



Piston Seals made of PTFE

A double piston sealing of **type KDAQ** is proven and tested for sealing pistons for double-acting hydraulic cylinders, for media separation liquid/liquid or liquid/gas in particular. The compact design with two or more NBR-O-rings as pretension element on the static side well as a X-ring for media separation on the dynamic side, guarantee for a perfect sealing system. The various material combination for the sealing element as well as the selection of the material for the pretension and sealing element on the static and the dynamic side alike, provide for a large number of variation options and thus for a nearly unlimited usage for a wide variety of applications.

The piston sealing has a rectangular profile, the edges on the dynamic side a slightly trimmed. The sealing has radial grooves on both front sides in order to guarantee for a direct pressure on the sealing in case of a quick load change as well as to prevent any back pressure.

The **KDAQ*** design with two O-rings as a pretension element allows for higher deployment limits. Hence, this sealing can be recommended for heavy duty deployment as well as for larger diameters.

Benefits

- Excellent friction behaviour
- No stick-slip effect, even with lower speeds
- High sealing effect with media separation
- Very good thermal and chemical durability
- Higher gliding characteristics (KDAQ*)
- Simple groove design

Application ranges

Velocity:	back and forth up to 2 m/s / 3 m/s*
Temperature:	- 30° C bis + 200° C <small>depends on material combination and O-Ring material</small>
Pressure:	up to 40 MPa (400 bar) up to 60 MPa (600 bar)*
Groove root:	$R_a \leq 1,6 \mu m / R_t \leq 16 \mu m$
Groove flanks:	$R_a \leq 1,6 \mu m / R_t \leq 16 \mu m$
Contact area::	$R_a \leq 0,3 \mu m / R_t \leq 3 \mu m$

Installation

Type KDAQ piston sealings can easily be installed in divided and undivided grooves.

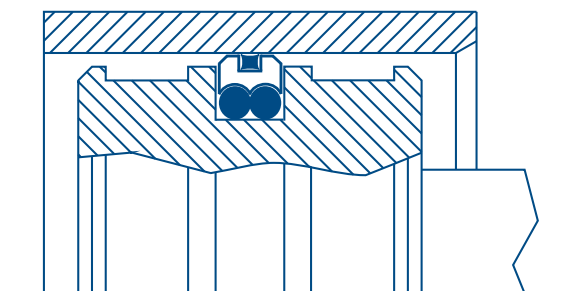
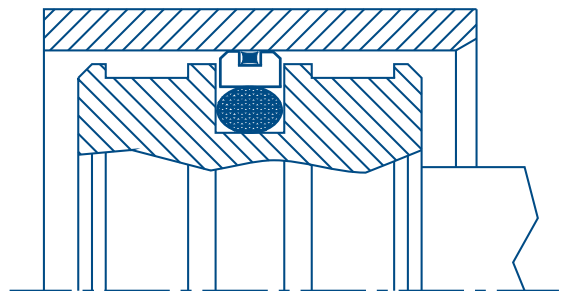
In order to make installation easier, the sealing may be heated in oil at approx. 80 C° before installation. After installing the pretension and sealing element, the PTFE piston sealing needs to be calibrated. Here, the cylinder pipe's feed with an angle of approx. 15 C° and a length of between 2 mm and 8 mm, depending on the design of the sealing height, may be used. However, a calibration quill may be used as well. Generally, any sharp edges should be deflashed before attaching radiuses or bevels. Thread tips should be covered. Chippings, dirt and other foreign particles should be removed before installation.

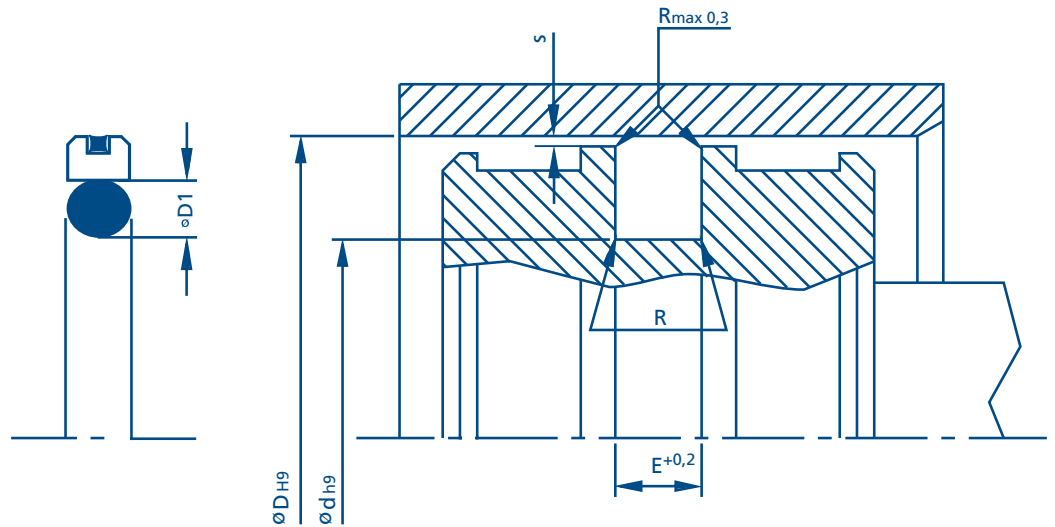
After installation and calibration of the sealing, a X-ring is to be installed in the respective groove on the dynamic side.

In order to guarantee the sealing's functionality and to not influence its life-cycle in a negative way, the surface quality of the area running in the opposite direction is decisive.

Generally, please make sure there are not marks, scratches or cavities as well as concentric or spiral toolmarks.

Key values such as Ra, Rz, Rt and Rmax, usually used to describe surfaces, are specified in compliance with DIN 4762 and DIN 4768 (DIN = German Industrial Standard).





Selections

Diameter D_{H9}

Standard design	Light-duty Design	Groove base $\varnothing d_{h9}$	Groove width $E^{+0,2}$	O-Ring Cord thickness $\varnothing D1$	X-Ring Cord thickness
16 - 39.9	40 - 79.9	$\varnothing D - 11.0$	4.2	3.53	1.78
40 - 79.9	80 - 132.9	$\varnothing D - 15.5$	6.3	5.33	1.78
80 - 132.9	133 - 252.9	$\varnothing D - 21.0$	8.1	7.00	2.62
133 - 252.9		$\varnothing D - 24.5$	8.1	7.00	2.62
253 - 462.9		$\varnothing D - 28.0$	9.5	8.40	3.53
463 - 700.0		$\varnothing D - 35.0$	11.5	10.00	5.33

Gap dimensions "s" / radius "R"

Groove width $E^{+0,2}$	Gap "s" 0 - 10 MPa	Gap "s" 10 - 20 MPa	Gap "s" 20 - 40 MPa	Radius R
4.2	0.25	0.15	0.10	1.0
6.3	0.30	0.20	0.15	1.3
8.1	0.30	0.20	0.15	1.8
8.1	0.30	0.20	0.15	1.8
9.5	0.45	0.30	0.25	2.5
11.5	0.55	0.40	0.35	3.0

All piston seals are supplied as standard with an O-ring, X-ring of NBR, 70 Shore. O-rings and X-rings of special materials such as Viton must be separately specified!

Piston seals / Ordering example:

K D A Q - 6 3 x 4 7 . 5 x 6 . 3 - B R

Piston seal for piston $\varnothing 63$ / PTFE-Bronze / Standard design

K D A Q - 6 3 x 5 2 x 4 . 2 - K

Piston seal for piston $\varnothing 63$ / PTFE-Carbon / light design

Material

PTFE - Bronze BR
PTFE - Carbon K
PTFE - Carbon fibre KF

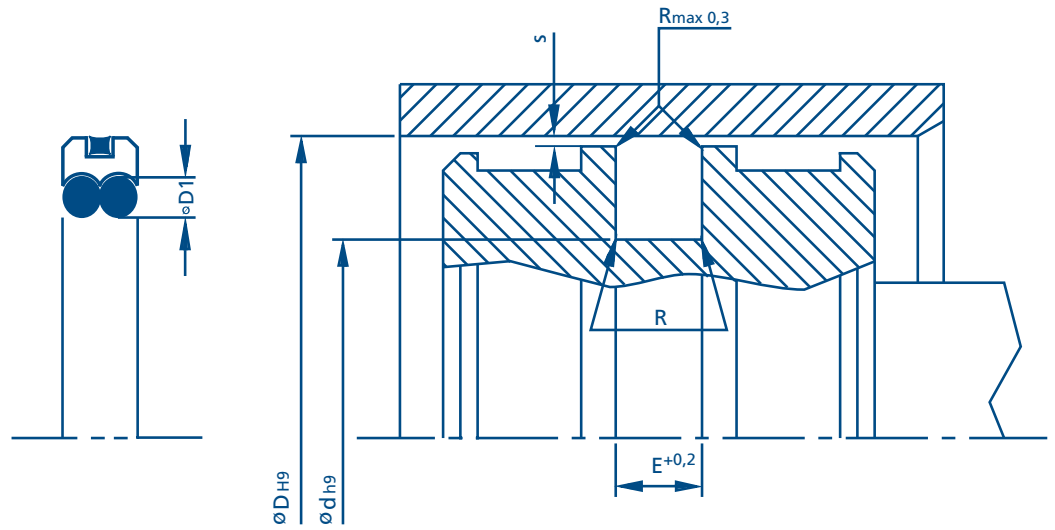
PUG - Polyurethane+graphite PG

(Special material; note modified material properties and technical specifications)



Order designation	∅D H9	∅d h9	E+0,2	Order designation	∅D H9	∅d h9	E+0,2
KDAQ - 16 - 5.0 - 4.2 - BR	16	5.0	4.2	KDAQ - 90 - 69.0 - 8.1 - BR	90	69.0	8.1
KDAQ - 18 - 7.0 - 4.2 - BR	18	7.0	4.2	KDAQ - 95 - 79.5 - 6.3 - BR	95	79.5	6.3
KDAQ - 20 - 9.0 - 4.2 - BR	20	9.0	4.2	KDAQ - 95 - 74.0 - 8.1 - BR	95	74.0	8.1
KDAQ - 22 - 11.0 - 4.2 - BR	22	11.0	4.2	KDAQ - 100 - 84.5 - 6.3 - BR	100	84.5	6.3
KDAQ - 25 - 14.0 - 4.2 - BR	25	14.0	4.2	KDAQ - 100 - 79.0 - 8.1 - BR	100	79.0	8.1
KDAQ - 28 - 17.0 - 4.2 - BR	28	17.0	4.2	KDAQ - 105 - 89.5 - 6.3 - BR	105	89.5	6.3
KDAQ - 30 - 19.0 - 4.2 - BR	30	19.0	4.2	KDAQ - 105 - 84.0 - 8.1 - BR	105	84.0	8.1
KDAQ - 32 - 21.0 - 4.2 - BR	32	21.0	4.2	KDAQ - 110 - 94.5 - 6.3 - BR	110	94.5	6.3
KDAQ - 40 - 29.0 - 4.2 - BR	40	29.0	4.2	KDAQ - 110 - 89.0 - 8.1 - BR	110	89.0	8.1
KDAQ - 42 - 31.0 - 4.2 - BR	42	31.0	4.2	KDAQ - 115 - 99.5 - 6.3 - BR	115	99.5	6.3
KDAQ - 45 - 34.0 - 4.2 - BR	45	34.0	4.2	KDAQ - 115 - 94.0 - 8.1 - BR	115	94.0	8.1
KDAQ - 48 - 37.0 - 4.2 - BR	48	37.0	4.2	KDAQ - 120 - 104.5 - 6.3 - BR	120	104.5	6.3
KDAQ - 50 - 39.0 - 4.2 - BR	50	39.0	4.2	KDAQ - 120 - 99.0 - 8.1 - BR	120	99.0	8.1
KDAQ - 50 - 34.5 - 6.3 - BR	50	34.5	6.3	KDAQ - 125 - 109.5 - 6.3 - BR	125	109.5	6.3
KDAQ - 52 - 41.0 - 4.2 - BR	52	41.0	4.2	KDAQ - 125 - 104.0 - 8.1 - BR	125	104.0	8.1
KDAQ - 55 - 44.0 - 4.2 - BR	55	44.0	4.2	KDAQ - 130 - 114.5 - 6.3 - BR	130	114.5	6.3
KDAQ - 60 - 49.0 - 4.2 - BR	60	49.0	4.2	KDAQ - 130 - 109.0 - 8.1 - BR	130	109.0	8.1
KDAQ - 63 - 52.0 - 4.2 - BR	63	52.0	4.2	KDAQ - 135 - 114.0 - 8.1 - BR	135	114.0	8.1
KDAQ - 63 - 47.5 - 6.3 - BR	63	47.5	6.3	KDAQ - 140 - 119.0 - 8.1 - BR	140	119.0	8.1
KDAQ - 64 - 53.0 - 4.2 - BR	64	53.0	4.2	KDAQ - 150 - 129.0 - 8.1 - BR	150	129.0	8.1
KDAQ - 65 - 54.0 - 4.2 - BR	65	54.0	4.2	KDAQ - 160 - 139.0 - 8.1 - BR	160	139.0	8.1
KDAQ - 70 - 59.0 - 4.2 - BR	70	59.0	4.2	KDAQ - 170 - 149.0 - 8.1 - BR	170	149.0	8.1
KDAQ - 70 - 54.5 - 6.3 - BR	70	54.5	6.3	KDAQ - 180 - 159.0 - 8.1 - BR	180	159.0	8.1
KDAQ - 75 - 64.0 - 4.2 - BR	75	64.0	4.2	KDAQ - 190 - 169.0 - 8.1 - BR	190	169.0	8.1
KDAQ - 80 - 64.5 - 6.3 - BR	80	64.5	6.3	KDAQ - 200 - 179.0 - 8.1 - BR	200	179.0	8.1
KDAQ - 80 - 59.0 - 8.1 - BR	80	59.0	8.1	KDAQ - 210 - 189.0 - 8.1 - BR	210	189.0	8.1
KDAQ - 85 - 69.5 - 6.3 - BR	85	69.5	6.3	KDAQ - 220 - 199.0 - 8.1 - BR	220	199.0	8.1
KDAQ - 85 - 64.0 - 8.1 - BR	85	64.0	8.1	KDAQ - 230 - 209.0 - 8.1 - BR	230	209.0	8.1
KDAQ - 90 - 74.5 - 6.3 - BR	90	74.5	6.3	KDAQ - 240 - 219.0 - 8.1 - BR	240	219.0	8.1
KDAQ - 90 - 69.0 - 8.1 - BR	90	69.0	8.1	KDAQ - 250 - 225.5 - 8.1 - BR	250	225.5	8.1
KDAQ - 95 - 79.5 - 6.3 - BR	95	79.5	6.3	KDAQ - 250 - 229.0 - 8.1 - BR	250	229.0	8.1
KDAQ - 95 - 74.0 - 8.1 - BR	95	74.0	8.1	KDAQ - 280 - 252.0 - 9.5 - BR	280	252.0	9.5
KDAQ - 100 - 84.5 - 6.3 - BR	100	84.5	6.3	KDAQ - 300 - 272.0 - 9.5 - BR	300	272.0	9.5
KDAQ - 100 - 79.0 - 8.1 - BR	100	79.0	8.1	KDAQ - 350 - 322.0 - 9.5 - BR	350	322.0	9.5
KDAQ - 105 - 89.5 - 6.3 - BR	105	89.5	6.3	KDAQ - 400 - 372.0 - 9.5 - BR	400	372.0	9.5

Special dimensions and intermediate size are also available.



Selections

Diameter DH9

Standard design	Light-duty design	Groove root $\varnothing d_{h9}$	Groove width $E^{+0,2}$	O-Ring Cord thickness $\varnothing D1$	X-Ring Cord thickness
40 - 79.9	25 - 140.0	$\varnothing D - 10.0$	6.3	2.62	1.78
80 - 132.9	50 - 250.0	$\varnothing D - 13.0$	8.3	3.53	2.62
133 - 462.9	100 - 480.0	$\varnothing D - 18.0$	12.3	5.33	3.53
463 - 700.0	425 - 700.0	$\varnothing D - 31.0$	16.3	7.00	5.33

Gap dimension "s" / radius "R"

Groove width $E^{+0,2}$	Gap "s" 0 - 10 MPa	Gap "s" 10 - 20 MPa	Gap "s" 20 - 40 MPa	Radius R
6.3	0.30	0.20	0.15	0.6
8.3	0.40	0.30	0.15	1.0
12.3	0.40	0.30	0.20	1.3
16.3	0.50	0.40	0.30	1.8

All piston seals are supplied as standard with an O-ring, X-ring of NBR, 70 Shore. O-rings and X-rings of special materials such as Viton must be separately specified!

Piston seals / Ordering example:

K D A Q - 80 x 67 x 8.3 - B R

Piston seal for piston $\varnothing 80$ / PTFE-Bronze / standard design

K D A Q - 80 x 70 x 6.3 - K

Piston seal for piston $\varnothing 80$ / PTFE-Carbon / light design

Material

- PTFE - Bronze BR
- PTFE - Carbon K
- PTFE - Carbon fibre KF
- PUG - Polyurethane+graphite PG

(Special material; note modified material properties and technical specifications)



Order designation	∅D H9	∅d h9	E+0,2
KDAQ - 40 - 30.0 - 6.3 - BR	40	30.0	6.3
KDAQ - 42 - 32.0 - 6.3 - BR	42	32.0	6.3
KDAQ - 45 - 35.0 - 6.3 - BR	45	35.0	6.3
KDAQ - 50 - 40.0 - 6.3 - BR	50	40.0	6.3
KDAQ - 55 - 45.0 - 6.3 - BR	55	45.0	6.3
KDAQ - 60 - 50.0 - 6.3 - BR	60	50.0	6.3
KDAQ - 63 - 53.0 - 6.3 - BR	63	53.0	6.3
KDAQ - 65 - 55.0 - 6.3 - BR	65	55.0	6.3
KDAQ - 70 - 60.0 - 6.3 - BR	70	60.0	6.3
KDAQ - 75 - 65.0 - 6.3 - BR	75	65.0	6.3
KDAQ - 80 - 67.0 - 8.3 - BR	80	67.0	8.3
KDAQ - 85 - 72.0 - 8.3 - BR	85	72.0	8.3
KDAQ - 90 - 77.0 - 8.3 - BR	90	77.0	8.3
KDAQ - 95 - 82.0 - 8.3 - BR	95	82.0	8.3
KDAQ - 100 - 87.0 - 8.3 - BR	100	87.0	8.3
KDAQ - 105 - 92.0 - 8.3 - BR	105	92.0	8.3
KDAQ - 110 - 97.0 - 8.3 - BR	110	97.0	8.3
KDAQ - 115 - 102.0 - 8.3 - BR	115	102.0	8.3
KDAQ - 120 - 107.0 - 8.3 - BR	120	107.0	8.3
KDAQ - 125 - 112.0 - 8.3 - BR	125	112.0	8.3
KDAQ - 130 - 117.0 - 8.3 - BR	130	117.0	8.3
KDAQ - 140 - 122.0 - 12.3 - BR	140	122.0	12.3
KDAQ - 150 - 132.0 - 12.3 - BR	150	132.0	12.3
KDAQ - 160 - 142.0 - 12.3 - BR	160	142.0	12.3
KDAQ - 170 - 152.0 - 12.3 - BR	170	152.0	12.3
KDAQ - 180 - 162.0 - 12.3 - BR	180	162.0	12.3
KDAQ - 190 - 172.0 - 12.3 - BR	190	172.0	12.3
KDAQ - 200 - 182.0 - 12.3 - BR	200	182.0	12.3

Order designation	∅D H9	∅d h9	E+0,2
KDAQ - 210 - 192.0 - 12.3 - BR	210	192.0	12.3
KDAQ - 220 - 202.0 - 12.3 - BR	220	202.0	12.3
KDAQ - 230 - 212.0 - 12.3 - BR	230	212.0	12.3
KDAQ - 240 - 222.0 - 12.3 - BR	240	222.0	12.3
KDAQ - 250 - 232.0 - 12.3 - BR	250	232.0	12.3
KDAQ - 280 - 262.0 - 12.3 - BR	280	262.0	12.3
KDAQ - 300 - 282.0 - 12.3 - BR	300	282.0	12.3
KDAQ - 320 - 302.0 - 12.3 - BR	320	302.0	12.3
KDAQ - 350 - 332.0 - 12.3 - BR	350	332.0	12.3
KDAQ - 400 - 382.0 - 12.3 - BR	400	382.0	12.3
KDAQ - 420 - 402.0 - 12.3 - BR	400	402.0	12.3
KDAQ - 450 - 432.0 - 12.3 - BR	450	432.0	12.3
KDAQ - 480 - 449.0 - 16.3 - BR	400	449.0	16.3
KDAQ - 500 - 469.0 - 16.3 - BR	500	469.0	16.3
KDAQ - 550 - 519.0 - 16.3 - BR	550	519.0	16.3
KDAQ - 600 - 569.0 - 16.3 - BR	600	569.0	16.3
KDAQ - 650 - 619.0 - 16.3 - BR	650	619.0	16.3
KDAQ - 700 - 669.0 - 16.3 - BR	700	669.0	16.3

Special dimensions and intermediate size are also available.