

Hydraulics Rod seals

DILAG® components (seal + bearing) Standard version QFNH

DILAG components are maintenance-free sealing elements which fulfill three different tasks at the same time:

Sealing – scraping – bearing

Previously, U-rings were generally used to seal rods. Additional scrapers were necessary in order to prevent dirt from penetrating the friction bearing. Bearing in the machine housing or in the bearing cover frequently necessitated expensive bearing bushes since the materials of which the housing or cover was made were not suitable for performing a bearing function. These expensive individual elements have been combined in the DILAG component to perform a combined seal.

Structure and operation

DILAG components comprise a metal support body to which the elastic sealing lip, the bearing component and the scraper are permanently connected by vulcanisation. The bearing component between the sealing lip and scraper is provided with grooves for accommodating grease over its bearing length. These grooves run like a multiple-start thread. This provides intensive lubrication, particularly in the case of short strokes and high frequency. Practical experience has demonstrated that, by comparison with metallic sliding bearings, the service life is extended many times owing to bearing of the piston rod in the rubber of the DILAG component, in particular with non-hardened surfaces, since no measurable scoring occurs on the piston rod.

The inner diameter in the bearing area of the DILAG component is up to 0.2 mm greater than the rod diameter in order to compensate for expansion of the elastomer due to the effects of temperature during operation which expands by approximately 10 times more than is the case with steel.

Especially in the case of multiple or parallel-guided rods, for example, in the case of tandem cylinders and in the case of pneumatic-hydraulic feed units, the elastic guidance of the seal has proven advantageous. By comparison with rigid metallic bearings, a greater mismatch is possible in the case of DILAG components with the same degree of reliability. DILAG components require no maintenance. They are thus particularly suitable for use as a bearing if lubrication or relubrication is not possible. The acceptable lateral force limit of the bearing component depends upon the stroke length and rod diameter. In general, the following formula applies to the maximum load limit:

$$\text{Rod } \phi \text{ (mm)} \times 30 \text{ (N/mm)} = \text{load limit (N)}$$

Scope of application

Medium	Hydraulic oil on a mineral oil basis or hydraulic fluids flammable with difficulty in accordance with HFA, HFB, HFC
Pressure range	$\leq 160 \text{ bar}$
Sliding speed	$\leq 0.5 \text{ m/s}$
Temperature range	$-30^{\circ} \text{ C to } +80^{\circ} \text{ C}$ (243 K to 353 K)

Installation instructions

DILAG components for hydraulics are pressed into an H8 hole with a pressing arbor (drawing, please refer to dimension list, Page 59) from the inside of the equipment. It must be ensured that the DILAG component is not pressed against the retaining collar of the hole since this could result in premature damage to the sealing element. For this reason, a path limiting facility must be provided in the pressing-in device in line with the design dimensions in order to ensure an axial gap of 0.3 to 0.5 mm between the retaining collar and sealing element.

The pressing-in tool should be as short as possible in order to prevent alignment errors and tilting when pressing in. Before pressing in, the DILAG component must be lightly oiled or greased on its outer surface.

It must be installed by pushing it in quickly. It must not be driven home.

When fitting the piston rod, it must be ensured that the grooves and chambers of the DILAG component are completely filled with grease on a mineral oil basis. If it is intended to use other types of grease, please consult us beforehand in order to establish whether such greases are compatible.

Removal

The DILAG component is removed using a pressing-out arbor (please refer to Page 59, Dimension list) in the direction of the inside of the equipment. Before fitting a new sealing element, the hole must be cleaned in order to remove any rubber residue which may have shorn off and in order to check for possible damage as the result of pressing out.

Material

Special requirements are made as regards the abrasion resistance of the material when operating hydraulic systems with hydraulic fluid on a mineral oil or synthetic basis. For this reason, a specially adapted SYGUMIN material on an NBR basis with a shore A hardness of 80 is used for the DILAG components. This material permits a long service life and good sliding properties.

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Machining information

Piston rod	$R_{\text{max}} = 1 - 4 \mu\text{m}$ $t_p = 50 - 70 \%$
Housing bore	$R_{\text{max}} = 10 - 16 \mu\text{m}$ $t_p = 50 - 70 \%$
Workpiece edges DIN 6784, Part 1 (draft standard)	Free of burrs -0.2 -0.1 Transition $+0.2 \text{ max}$

Designation system:

DILAG component for hydraulics	QFNH 16 · 25 V G 02
Nominal dimensions inner ϕ , outer ϕ	
Sealing lip with projection	
Rubber seat	
Count number	

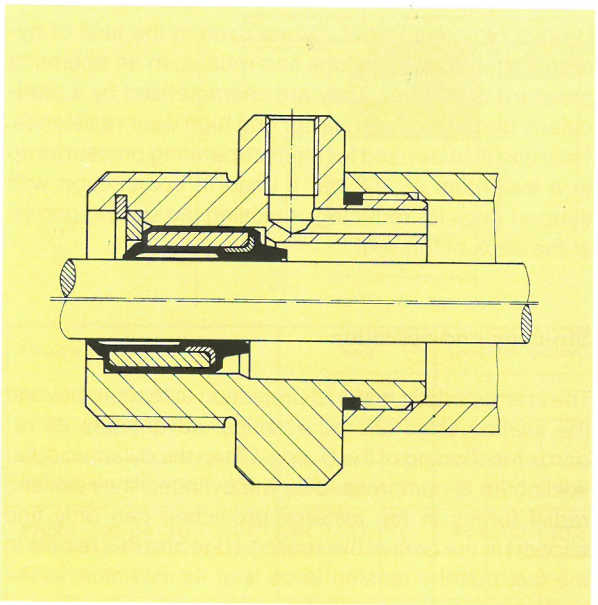
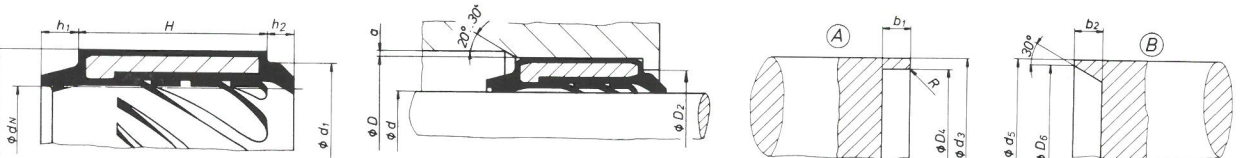


Figure 40: Example of how to install a DILAG component, type QFNH

Dimension list



Designation	Seal						Installation location				(A) Installation or (B) Removal tool							
	Tol.	dN	DN	H	h1	h2	d1	d	D	D2	a	d3	D4	d5	D6	b1	b2	R
QFNH 8 · 15 VG 02		8	15	12,7	2,8	2	11,5	8	15	12,5	0,3	14,7	11	12,2	10,4	5	4	0,5
QFNH 10 · 17 VG 02		10	17	15,7	2,8	2	13,5	10	17	14,5	0,4	16,7	13	14,2	12,4	5	4	0,5
QFNH 12 · 19 VG 02		12	19	16	4	2,5	15,5	12	19	16,5	0,4	18,7	15,7	16,2	14,4	5,5	4,5	0,5
QFNH 14 · 21 VG 02		14	21	17	4	2,5	17,5	14	21	18,5	0,4	20,7	17,7	18,2	16,4	5,5	4,5	0,8
QFNH 15 · 23 VG 02		15	23	18	3,5	3	18,5	15	23	19,5	0,4	22,7	19,1	19,2	17,4	5,5	4,5	0,8
QFNH 16 · 25 VG 02		16	25	17,5	5	3	20,5	16	25	21,5	0,4	24,7	20,5	21,2	19,4	6,5	5	0,8
QFNH 18 · 27 VG 02		18	27	19,5	4,5	3,5	22,5	18	27	23,5	0,4	26,7	22,5	23,2	21,2	6,5	5	0,8
QFNH 20 · 29 VG 02		20	29	22	5	3,5	24,5	20	29	25,5	0,4	28,7	24,5	25,2	23,2	6,5	5,5	0,8
QFNH 22 · 31 VG 02		22	31	22	5	3,5	26,5	22	31	27,5	0,4	30,7	26,5	27,2	25,2	6,5	5,5	0,8
QFNH 25 · 35 VG 02		25	35	27	5	3,5	30	25	35	31	0,4	34,7	29,5	30,7	28,7	6,5	5,5	0,8
QFNH 26 · 36 VG 02		26	36	27	5	3,5	30	26	36	32	0,4	35,7	30,6	31,7	29,7	6,5	5,5	0,8
QFNH 30 · 41 VG 02		30	41	32	5,5	3,5	35	30	41	36,5	0,4	40,7	34,7	36,2	33,7	7	5,5	0,8
QFNH 32 · 43 VG 02		32	43	32	5,5	3,5	37	32	43	38,5	0,4	42,7	36,7	38,2	35,7	7	5,5	0,8
QFNH 35 · 46 VG 02		35	46	34	5,5	3,5	40	35	46	41,5	0,4	45,7	40	41,2	38,7	7	5,5	0,8
QFNH 36 · 49 VG 01		36	49	43,5	5	3,5	41	36	49	50,5	0,4	48,7	39,5	50,3	39,7	7	5,5	0,8
QFNH 40 · 51 VG 02		40	51	34	5,5	3,5	45	40	51	46,5	0,4	50,7	45	46,2	43,7	7	5,5	0,8
QFNH 45 · 56 VG 02		45	56	37	5,5	3,5	50	45	56	51,5	0,4	55,7	50	51,2	48,7	7	5,5	0,8

Dimensions in bold print = preferred dimensions

Subject to design and dimensional modification