Herbe

KNIFE GATE
VALVES
PAL

Contents

1. General Characteristics and Applications

The PAL model is a wafer valve. It is generally used for fluids, although It is also suitable for systems used to transport fluids that contain a load of suspended particles. Some of its main areas of application are:

Paper/cellulose industry (paper pulp, mechanical pulps, etc.). Environment (circuits for wastewater, sludge, ash, ventilation, etc.). Chemical industry (viscous pastes, dust, aggregates, etc.). Food industry (washing facilities, silos, etc.). Metal/mining/glass/cement industry (silos, abrasive products, etc.).

1.1. Installation and service instructions

1.1.1. Handling

Do not lift the valve by holding its operation system or protective components. These have not been designed to withstand weight and they could be easily damaged.

Do not lift the valve using the valve bore. This could damage the surface of the seat and its seals.

Use eye bolts screwed into the threaded bore holes on the valve's body. Furthermore, using slings to lift the valve during installation is recommended. These slings will be attached to the top of the valve's body.

1.1.2. Flow direction and position

The standard valve is unidirectional, but it may be manufactured to be bidirectional In any case, the direction of flow is indicated on the body.

The unidirectional valve must be installed such that the highest pressure is exercised on the seat. Remember that the direction of flow does not necessarily coincide with the direction of pressure.

The valve should preferably be installed vertically in a horizontal pipe, whenever the installation permits this.

Do not install the valve with its operation system at the bottom. However, the valve can be assembled in any position around the pipe (please consult our Technical Department first).

WARNING: In applications with liquids loaded via gravity and in silos, the valve must be assembled inversely to the direction of the arrow, meaning the seat or deflector will be positioned upstream.

1.1.3. Assembly

Assembly should be performed such that the pipe's weight and different mechanical stresses should not impact the valve directly.

Preparation

Before fixing the valve to the pipe, inspect it to ensure it has not deteriorated or been damaged during transport or storage. Also ensure that the inside of the body, particularly in the seat area, is clean.

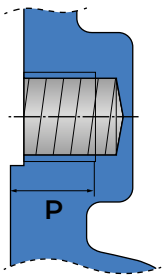
Check the flanges and their flange seals are suitable and pay special attention to make sure the right distance is maintained between the flanges, and also ensure they are aligned and parallel to the pipe. Incorrect positioning could cause deformations to the valve's body, thereby hindering or even preventing its operation.

Fixing to the pipe

Ensure the parts attached to the valve (flanges, gaskets, piping, etc.) are clean and check the liquid's direction of travel.

We recommend attaching the valve using threaded rods and nuts, instead of screws, in the blind threaded attachment holes on the body with the flange to prevent the thread of the same deteriorating when tightened (in the event the screws are overly long). The connection will be made diagonally using the right screws and without overtightening.

The following table shows the maximum tightening torques as well as the maximum insertion distance in the body's blind bore holes.



DN	50	65	80	100	125	150	200	250	300	350	400	500
P	8	8	9	9	9	10	10	12	12	21	21	22
TOR	60	60	60	60	70	70	70	110	110	150	150	190

DN Nominal diameter **P** Maximum insertion distance in mm **TOR** Maximum tightening torque in Nm

1.1.4. Warnings

Pneumatic operation

The valve is supplied by the standard double-acting cylinder, although single-acting cylinders may be supplied on request. In both cases the feed pressure can vary between 3.5 and 10 bar, with the cylinder's size having been designed for a feed pressure of 6 bar.

Using dry, filtered and lubricated air at 6 nominal bar (maximum: 10 bar) **is recommended** for optimal operation and duration of both the valve and the cylinder.

Electric operation

Motorisation via servomotor with disengageable safety handwheel. The motor's opening and closing limit switches, in addition to the torque limiters, will be adjusted at our facilities and should not be subsequently altered.

Before making any connections check the motor's supply voltage.

The instruction sheet and connection plan can be found inside the servomotor's junction box.

NOTE: The pneumatic or electric connection should be made after all assembly operations have been completed and after ensuring there are no hazards.

WARNING: The user is responsible for checking the liquid's compatibility in its service conditions with the valve's materials.

1.1.5. Before and during start-up

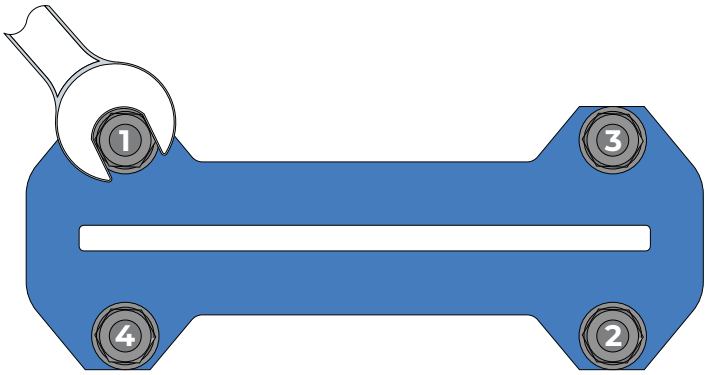
Before pressurising the pipe, it is essential that you retighten the screws on the packing gland, diagonally (as shown in the figure below) and progressively but not excessively, since during shipping/storage of the valve, a small leak may have occurred in the packing.

If the packing gland is overtightened, the force necessary to activate the valve will increase, thus hindering its operation and reducing the packing's useful life.

In any case, the following table indicates the maximum tightening torque allowed for each DN.

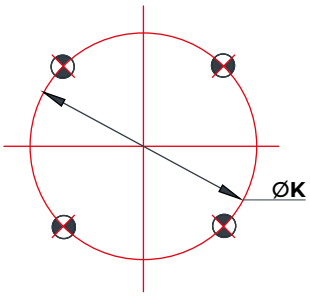
DN	50 - 100	125 - 200	250 - 500
TOR	20	30	35

DN Nominal diameter **TOR** Maximum tightening torque in Nm

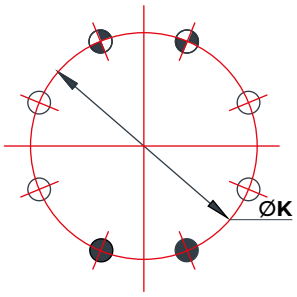


During start-up, in the event of a leak in the packing gland, progressively tighten each screw in a crossed and interspersed manner (as shown in the figure) and wait 30 minutes. Repeat this operation if necessary until the leak has disappeared and stop tightening.

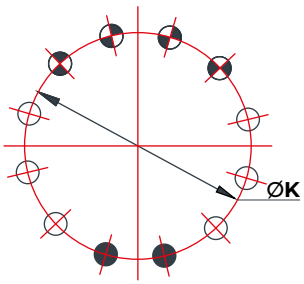
1.1.6. Dimensions of flanges EN1092 PN10



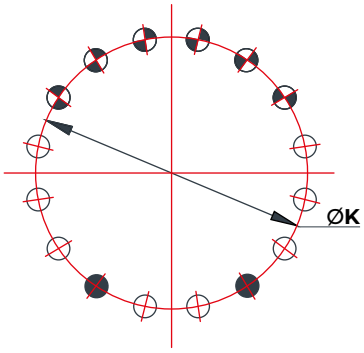
DN 50-65



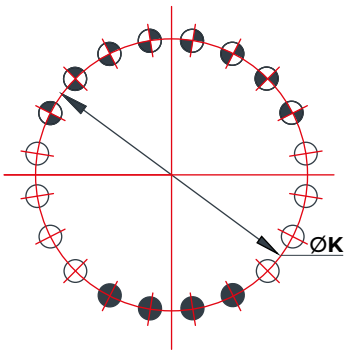
DN 80-200



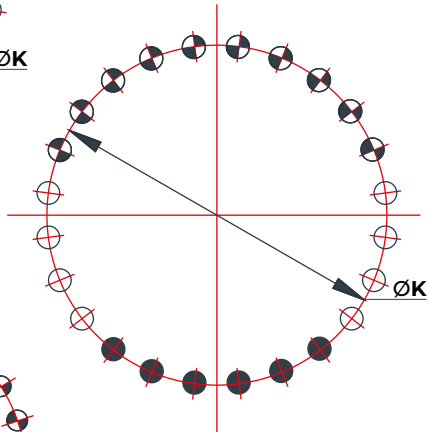
DN 250-300



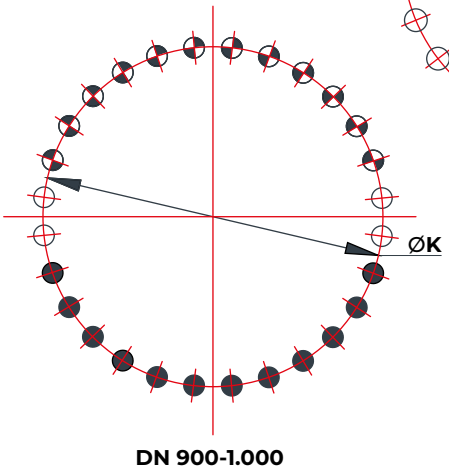
DN 350-400



DN 450-600



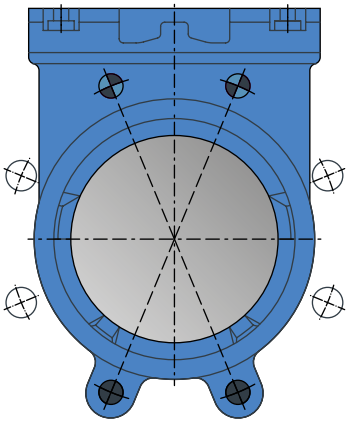
DN 700-800

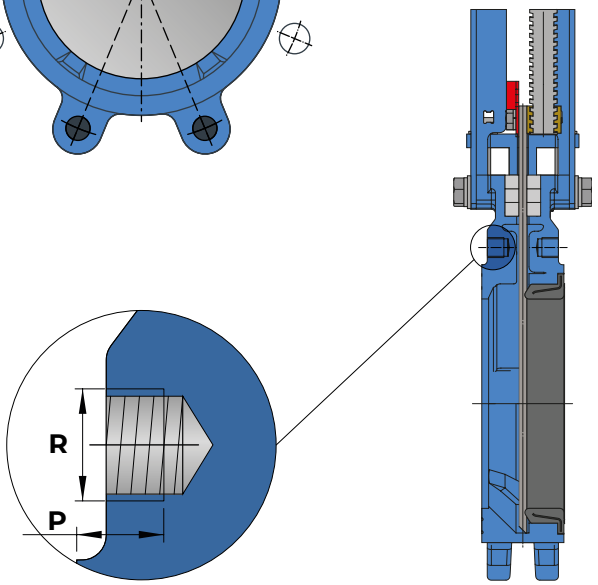


DN 900-1.000

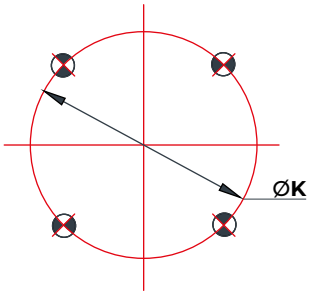
DN	ØK	Z	◓	○	●	R	P
50	125	4	4	-	4	M-16	8
65	145	4	4	-	4	M-16	8
80	160	8	2	2	4	M-16	9
100	180	8	2	2	4	M-16	9
125	210	8	2	2	4	M-16	9
150	240	8	2	2	4	M-20	10
200	295	8	2	2	4	M-20	10
250	350	12	4	2	6	M-20	12
300	400	12	4	2	6	M-20	12
350	460	16	6	2	8	M-20	21
400	515	16	6	2	8	M-24	21
450	565	20	8	4	8	M-24	22
500	620	20	8	4	8	M-24	22
600	125	20	8	4	8	M-27	24

DN Nominal diameter in mm
ØK Diameter in mm
Z No. bore holes
◓ No. blind threaded bore holes
○ No. through bolts
● No. through threaded bore holes
R Metric thread
P Depth in mm

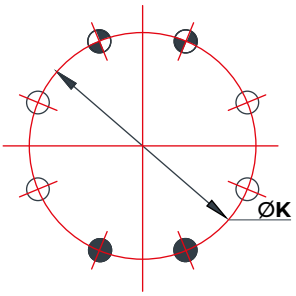




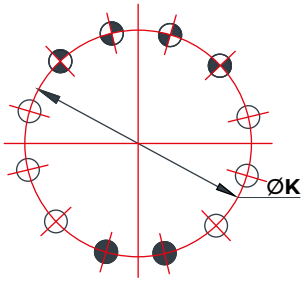
1.1.7. Dimensions of flanges ASME B16.5, Class 150



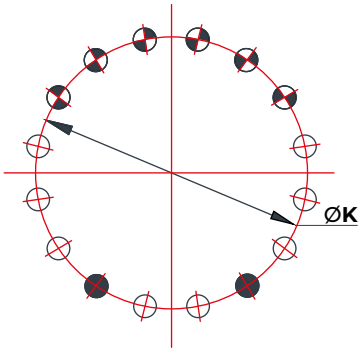
DN 50-65-80



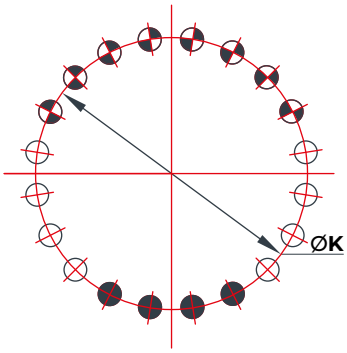
DN 100-200



DN 250-350



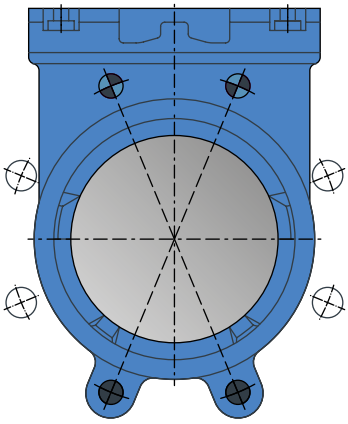
DN 400-450

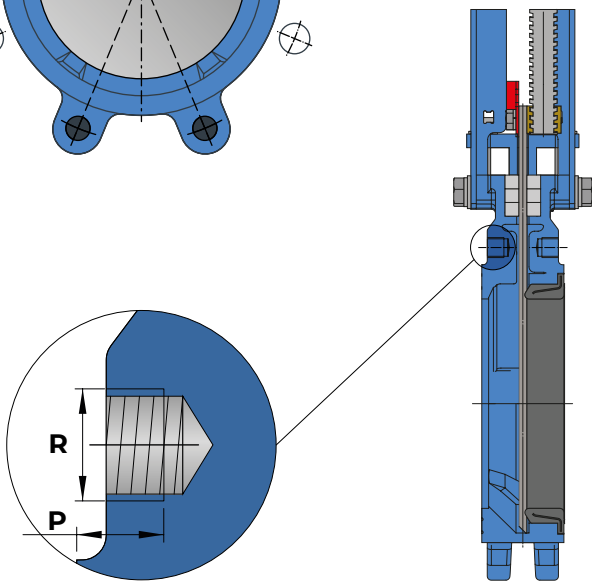


DN 500-600

DN	ØK	Z	◓	●	○	R	P
50	120.6	4	4	-	-	5/8" W	8
65	139.7	4	4	-	-	5/8" W	8
80	152.4	4	4	-	-	5/8" W	9
100	190.5	8	2	4	2	5/8" W	9
125	215.9	8	2	4	2	3/4" W	9
150	241.3	8	2	4	2	3/4" W	10
200	298.4	8	2	4	2	3/4" W	10
250	361.9	12	4	6	2	7/8" W	12
300	431.8	12	4	6	2	7/8" W	12
350	476.2	12	4	6	2	1" W	21
400	539.7	16	6	8	2	1" W	21
450	577.8	16	6	8	2	1" W	22
500	635	20	8	8	4	1 1/8" W	22
600	749.3	20	8	8	4	1 1/4" W	24

DN Nominal diameter in mm
ØK Diameter in mm
Z No. bore holes
◓ No. blind threaded bore holes
○ No. through bolts
● No. through threaded bore holes
R Whitworth thread. Others on request (UNC, metric, etc.).
P Depth in mm

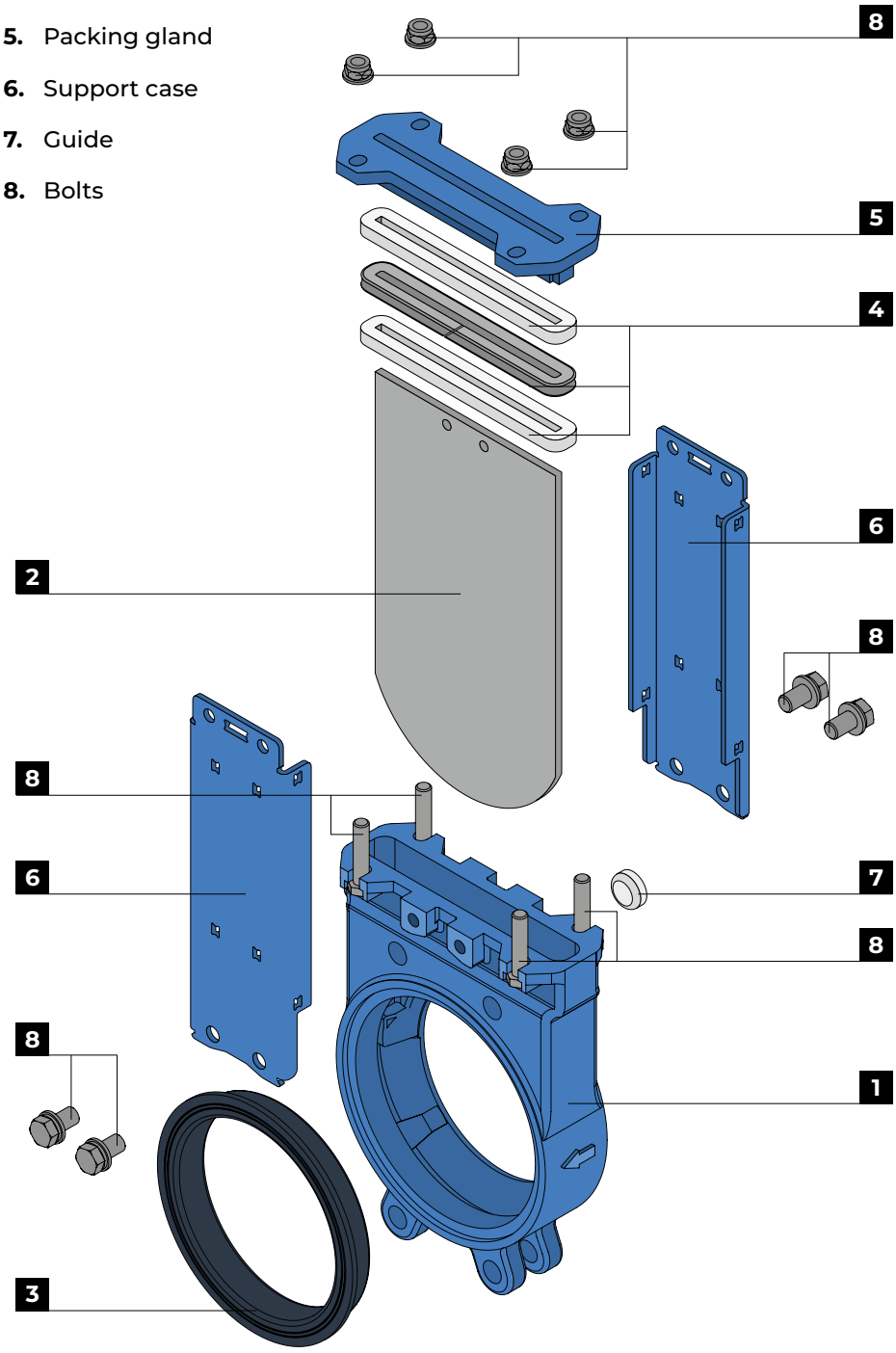




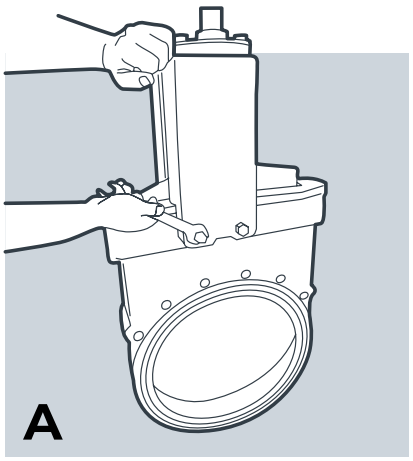
1.2. Maintenance

1.2.1. Change of packing

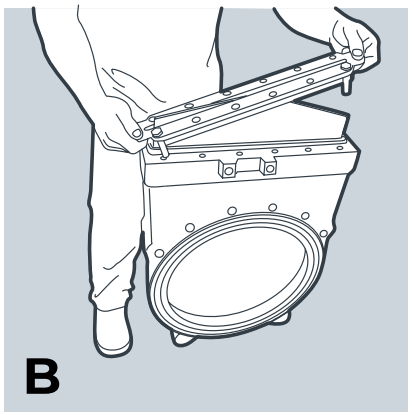
1. Body
2. Gate
3. Seat
4. Packing
5. Packing gland
6. Support case
7. Guide
8. Bolts



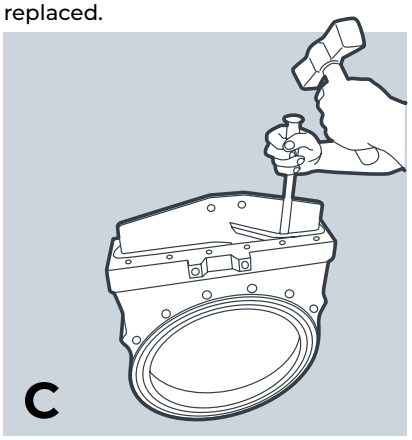
To change the packing follow these steps.



Disassemble and remove the support case assembly (6) by releasing the bolts (8) that fasten it to the body and releasing the bolts that fix the gate to the stem.



Lift off the packing gland (5) and remove the packing (4) to be replaced.

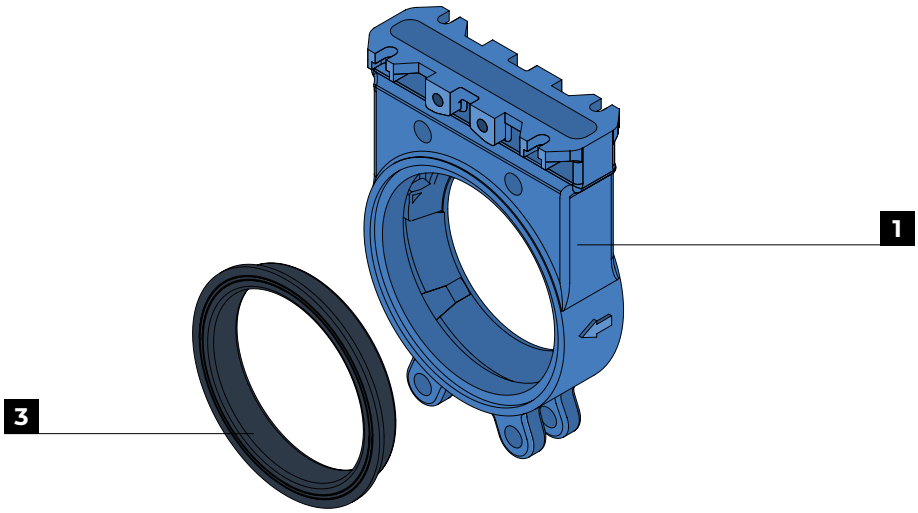


Move the new packing into position and adjust. Return the packing gland (5) to its position and assemble the bolts (8).

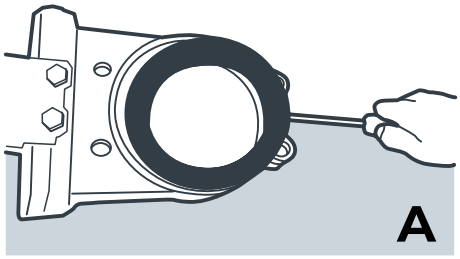
1.2. Maintenance

1.2.2. Change of seat

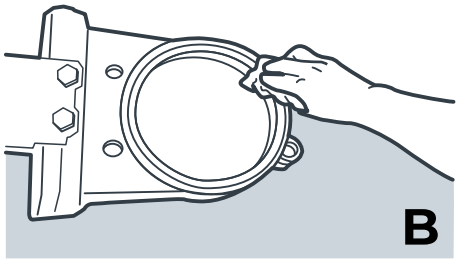
1. Body
3. Seat



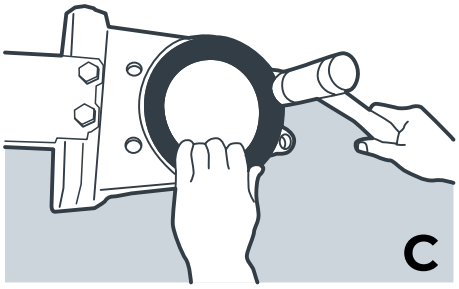
To change the seat follow these steps:



Disassemble the seat using a screwdriver.



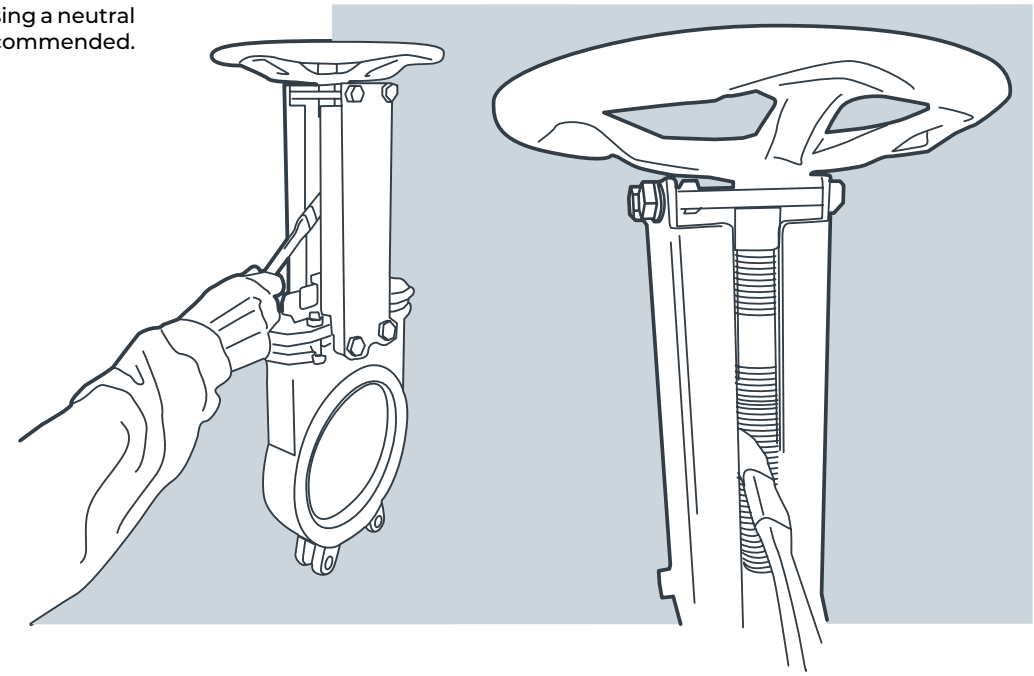
Clean the base of the body where the new seat is to be installed.



Assemble the new seat by pressing on it using a plastic hammer.

1.2.3. Lubrication

In manual valves, greasing the stem using a neutral grease once a year, at minimum, is recommended.



1.3. EU Directives

1. Machinery Directive: 2006/42/EC

2. Pressure Equipment Directive (PED): 2014/68/EU

PAL knife gate valves for Group 1 fluids (dangerous) and Group 2 fluids (non-dangerous), as defined in tables below, comply with the requirements of the EUROPEAN PRESSURE EQUIPMENT DIRECTIVE 2014/68/EU in accordance with Module A.

GROUP 1

DN	PN	CAT
50	10	1
65	10	1
80	10	1
100	10	1

GROUP 2

DN	PN	CAT
125	10	1
150	10	1
200	10	1
250	10	1
300	6	1
350	5	1
400	5	1
450	4	1
500	4	1

DN Nominal diameter in mm
PN Maximum operating pressure in bar
CAT Category

3. Directive on equipment and protective systems intended for use in potentially explosive atmospheres (ATEX): 2014/34/EU

Pneumatic and hydraulic PAL knife gate valves comply with the requirements of the ATEX DIRECTIVE 94/9/EC concerning equipment and protective systems intended for use in potentially explosive atmospheres, in accordance with GROUP II, CATEGORY 3, ZONES 2 AND 22.

2. Technical Characteristics

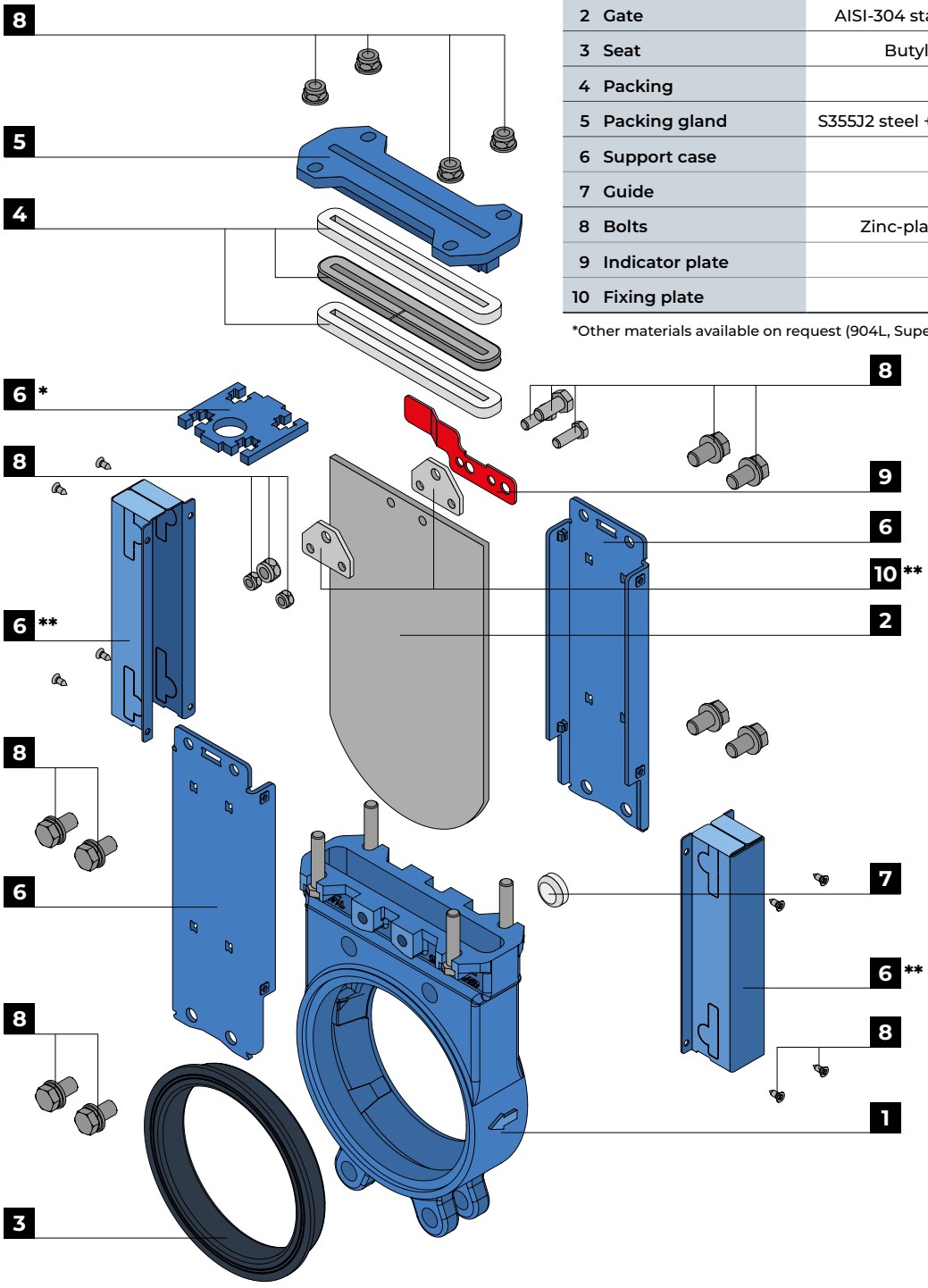
2.1. Construction and Nomenclature

2.1.1. Description and materials

The PAL knife gate valve is a unidirectional valve with a wafer design.

Description	EN-GJL-250	CF8 M
1 Body	GJL-250 grey cast iron + Epoxy	CF8M stainless steel
2 Gate	AISI-304 stainless steel	AISI-316 stainless steel
3 Seat	Butyl, NBR, EPDM, PTFE, FKM, other	
4 Packing	Greased cotton + Profile	
5 Packing gland	S355J2 steel + Zinc + Epoxy	Stainless steel
6 Support case	Steel + Zinc + Epoxy	
7 Guide	POM	
8 Bolts	Zinc-plated steel	Stainless steel
9 Indicator plate	Stainless steel	
10 Fixing plate	Stainless steel	

*Other materials available on request (904L, Super Duplex, etc.).



* Manual operation.
** Automatic operation.

2.1.1. Description and materials

1. Body
The body is made of a single piece of EN-GJL-250 cast iron (painted with 85-micron epoxy protection in RAL 5015) or CF8M steel.

Its faces are highlighted for installation between flanges. It has internal guides to ensure full closure between the gate and seat. It can be supplied in other materials, such as Duplex, Super Duplex, 904L, 254SMO, etc., on request.

2. Gate
The standard manufacturing materials for this part are AISI304 stainless steel in valves with a grey cast iron body (EN-GJL-250) and AISI316 stainless steel in valves with the CF8M steel body. For other materials like Duplex, Super Duplex, 904L, 254SMO or combinations please consult us.

Different degrees of polishing are possible, as are anti-abrasion treatments and modifications to adapt this part to the specific requirements of special installations.

The gate is polished on both sides to provide a soft-contact, homogeneous surface with the seat.

3. Seat
This piece provides the valve with 100% watertightness. The standard seat is made using a metal ring that is vulcanised with different kinds of elastomers depending on its application. It allows full fluid passage.

BUTYL This is the standard seat. It can be used in multiple applications.

NBR Suitable for fluids containing fats or oils at temperatures that do not exceed 100°C.

EPDM Generally used for water and products diluted in water at temperatures that do not exceed 100°C. It can also be used with abrasive products.

FKM Suitable for corrosive applications and for continuous high temperatures up to 190°C and for peaks of up to 220°C.

SILICONE Mainly used in the food industry and for pharmaceutical products at temperatures that do not exceed 250°C.

OTHERS The seat can be supplied, on request, using certified elastomers such as FDA, WARRAS, etc.

METAL/METAL Does not include seat, therefore is not 100% watertight.

Elastomer comparison table

Elastomers	Min. T. °C	Max. T. °C
BUTYL	-15	130
NBR	-20	100
EPDM	-25	100
FKM	-5	220
SILICONE	-40	250

3.1 OTHER PTFE CLOSURES
Not built with the internal metal ring. Suitable for corrosive applications as well as for the chemical, pharmaceutical and food industries. 100% watertight.

4 Packing
Braided packing with cotton threads, impregnated with treated tallow to prevent its properties from deteriorating.
Other options on request: food industry, high temperature, high range of cycles, etc.

- pH range: 6-8
- Temperature range °C: -20 to +120

5 Packing gland
The valve with a grey cast iron body (EN-GJL-250) is supplied with the packing gland made of highly resistant, mechanically welded carbon steel.

For the valve with the CF8M steel body, the packing gland is supplied in mechanically welded stainless steel. Consult us for other materials, such as Duplex, Super Duplex, 904L, etc.

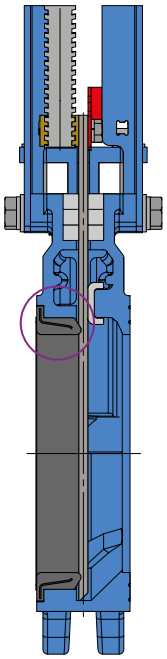
6 Support case assembly
Made of zinc-plated carbon steel that has been subsequently painted with 85-micron epoxy paint in RAL 5015.

The support case may be supplied fully in stainless steel or other materials, on request.

7 Internal guide
The gate slides internally thanks to POM guides that protect it and enhance watertightness by

providing better contact between the gate and the locking seal. Consult us for other materials, such as PTFE, brass, etc.

2.1.2. Closure types



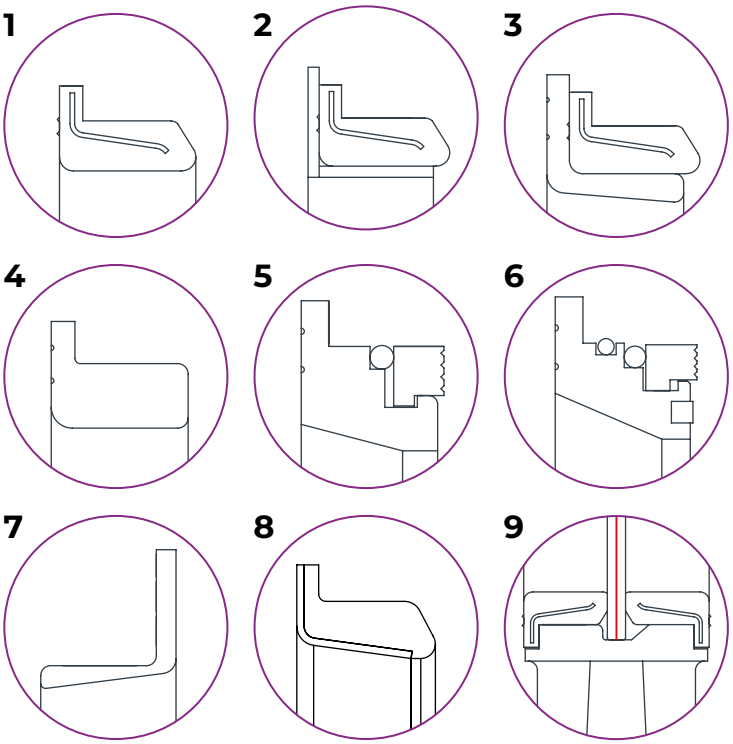
Unidirectional

1. Seat.
2. Seat + scraper deflector. REF. 3310M
3. Seat + scraper deflector. REF. 3310
4. Metal-Metal deflector. REF. 3313
5. PTFE deflector. REF. 3317
6. SLR deflector REF. 3316
7. Conical deflector. Side opposite rubber.

Bidirectional

8. With one seat. (NEW) From DN50 to DN300
9. With two seats.

Valves can be bidirectional with any closure type.



2.1.3. Options and accessories

Flush ports

Locking devices
Allow the valve to be locked to prevent any undesired handling.

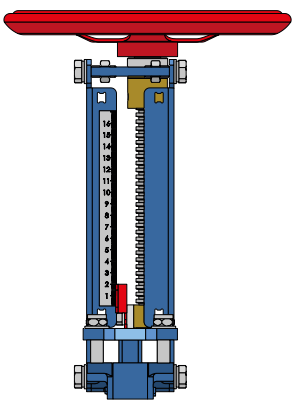
Manual emergency operation devices (wheel, lever)
Allows pneumatic valves to be operated manually in the event of breakdowns or pressure losses in the air system.

Columns and operation system extensions
Facilitates operation of the valve in scenarios where access is complicated.

Mechanical limit switches
Allow the pneumatic operation system to be mechanically adjusted, limiting the valve's path.

Mechanical, inductive and positioning limit switches
To indicate the valve's isolated or continuous position.

Graduated position indicator



Supports
Allow different types of positioners, detectors and other components to be installed.

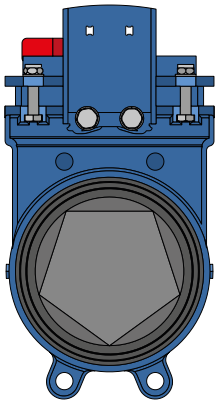
Pneumatic distributors or electro-distributors
To distribute air to the pneumatic operation systems.

Gate with mirror polish
Recommended in the food industry and generally in applications where solids need to slide rather than remain stuck to the gate.

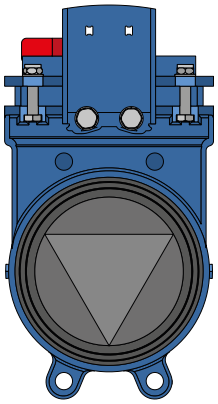
Gate with hard chrome
Offers greater hardness and improved resistance to abrasion.

Flow regulators

Deflector with Pentagonal Diaphragm



Deflector with Triangular Diaphragm



2.1.3. Options and accessories

Different packing

STANDARD
Packing with greased cotton
Braided packing with cotton threads, impregnated with treated tallow to prevent its properties from deteriorating.

- pH range: 6-8
- Temperature range °C: -20 to +120

Packing with PTFE-greased cotton
Braided packing with interwoven system based on high-quality acrylic threads impregnated with PTFE and silicone-free running-in lubricant.

- pH range: 5-11
- Temperature range °C: -100 to +250

OPTIONAL
Packing with graphite cotton
Braided packing with interwoven system based on high-quality acrylic threads impregnated with high-performance grease and graphite.

- pH range: 4-10
- Temperature range °C: -50 to +250

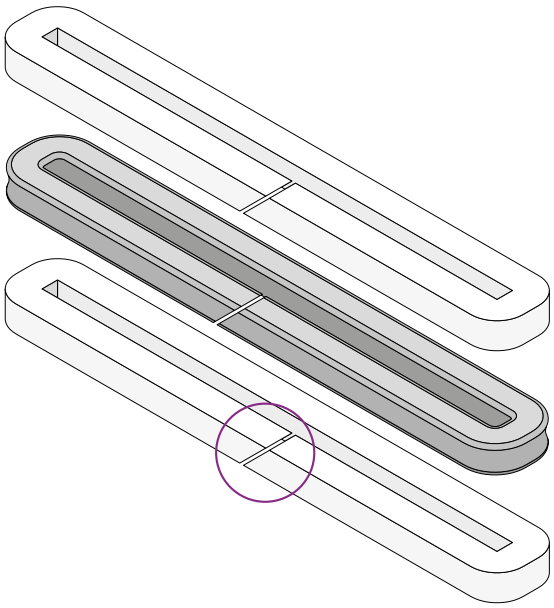
Packing with PTFE-greased cotton (food industry)
Braided packing with interwoven system based on expanded PTFE threads impregnated with PTFE dispersion, 100% Gore-Tex® fibre. This packing complies with standards for work in oxygen, as well as in the food industry (FDA).

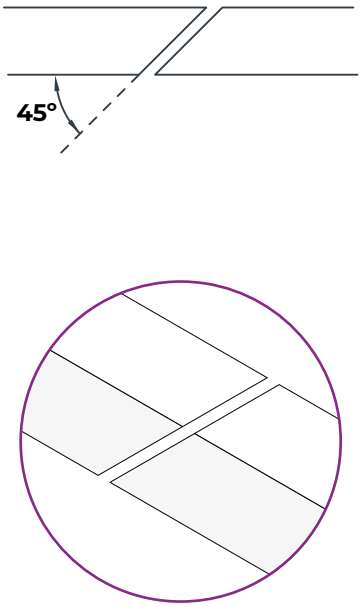
- pH range: 0-14
- Temperature range °C: -100 to +280

Carbon packing for high temperatures
Braided packing with interwoven system based on high-quality carbon and finished with lock lubricants.

- pH range: 0-14
- Temperature range °C: -100 to +650

Others on request.



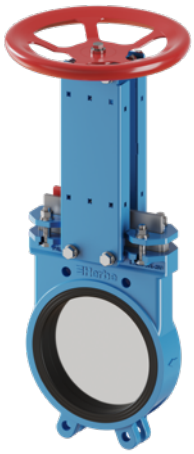


2.2. Drivers systems

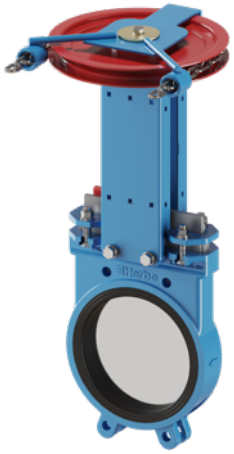
HERBE's PAL knife gate valves can be operated using different types of drivers systems, both manual and automatic. Choosing the correct operation system leads to improved efficiency in the valve's use.

Consult our Technical Department for advice on choosing the right operation system for your needs.

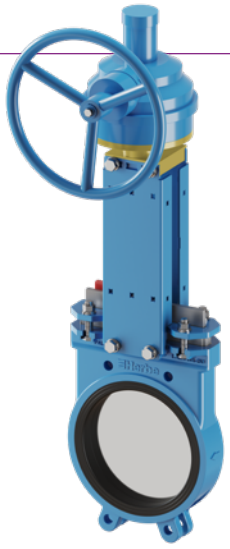
MANUAL



PAL-VF
Handwheel with non-rising stem



PAL-VC
Chain wheel

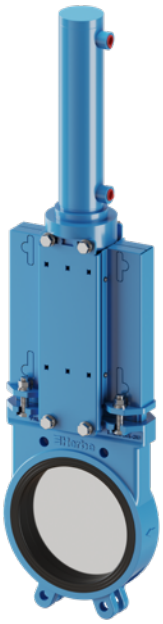


PAL-R
Manual reducer

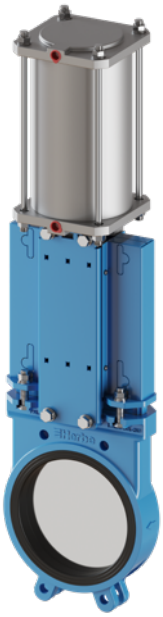
PAL-P
Lever

AUTOMATIC

PAL-E
Electric actuator

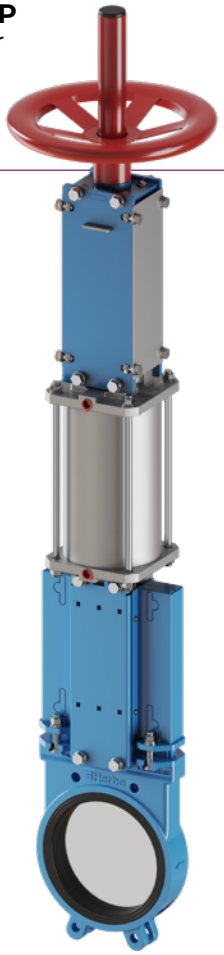


PAL-HI
Hydraulic cylinder



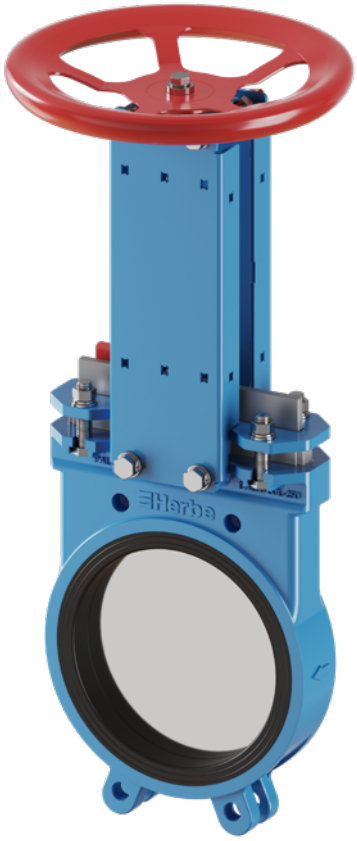
PAL-NDE
Pneumatic cylinder

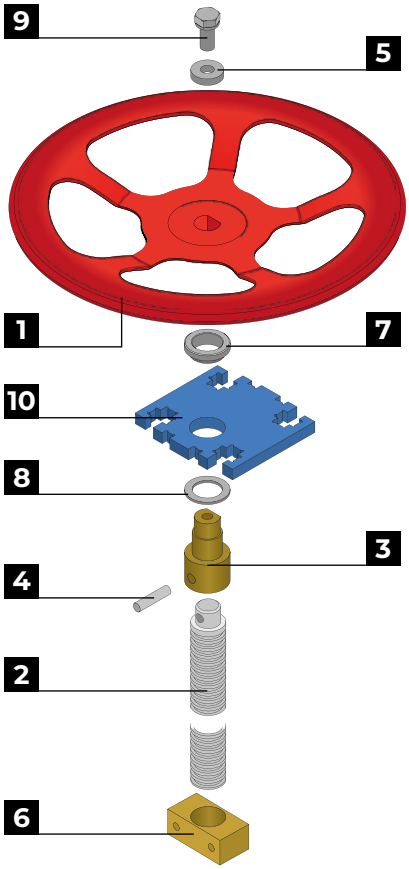
PAL-NSE
Single-acting pneumatic cylinder



PAL-NDE
+ Emergency wheel

2.2.1. PAL-VF

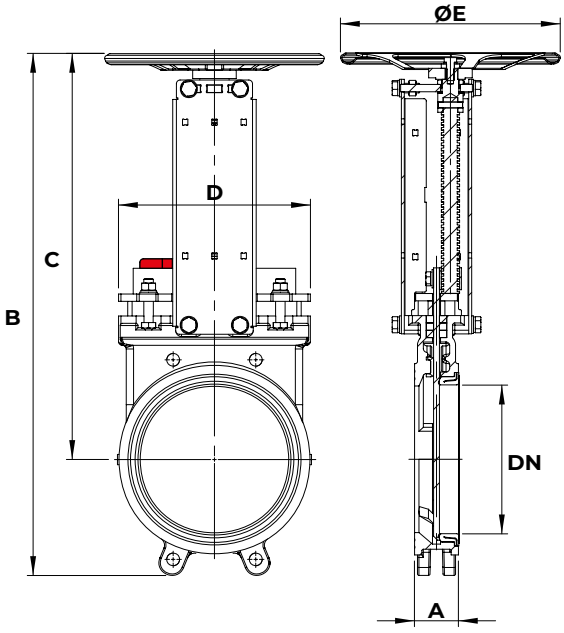




VF. Handwheel with non-rising stem
Made from DN50 to DN600. For other diameters, consult our Technical Department.

	Description	Material	Unit
1	Handwheel	Steel	1
2	Stem	AISI-303	1
3	End-shaft bushing	Bichrom. F-114	1
4	Elastic pin	Steel	1
5	Washer	Steel	1
6	Nut	Brass	1
7	Bearing	POM	1
8	Washer	POM	1
9	Screw	Steel	1
10	Support case	Steel	1

*Other materials available on request.

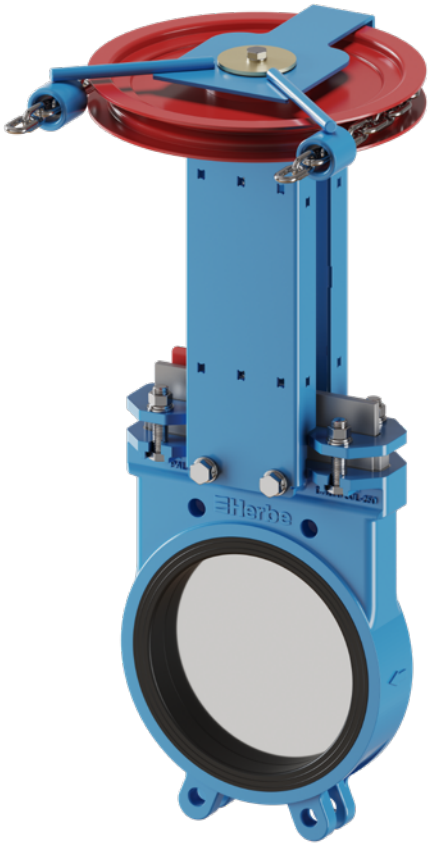


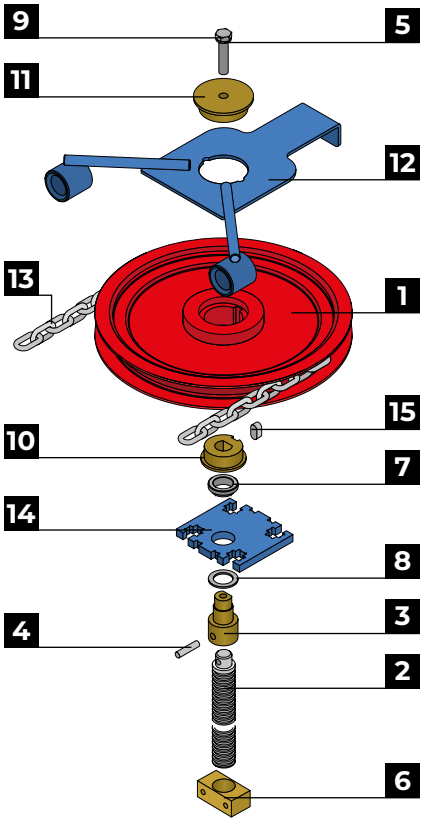
DN	A	B	C	D	ØE	Weight	Ps
50	40	400	340	145	200	7	10
65	40	411	346	160	200	7	10
80	50	456	368	172	200	8	10
100	50	506	403	194	200	10	10
125	50	546	429	184	250	13	10
150	60	602	474	211	250	16	10
200	60	713	554	262	300	25	10
250	70	833	638	316	300	30	10
300	70	971	740	375	300	45	6
350	96	1,067	856	423	400	66	6
400	100	1,232	979	507	400	105	6
450	100	1,373	1,084	579	500	135	5
500	110	1,553	1,207	618	500	179	4
600	110	1,824	1,452	743	500	243	3

Other diameters available on request

Assembly between PN10/Class150 flanges
DN Nominal diameter
Dimensions in mm
ØE Wheel diameter
Weight in kg
Ps Nominal pressure in bar

2.2.2. PAL-VC



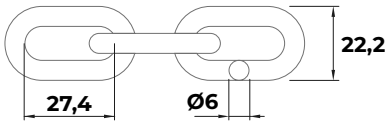


VC. Chain wheel
Made from DN50 to DN500.
For diameters of DN600 and larger, the chain wheel is supplied with a manual reducer.

	Description	Material	Unit
1	Chain wheel	Steel	1
2	Stem	AISI-303	1
3	End-shaft bushing	Bichromated F-114	1
4	Elastic pin	Steel	1
5	Washer	Steel	1
6	Nut	Brass	1
7	Bearing	POM	1
8	Washer	POM	1
9	Screw	Steel	1
10	Bushing	Bichromated steel	1
11	Washer	Bichromated steel	1
12	Chain guide	Steel	1
13	Chain	Steel	1
14	Support case	Steel	1
15	Parallel key	Steel	1

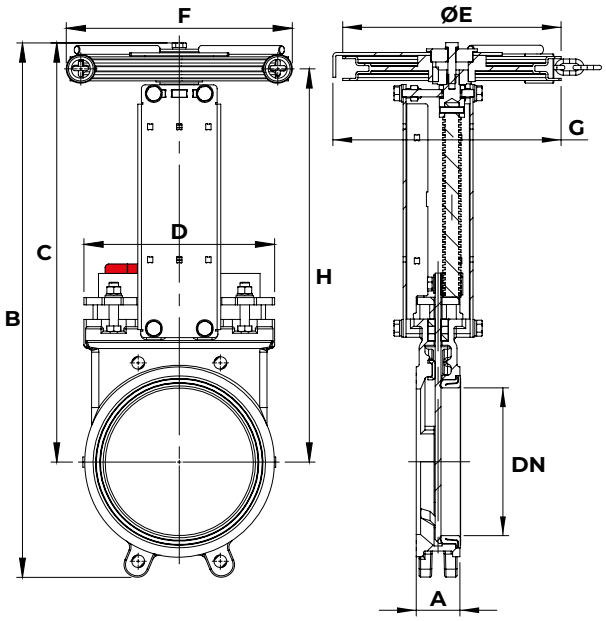
*Other materials available on request.

Chain wheel in accordance with the valve's diameter.



DN	Wheel Ø	No. Di	Chain Ø	Weight
50 - 100	210	11	6	1.6
125 - 150	260	14	6	3.1
200 - 300	300	16	6	4.2
350	400	22	6	7.3
400 - 600	500	28	6	12.2

DN Nominal diameter Approx. **weight** in kg **Dimensions** in mm

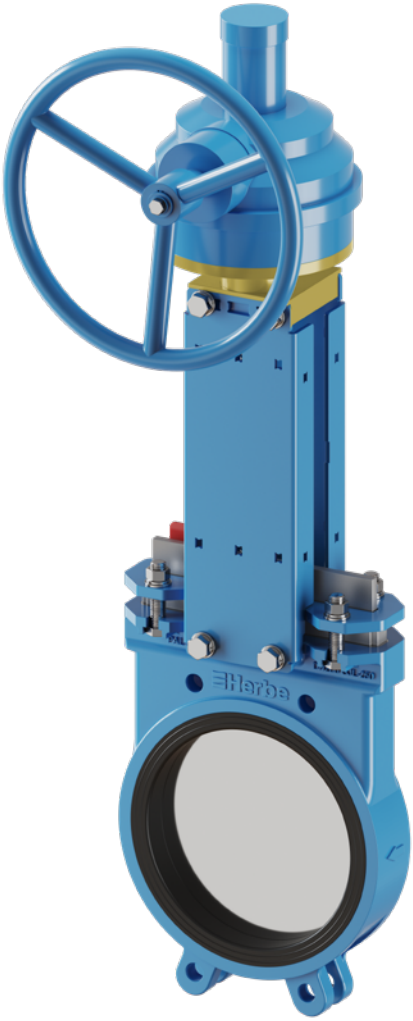


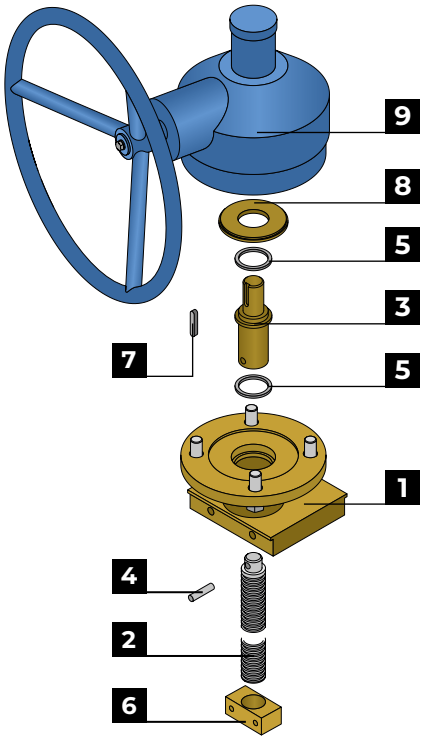
DN	A	B	C	D	ØE	F	G	H	Weight	Ps
50	40	388	327	145	210	226	215	292	7	10
65	40	399	333	160	210	226	215	298	8	10
80	50	445	355	172	210	226	215	319	9	10
100	50	493	390	194	210	226	215	354	11	10
125	50	552	434	184	260	278	268	398	13	10
150	60	608	478	211	260	278	268	443	17	10
200	60	736	577	262	300	318	308	540	29	10
250	70	856	661	316	300	318	308	624	40	10
300	70	994	763	375	300	318	308	726	53	6
350	96	1,064	853	423	400	422	409	813	93	6
400	100	1,234	980	507	400	422	409	940	126	6
450	100	1,380	1,091	579	500	518	508	1,047	160	5
500	110	1,560	1,214	618	500	518	508	1,170	193	4

Other diameters available on request

Assembly between PN10/Class150 flanges
DN Nominal diameter
Dimensions in mm
ØE Wheel diameter
Estimated **weight** in kg
Ps Nominal pressure in bar

2.2.3. PAL-R

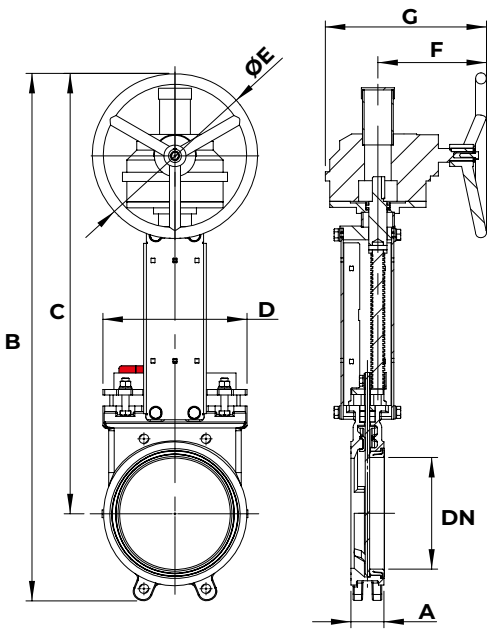




R. Manual reducer
Made from DN50 to DN600. For other diameters, consult our Technical Department.

	Description	Material	Unit
1	Flange	Bichromated steel	1
2	Stem	AISI-303	1
3	End-shaft bushing	Bichromated F-114	1
4	Elastic pin	Steel	1
5	Washer	POM	2
6	Nut	Brass	1
7	Parallel key	Steel	1
8	Gear washer	Bichromated steel	1
9	Reducer	Cast iron	1

*Other materials available on request.

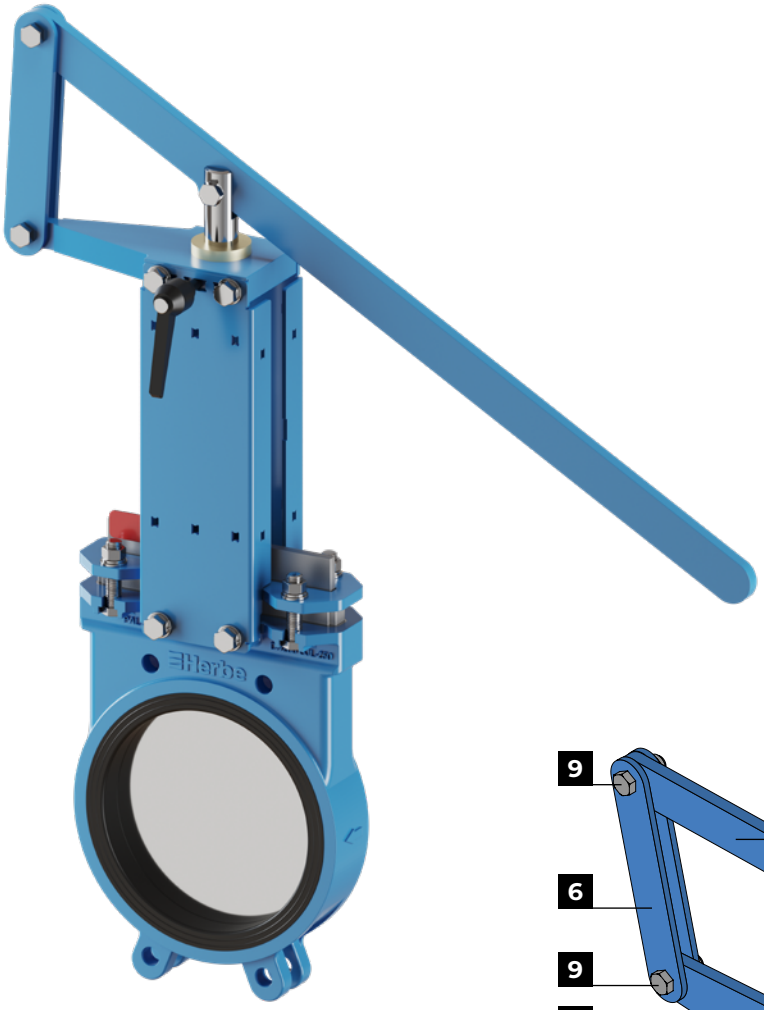


DN	A	B	C	D	ØE	F	G	Weight	Ps
50	40	619	559	145	300	197	270	17	10
65	40	631	565	160	300	197	270	18	10
80	50	677	587	172	300	197	270	19	10
100	50	725	622	194	300	197	270	20	10
125	50	789	671	184	300	197	270	24	10
150	60	846	716	211	300	197	270	26	10
200	60	959	801	262	300	197	293	50	10
250	70	1,083	888	316	300	197	293	63	10
300	70	1,293	1,062	375	450	217	313	77	6
350	96	1,358	1,145	423	450	217	313	106	6
400	100	1,552	1,298	507	450	288	402	134	6
450	100	1,685	1,396	579	450	288	402	173	5
500	110	1,996	1,650	618	650	288	409	216	4
600	110	2,218	1,846	743	650	288	429	279	3

Other diameters available on request

Assembly between PN10/Class150 flanges
DN Nominal diameter
Dimensions in mm
ØE Wheel diameter
Estimated **weight** in kg
Ps Nominal pressure in bar

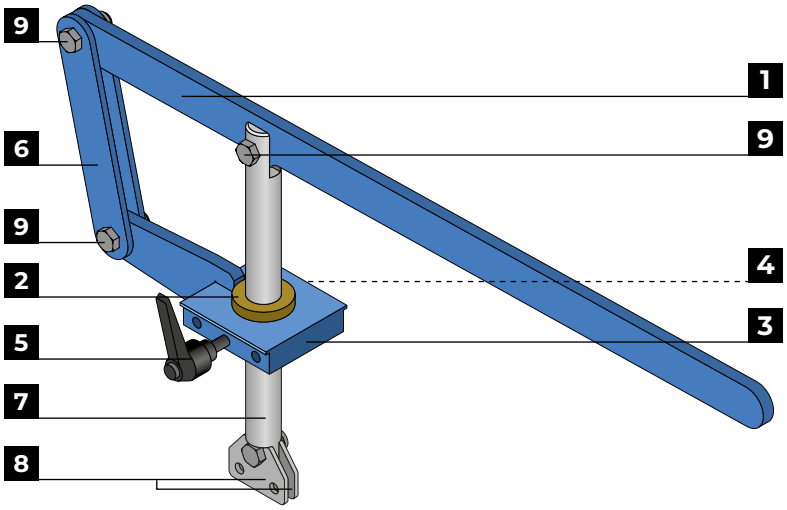
2.2.4. PAL-P

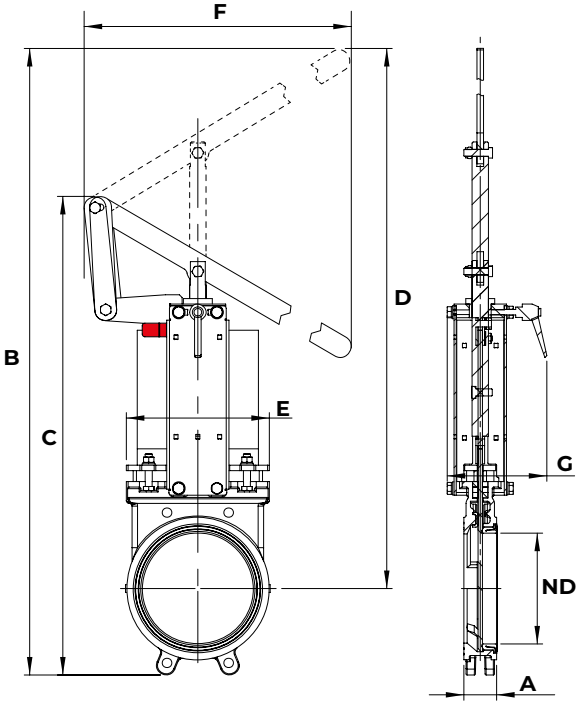


P. Lever
Made from DN50 to DN200. For other diameters, consult our Technical Department.

	Description	Material	Unit
1	Lever	Steel	1
2	Bushing	Bronze	1
3	Support	Steel	1
4	Grub screw	Steel	1
5	Brake	Commercial	1
6	Lever	Steel	2
7	Shaft	Stainless steel	1
8	Fixing plate	Stainless Steel	2
9	Bolt assembly	Steel	1

*Other materials available on request.



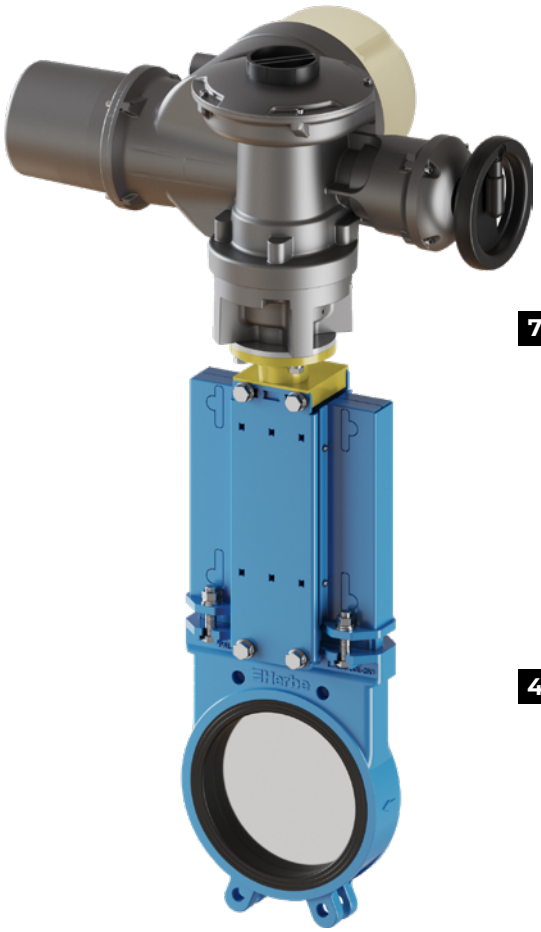


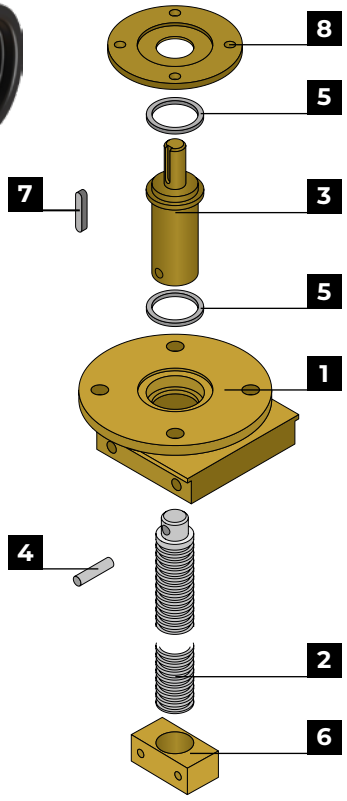
DN	A	B	C	D	E	F	G	Weight	Ps
50	40	514	508	454	145	486	136	8	10
65	40	525	519	460	160	489	136	9	10
80	50	586	572	496	172	489	136	10	10
100	50	703	620	600	194	577	136	11	10
125	50	844	684	726	184	559	136	14	10
150	60	977	740	847	211	529	136	16	10
200	60	1,287	877	1,129	262	735	182	32	10

Other diameters available on request

Assembly between PN10/Class150 flanges
DN Nominal diameter
Dimensions in mm
Estimated **weight** in kg
Ps Nominal pressure in bar

2.2.5. PAL-E

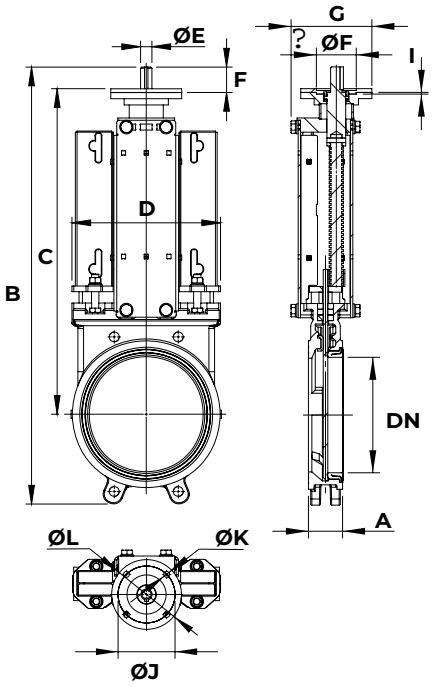




Electric actuator
Made from DN50 to DN600. For other diameters, consult our Technical Department.

	Description	Material	Unit
1	ISO flange	Bichromated steel	1
2	Stem	AISI-303	1
3	End-shaft bushing	Bichromated F-114	1
4	Elastic pin	Steel	1
5	Washer	POM	2
6	Nut	Aluminium bronze	1
7	Parallel key	Steel	1
8	Washer	Bichromated steel	1

Other materials available on request. *Optional

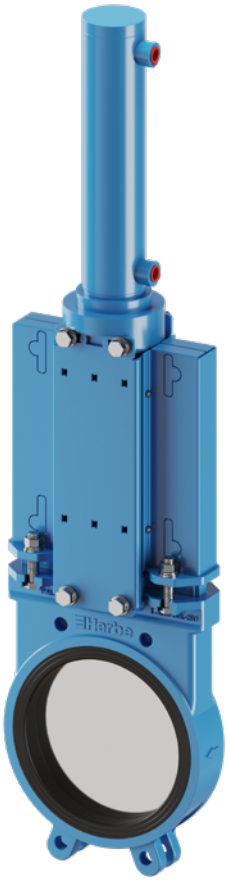


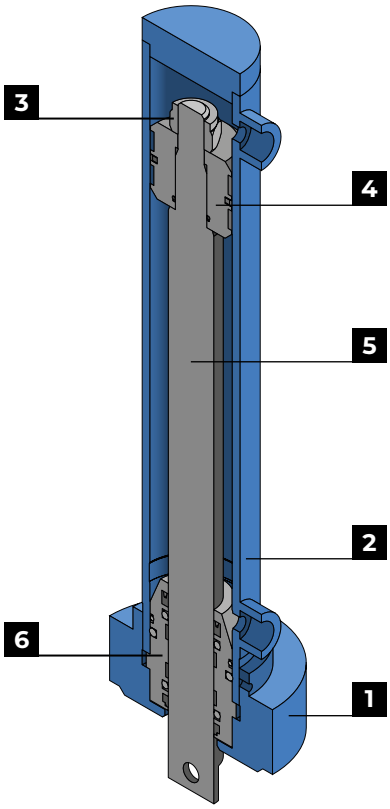
DN	A	B	C	D	ØE	F	G	ØH	I	ØJ	ØK	ØL	Weight	Ps
50	40	437	332	145	20	45	125	70	3	102	10.5	125	24	10
65	40	449	339	160	20	45	125	70	3	102	10.5	125	25	10
80	50	493	360	172	20	45	125	70	3	102	10.5	125	26	10
100	50	543	395	194	20	45	127	70	3	102	10.5	125	27	10
125	50	607	444	184	20	45	127	70	3	102	10.5	125	30	10
150	60	663	489	211	20	45	127	70	3	102	10.5	125	32	10
200	60	777	574	262	20	45	142	70	3	102	10.5	125	42	10
250	70	900	660	316	20	45	142	70	3	102	10.5	125	55	10
300	70	1,036	760	375	20	45	149	70	3	102	10.5	125	72	6
350	96	1,099	844	427	20	45	149	70	3	102	10.5	125	99	6
400	100	1,292	1,038	507	30	65	185	100	4	140	16.5	175	136	6
450	100	1,429	1,075	579	30	65	200	100	4	140	16.5	175	166	5
500	110	1,631	1,227	618	30	65	208	100	4	140	16.5	175	245	4
600	110	1,919	1,482	743	30	65	245	100	4	140	16.5	175	362	3

Other diameters available on request

Assembly between PN10/Class150 flanges
DN Nominal diameter
Dimensions in mm
Estimated **weight** in kg
Ps Nominal pressure in bar

2.2.6. PAL-HI

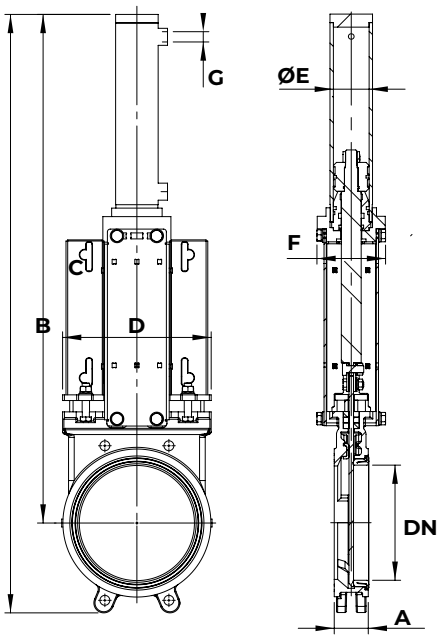




HI. Hydraulic cylinder
Made from DN50 to DN600. For other diameters, consult our Technical Department.

	Description	Material	Unit
1	Lower cover	Steel	1
2	Jacket	Steel	1
3	Nut DN985	Steel	1
4	Piston	Steel	1
	AGE guide	Acetal resin	
	Piston seal TTR	Polyurethane	
	O-ring	NBR	
5	Stem	Chrome/stainless steel	1
6	Bushing	Steel	2
	Collar	NBR	
	O-ring	NBR	
	AGI guide	Acetal resin	
	Scraper	Polyurethane	
	GKM seal	Polyester+NBR	
	Ext. O-ring	NBR	

*Other materials available on request.



DN	A	B	C	D	E	F	G	Limit	Weight	Ps
50	40	546	486	145	40	100	3/8" BSP	64	7	10
65	40	572	506	160	40	100	3/8" BSP	78	8	10
80	50	634	543	172	40	100	3/8" BSP	94	9	10
100	50	702	598	194	40	100	3/8" BSP	114	12	10
125	50	808	690	184	50	125	3/8" BSP	139	15	10
150	60	894	764	211	50	125	3/8" BSP	167	20	10
200	60	1,055	897	262	63	125	1/2" BSP	216	31	10
250	70	1,256	1,061	316	63	125	1/2" BSP	266	44	10
300	70	1,453	1,223	375	63	143	1/2" BSP	341	62	6
350	96	1,571	1,361	427	63	145	1/2" BSP	368	100	6
400	100	1,780	1,527	507	63	175	1/2" BSP	441	138	6
450	100	1,997	1,709	579	80	175	1/2" BSP	468	161	5
500	110	2,227	1,882	618	80	185	1/2" BSP	518	223	4
600	110	2,589	2,211	743	80	225	1/2" BSP	616	325	3

Other diameters available on request

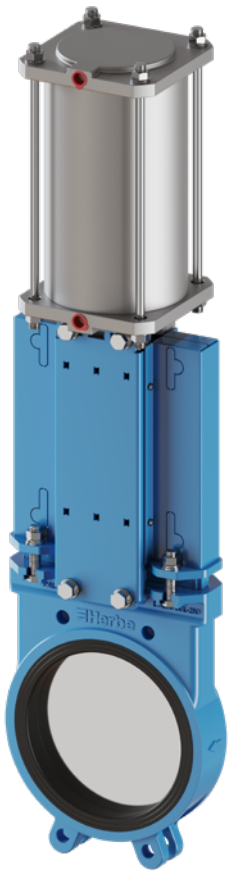
Assembly between PN10/Class150 flanges
DN Nominal diameter

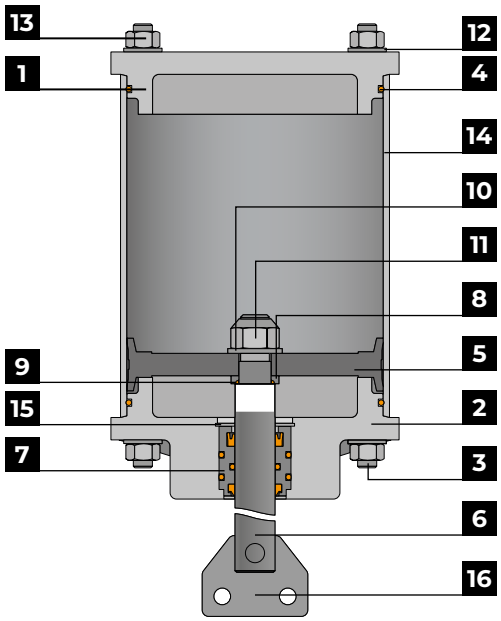
Dimensions in mm
Estimated **weight** in kg

Ps Nominal pressure in bar

2.2.7. PAL-NDE

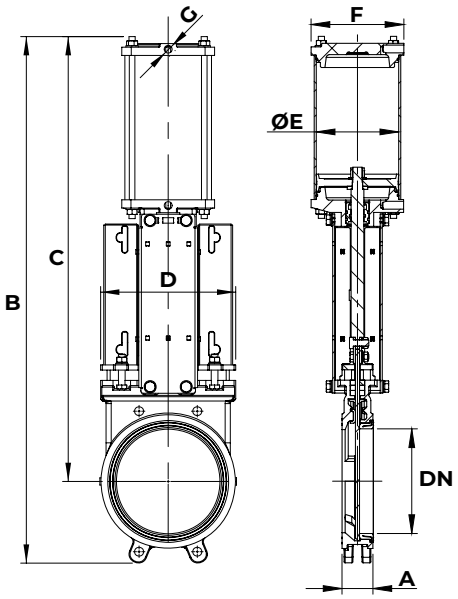
Double-acting pneumatic cylinder
Made from DN50 to DN600. For other diameters, consult our Technical Department.





	Description	Material	Unit
1	Top cover	Steel	1
2	Lower cover	Aluminium	1
3	Tie rods	Stainless steel	4
4	O-ring	NBR	2
5	Piston	NBR	1
6	Shaft	Chrome steel	1
7	Bushing	POM	1
	Collar	NBR	1
	Interior O-ring	NBR	1
	Exterior O-ring	NBR	1
	Scraper	Polyurethane	1
8	Washer	Bichromated F-114	1
9	O-ring	NBR	1
10	Washer DIN125	Steel	1
11	Self-locking nut DIN985	Steel	1
12	Grower washer DIN127	Stainless steel	8
13	Nut DIN934	Steel	8
14	Jacket	Aluminium	1
15	Safety ring	Steel	1
16	Fixing plate	Stainless steel	2

Other materials available on request.

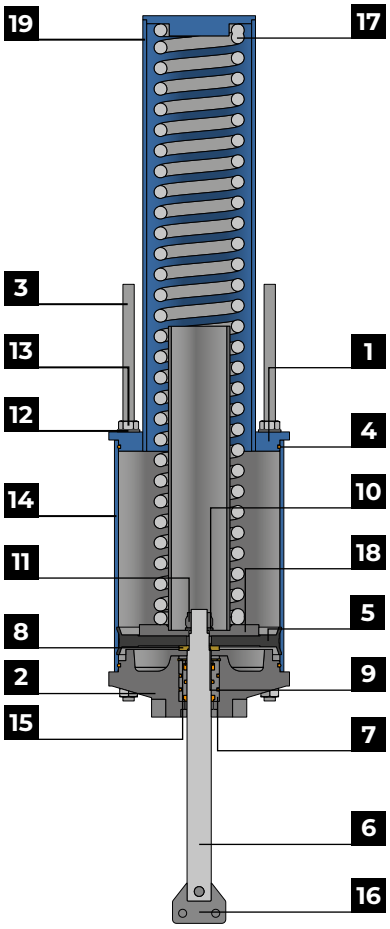


DN	A	B	C	D	ØE	F	G	Limit	Weight	Ps
50	40	540	480	158	100	118	3/8" BSP	67	8	10
65	40	551	486	171	100	118	3/8" BSP	75	10	10
80	50	606	528	174	100	118	3/8" BSP	97	11	10
100	50	680	578	194	100	118	3/8" BSP	117	14	10
125	50	767	650	186	125	144	3/8" BSP	141	17	10
150	60	860	731	211	125	144	3/8" BSP	171	20	10
200	60	1,021	863	262	160	180	3/8" BSP	216	32	10
250	70	1,195	1,000	316	160	180	3/8" BSP	270	41	10
300	70	1,399	1,169	375	200	224	1/2" BSP	322	61	6
350	96	1,510	1,300	428	200	224	1/2" BSP	370	80	6
400	100	1,745	1,492	507	250	280	1/2" BSP	421	135	6
450	100	1,930	1,641	579	250	280	1/2" BSP	469	162	5
500	110	2,160	1,814	618	250	280	1/2" BSP	520	214	4
600	110	2,591	2,219	743	300	328	3/4" BSP	617	325	3

Other diameters available on request

Assembly between PN10/Class150 flanges
DN Nominal diameter
Dimensions in mm
ØE Cylinder diameter
Weight in kg
Ps Nominal pressure in bar

2.2.8. PAL-NSE



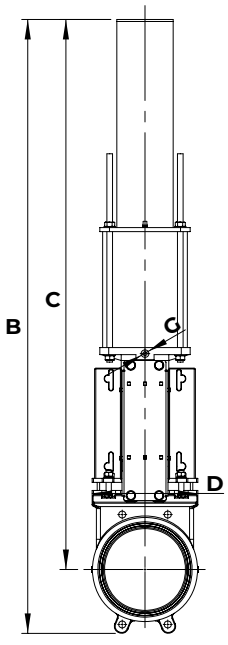
NSE. Single-acting pneumatic cylinder
Made from DN50 to DN300 with single-acting pneumatic cylinder.

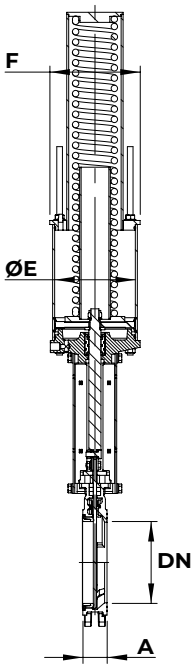
	Description	Material	Unit
1	Top cover	Steel	1
2	Lower cover	Aluminium	1
3	Tie rod	Stainless steel	4
4	O-ring	NBR	2
5	Piston	NBR	1
6	Shaft	Chrome steel	1
7	Bushing	POM	1
	Collar	NBR	1
	Interior O-ring	NBR	1
	Exterior O-ring	NBR	1
	Scraper	Polyurethane	1
8	Washer	Bichromated F-114	1
9	O-ring	NBR	1
10	Washer DIN125	Steel	1
11	Self-locking nut DIN985	Steel	1
12	Washer DIN125	Stainless steel	8
13	Nut DIN934	Stainless steel	8
14	Jacket	Aluminium	1
15	Safety ring DIN471	Steel	1
16	Fixing plate	Stainless steel	2
17	Spring	Steel	1
18	Spring guide	Steel	1
19	Silencer	Brass	1

Other materials available on request.

From DN350, double-acting pneumatic cylinder system plus accumulator tank.

The tank stores the necessary volume to perform a movement in event of breakdown.





DN	A	B	C	D	ØE	F	G	Weight	Ps
50	40	788	728	158	125	144	3/8" BSP	19	10
65	40	800	734	171	125	144	3/8" BSP	22	10
80	50	846	756	174	125	144	3/8" BSP	23	10
100	50	929	826	194	125	144	3/8" BSP	24	10
125	50	1,106	989	184	160	180	3/8" BSP	35	10
150	60	1,182	1,054	211	160	180	3/8" BSP	36	10
200	60	1,522	1,364	262	200	224	1/2" BSP	66	10
250	70	1,771	1,576	316	200	224	1/2" BSP	130	10
300	70	1,910	1,680	375	250	280	1/2" BSP	143	6

Assembly between PN10/Class150 flanges
DN Nominal diameter
Dimensions in mm
ØE Cylinder diameter
Estimated **weight** in kg
Ps Nominal pressure in bar

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