215,00	9,70	2,50	HF470 2150-16-400	HF470 2150-16-420	HF470 2150-16-440
220,00	215,00	15,00	2,50	HF470 2150-18-400	HF470 2150-18-420	HF470 2150-18-440
250,00	245,00	9,70	2,50	HF470 2450-16-400	HF470 2450-16-420	HF470 2450-16-440
250,00	245,00	15,00	2,50	HF470 2450-18-400	HF470 2450-18-420	HF470 2450-18-440
280,00	275,00	9,70	2,50	HF470 2750-16-400	HF470 2750-16-420	HF470 2750-16-440
280,00	275,00	15,00	2,50	HF470 2750-18-400	HF470 2750-18-420	HF470 2750-18-440



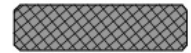
Piston Slides

D H9	d h8	E +0,2	W	Material 400 Part N°.	Material 420 Part N°.	Material 440 Part N°.
280,00	272,00	25,00	4,00	HF474 2720-20-400	HF474 2720-20-420	
320,00	315,00	15,00	2,50	HF470 3150-18-400	HF470 3150-18-420	HF470 3150-18-440
320,00	315,00	25,00	2,50	HF470 3150-20-400	HF470 3150-20-420	HF470 3150-20-440
320,00	312,00	25,00	4,00	HF474 3120-20-400	HF474 3120-20-420	
360,00	355,00	15,00	2,50	HF470 3550-18-400	HF470 3550-18-420	HF470 3550-18-440
360,00	355,00	25,00	2,50	HF470 3550-18-400	HF470 3550-18-420	HF470 3550-18-440
360,00	352,00	25,00	4,00	HF474 3520-20-400	HF474 3520-20-420	
400,00	395,00	15,00	2,50	HF470 3950-18-400	HF470 3950-18-420	HF470 3950-18-440
400,00	395,00	25,00	2,50	HF470 3950-20-400	HF470 3950-20-420	HF470 3950-20-440
400,00	392,00	25,00	4,00	HF474 3920-20-400	HF474 3920-20-420	
450,00	445,00	15,00	2,50			HF470 4450-18-440
450,00	445,00	25,00	2,50			HF470 4450-20-440
500,00	495,00	15,00	2,50			HF470 4950-18-440
500,00	495,00	25,00	2,50			HF470 4950-20-440

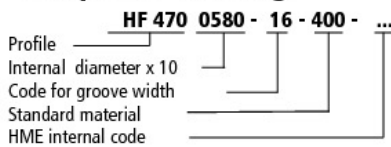
Rod Slides

d f8/h9	D H8	E +0,2	W	Material 400 Part N°.	Material 420 Part N°.	Material 440 Part N°.
12,00	15,10	4,00	1,55	HF471 0120-12-400	HF471 0120-12-420	
14,00	17,10	4,00	1,55	HF471 0140-12-400	HF471 0140-12-420	
16,00	19,10	4,00	1,55	HF471 0160-12-400	HF471 0160-12-420	
18,00	21,10	4,00	1,55	HF471 0180-12-400	HF471 0180-12-420	
20,00	23,10	4,00	1,55	HF471 0200-12-400	HF471 0200-12-420	
22,00	25,10	4,00	1,55	HF471 0220-12-400	HF471 0220-12-420	
25,00	28,10	4,00	1,55	HF471 0250-12-400	HF471 0250-12-420	
25,00	30,00	5,60	2,50	HF470 0250-14-400	HF470 0250-14-420	HF470 0250-14-440
28,00	31,10	4,00	1,55	HF471 0280-12-400	HF471 0280-12-420	
28,00	33,00	5,60	2,50	HF470 0280-14-400	HF470 0280-14-420	HF470 0280-14-440
32,00	37,00	5,60	2,50	HF470 0320-14-400	HF470 0320-14-420	HF470 0320-14-440
32,00	37,00	9,70	2,50	HF470 0320-16-400	HF470 0320-16-420	HF470 0320-16-440
36,00	41,00	5,60	2,50	HF470 0360-14-400	HF470 0360-14-420	HF470 0360-14-440
36,00	41,00	9,70	2,50	HF470 0360-16-400	HF470 0360-16-420	HF470 0360-16-440
40,00	45,00	5,60	2,50	HF470 0400-14-400	HF470 0400-14-420	HF470 0400-14-440
40,00	45,00	9,70	2,50	HF470 0400-16-400	HF470 0400-16-420	HF470 0400-16-440
45,00	50,00	5,60	2,50	HF470 0450-14-400	HF470 0450-14-420	HF470 0450-14-440
45,00	50,00	9,70	2,50	HF470 0450-16-400	HF470 0450-16-420	HF470 0450-16-440
50,00	55,00	5,60	2,50	HF470 0500-14-400	HF470 0500-14-420	HF470 0500-14-440
50,00	55,00	9,70	2,50	HF470 0500-16-400	HF470 0500-16-420	HF470 0500-16-440
56,00	61,00	5,60	2,50	HF470 0560-14-400	HF470 0560-14-420	HF470 0560-14-440
56,00	61,00	9,70	2,50	HF470 0560-16-400	HF470 0560-16-420	HF470 0560-16-440
63,00	68,00	5,60	2,50	HF470 0630-14-400	HF470 0630-14-420	HF470 0630-14-440
63,00	68,00	9,70	2,50	HF470 0630-16-400	HF470 0630-16-420	HF470 0630-16-440
70,00	75,00	5,60	2,50	HF470 0700-14-400	HF470 0700-14-420	HF470 0700-14-440
70,00	75,00	9,70	2,50	HF470 0700-16-400	HF470 0700-16-420	HF470 0700-16-440
80,00	85,00	9,70	2,50	HF470 0800-16-400	HF470 0800-16-420	HF470 0800-16-440
80,00	85,00	15,00	2,50	HF470 0800-18-400	HF470 0800-18-420	HF470 0800-18-440
90,00	95,00	9,70	2,50	HF470 0900-16-400	HF470 0900-16-420	HF470 0900-16-440
90,00	95,00	15,00	2,50	HF470 0900-18-400	HF470 0900-18-420	HF470 0900-18-440
100,00	105,00	9,70	2,50	HF470 1000-16-400	HF470 1000-16-420	HF470 1000-16-440
100,00	105,00	15,00	2,50	HF470 1000-18-400	HF470 1000-18-420	HF470 1000-18-440
110,00	115,00	9,70	2,50	HF470 1100-16-400	HF470 1100-16-420	HF470 1100-16-440
110,00	115,00	15,00	2,50	HF470 1100-18-400	HF470 1100-18-420	HF470 1100-18-440
125,00	130,00	9,70	2,50	HF470 1250-16-400	HF470 1250-16-420	HF470 1250-16-440
125,00	130,00	15,00	2,50	HF470 1250-18-400	HF470 1250-18-420	HF470 1250-18-440
140,00	145,00	9,70	2,50	HF470 1400-16-400	HF470 1400-16-420	HF470 1400-16-440
140,00	145,00	15,00	2,50	HF470 1400-18-400	HF470 1400-18-420	HF470 1400-18-440
160,00	165,00	9,70	2,50	HF470 1600-16-400	HF470 1600-16-420	HF470 1600-16-440
160,00	165,00	15,00	2,50	HF470 1600-18-400	HF470 1600-18-420	HF470 1600-18-440
180,00	185,00	9,70	2,50	HF470 1800-16-400	HF470 1800-16-420	HF470 1800-16-440
180,00	185,00	15,00	2,50	HF470 1800-18-400	HF470 1800-18-420	HF470 1800-18-440
200,00	205,00	15,00	2,50	HF470 2000-18-400	HF470 2000-18-420	HF470 2000-18-440
200,00	205,00	25,00	2,50	HF470 2000-20-400	HF470 2000-20-420	HF470 2000-20-440

Further sizes available up to Ø 2500 mm on request



Example for ordering:



Profile Key:

- 470 - radial strength 2.50 mm
- 471 - radial strength 1.55 mm
- 472 - radial strength .00 mm
- 473 - radial strength 3.00 mm
- 474 - radial strength 4.00 mm

Codes for Groove Width:

- 12 - Groove width for mounting space 4.00 mm
- 14 - Groove width for mounting space 5.60 mm
- 16 - Groove width for mounting space 9.70 mm
- 18 - Groove width for mounting space 15.00 mm
- 20 - Groove width for mounting space 25.00 mm

Material Key:

- 400 - Cotton hard fabric
- 420 - Cotton hard fabric graphitized
- 440 - Synthetic fiber

Note: The rings are delivered by us with bevel cut (standard). The split "m" necessary for sealing function is duly considered herein.

WARNING: Limits of application stated herein are standard values. They could be individually transgressed with due consideration to respective service conditions. In the event of a large duty cycle, pulsating operation and other complex operational conditions, simultaneous transgression of these values is not recommended. Due to a large variety of service conditions that may arise in course of actual use, the company does not take responsibility of or guarantee the functional accuracy of the individual components. Rights for changes are reserved.

Issue

01 | 05