

Operation
and Maintenance Manual

KNIFE
GATE VALVES
FOR UNDERGROUND INSTALLATION

P/N
2006

Approved for use by

President of Factory, JAFAR S.A.

Failure to comply with the guidelines and instructions in this Operation and Maintenance Manual releases the manufacturer from all obligations, liability and warranty.

Due to the continuous development of the company, we reserve the right to modifications and design changes in the product presented herein.

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1 TECHNICAL DESCRIPTION

1.1 PRODUCT DESIGNATION AND IDENTIFICATION

The subject of this Operation and Maintenance Manual is:

Type 2006 two-way flange-to-flange knife gate valve for underground installation

- full bore design
- stainless steel knife (closer)
- available with rising or stationary (encased) spindle
- soft gland seal of the closer and the body
- drive gear guard.

1.2 USE

The Type 2006 encased two-way flange-to-flange knife gate valves are intended for water supply systems, and especially sewage systems, and industrial processing systems. The valves can be operated both in underground installations as installed in vertical or horizontal pipelines.

1.3 TECHNICAL CHARACTERISTICS

The Type 2006 flange-to-flange knife gate valves are intended for transfer of potable water, process water and sewage, as well as other liquids as approved by the manufacturer.

- Temperature: 0°C to +70°C
 - Nominal diameter (dimension) range: DN50 to DN1000 [mm]
 - Maximum medium flow rate:
 - liquid: max. 4 [m/s]
 - gas: max. 30 [m/s]
- The driving torque at opening start and closing end is as listed below:

DN [mm]	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	800	900	1000
Mmax [Nm]	20	25	30	30	50	55	55	60	80	105	150	160	200	280	480	510	600	680

- Valve control mode: the standard version of knife gate has the clockwise closing sense of rotation. The closing sense of rotation can be opposite on special order.
- The knife gate valves are designed for installation between flange end faces acc. to PN-EN 1092-2: 1999 with bolt holes for the pressure rating of PN10.
- Installation length: per the technical file, see general table for sizes.
- nominal pressure ratings (PN): - per size:

DN40 to DN400	- 1 MPa
DN500 to DN600	- 0.6 MPa
DN700 to DN1000	- 0.25 MPa

2 DESIGN

2.1 DESCRIPTION OF THE VALVE DESIGN

The Type 2006 two-way flange-to-flange knife gate valves supplied by F.A. „JAFAR”S.A. feature a full bore body, a stationary spindle (in the standard version) or a rising spindle with a parallel running gearbox (for DN600 to DN1000). The closure seal is a square-section gasket with the knife guide set in the body seat. The knife remains encased throughout the opening and closing cycle. The knife seal is reinforced by a stainless steel bar which prevents washing the seal from the seat. The body seal of the knife is a multi-layered packing compressed by a gland with bolts. The knife gate valve body is a monolithic panel design. The gate valve knife clears the body by the interaction of the brass nut with the spindle when the latter is operated with a wrench (from

the DN600 bore size the opening action is done by a parallel running gearbox). The knife gate valves are two-way, permitting flow in both directions.

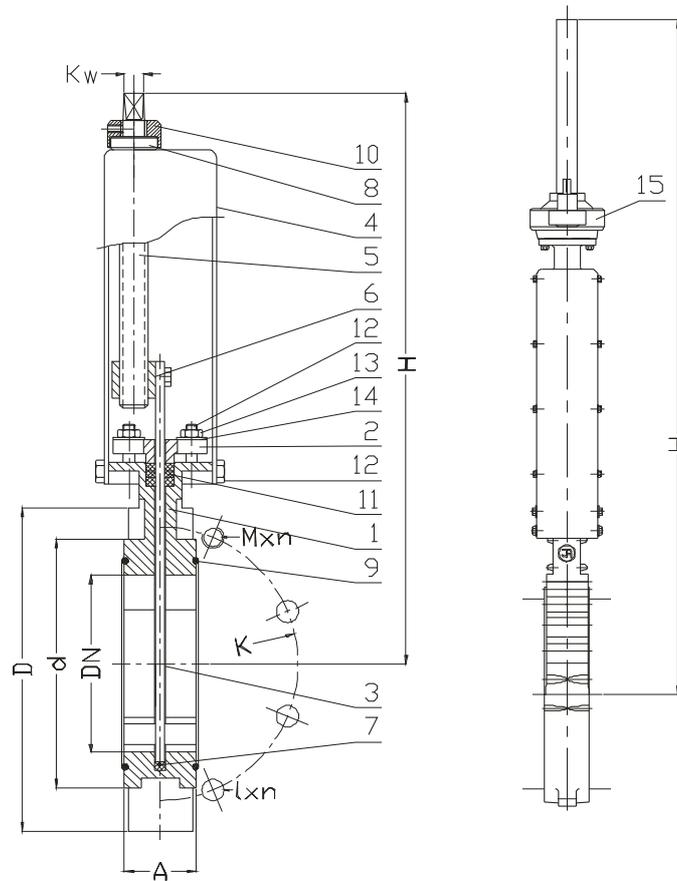
The gate valve design allows easy installation between pipework flanges with blind tapped holes at the body top section and open holes that allow fastening with all flange holes. (See Table 4 for the selection of flange fastening bolts.)

2.2 MATERIALS

The table below lists the structural materials of the Type 2006 flange-to-flange knife gate valves.

Item	Part designation	Material	Reference standard
1	Body	Cast iron, EN-GJS-400-15	PN-EN 1563: 2012
2	Pressure plate	Cast iron, EN-GJS-400-15	PN-EN 1563: 2012
3	Knife	Steel grade 1.4301	PN-EN 10088-1: 2014
4	Stem (guard)	Steel grade 1.0038	PN-EN 10025-2: 2007
5	Spindle	Steel grade 1.4021	PN-EN 10088-1:2014
6	Spindle nut	Brass	PN-EN 1982: 2010
7	Gasket	NBR	PN-ISO 1629: 2005
8	Sliding bushings	Polyamide brass	PN-EN 1874-1:2010 PN-EN 1982:2010
9	O-ring	NBR	PN-ISO 1629:2005
10	Safety	Steel grade 1.4021	PN-EN 10088-1:2014
11	Seal	PACK, asbestos-free sealant, NBR rubber, asbestos-free sealant, scraper	PN-ISO 1629:2005 Manufacturer's catalogue
12	Bolt	Stainless steel, A2	PN-EN ISO 4014: 2011
13	Nut	Stainless steel, A4	PN-EN ISO 4032: 2013
14	Washer	Stainless steel, A2	PN-EN ISO 7091: 2003
15	Parallel running gearbox		Manufacturer's catalogue

2.3 DIMENSIONS



Stationary spindle (standard)
Knife gate valve size DN50-DN500

Rising spindle (standard)
Knife gate valve size DN600-DN1000

DN	PN	PS	K	D	d	Kw	L x n	M x n	A		H	Ilość obrotów do otwarcia	Mass			
									Ref. dwg.	Series 20						
[mm]			[bar]			[mm]					[kg]					
50	10	16	125	165	99	12	-	M16x4	48	-	281	14	10			
65			145	185	118	12	-			-	315	18	12			
80			160	200	132	14	Ø19x6	M16x2	52	-	333	22	13			
100			180	220	156	14	Ø19x6			52	52	363	27	16		
125			210	250	184	14	Ø19x6		56	56	420	33	22			
150	10	10	240	285	212	17	Ø23x6	M20x2	56	-	487	32	27			
200			295	340	266	17	Ø23x6			70	-	568	42	47		
250			350	395	319	17	Ø23x8	M20x4	76	-	674	52	60			
300			400	445	370	19	Ø23x8			-	780	62	74			
350			460	505	430	19	Ø23x10			-	840	72	90			
400			515	565	480	24	Ø28x10	M24x6	86	-	980	68	106			
500			10	6	620	670	582	27	Ø28x12	M24x8	114	-	1300(1820)	85	252	
600					725	780	682	27	Ø31x12	M27x8		-	1480(2130)	102	300	
700				2.5	2.5	840	910	794	-	Ø31x14	M27x10	-	165	(2495)	118	569
800						950	1015	901	-	Ø34x14	M30x10	-	190	(2850)	116	696
900	1050	1115				1001	-	Ø34x16	M30x12	-	203	(3160)	115	868		
1000	1160	1230				1112	-	Ø37x16	M33x12	-	216	(3428)	127	1175		

2.4 REFERENCE STANDARDS

PN-EN 1074-1: 2002	Valves for water supply. Fitness for purpose requirements and appropriate verification tests. General requirements
PN-EN 1074-2: 2002	Valves for water supply. Fitness for purpose requirements and appropriate verification tests. Isolating valves.
PN-89/H-02650	Valves and pipelines. Pressure and temperature ratings.
PN-EN 1092-2: 1999	Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated. Cast iron flanges.
PN-EN19: 2005	Industrial valves. Marking of metallic valves
PN-EN 12266-1: 2012	Industrial valves. Testing of metallic valves. Pressure tests, test procedures and acceptance criteria. Mandatory requirements.
PN-EN ISO 6708: 1998	Pipework components. Definition and selection of DN (nominal size).
PN-EN 1559-1: 2011	Foundry. Technical conditions for delivery. Delivery specifications.
PN-EN 1561: 2012	Founding. Grey cast irons.
PN-EN 1563: 2012	Founding. Spheroidal graphite cast irons.
PN-EN 1370: 2012	Foundry. Surface roughness testing using visual and tactile reference.
PN-EN 10088-1: 2014	Stainless steels. List of stainless steels.
PN-89/H-84023.05	Specific application steel. Improved quality low-carbon, low-alloy and alloy steels. Grades.
PN-EN 10025-2:2007	Hot-rolled products of structural steel grades – Part 2: Technical conditions for supply of non-alloy structural steel.
PN-EN 1982: 2010	Copper and copper alloys. Ingots and castings.
PN-EN 12420: 2002	Copper and copper alloys. Forgings.
PN-EN 1706: 2011	Aluminium and aluminium alloys. Castings. Chemical composition and mechanical properties.
PN-ISO 965-1: 2001	General purpose ISO metric threads. Tolerances. Principles and basic data.
PN-ISO 2903: 1996	Trapezoid ISO metric threads. Tolerances.
PN-EN ISO 4017: 2011	Hexagon head screws. Product grades A and B.
PN-EN ISO 4027: 2006	Hexagon socket set screws with cone point.
PN-ISO 1629: 2005	Rubbers and latices. Nomenclature.
PN-EN ISO 12944-5: 2009	Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Protective paint systems.

2.5 ORDERING INFORMATION

Water supply system fittings are specific purpose industrial fittings, therefore orders must include:

- part number (P/N, equal to the product type);
- intended use, e.g. for water supply systems,

and:

- nominal diameter, acc. to PN-EN ISO 6708: 1998
- nominal pressure, acc. to PN-89/H-02650
- type of body material, acc. to PN-EN 1563: 2012
- maximum operating temperature, acc. to PN-89/H-02650.

2.6 PRODUCTION AND ACCEPTANCE

The Type 2006 flange-to-flange knife gate valves are accepted and produced in accordance with PN-EN 1074-2:2002 (Water supply system fittings. Fitness for purpose requirements and appropriate verification tests. Stop fittings) and PN-EN 12266-1:2012 (Industrial fittings. Testing of metallic valves. Pressure tests, test procedures and acceptance criteria. Mandatory requirements). All gate valves are leak tested (100%). The tests include external body tightness and closing tightness.

2.7 MARKING

The valve marking is regulated by the following standards: PN-EN-19: 2005, PN-EN-1074-1: 2002.

The valve bodies feature markings on the front and back walls of the body chamber (or on the side walls from DN300 to DN1000). The marking contains the following data:

- valve type (defined by the product reference standard number)
- nominal diameter
- nominal pressure
- body material type
- manufacturer trademark

The location on the valve specified in the documentation features the nameplate which contains the following data:

- manufacturer's company name and logo
- serial number
- sealing temperature grade
- the Polish Building Mark "B" and/or the CE mark (as applicable)
- product type

3 PROTECTION, STORAGE & TRANSPORT

3.1 PROTECTIVE COATINGS

All inner and outer cast-iron and steel surfaces are protected with electro-deposited epoxy coat. The coat has been approved for contact with foodstuffs.

The anti-corrosion coating layer minimum thickness is 250 µm. The casting surface is prepared for the application of the epoxy coating in accordance with the technical file and PN-EN ISO 12944-5: 2009.

The stem to body and to nut mount fastening bolts are made of stainless steel (A2).

3.2 PACKAGING

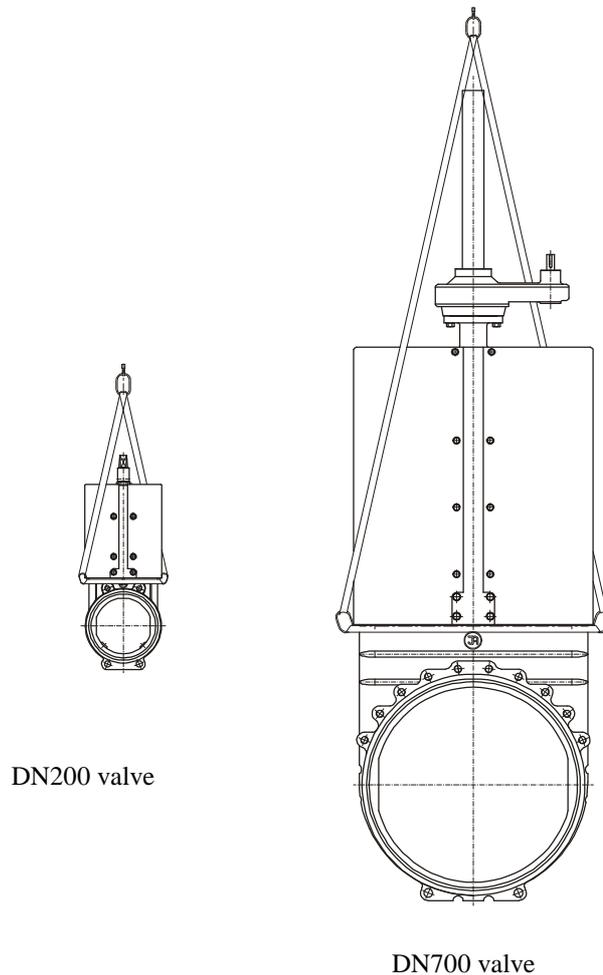
The Type 2006 knife gate valves are packed on EURO pallets (1200x800) and protected with heat-shrunk film.

3.3 STORAGE

Store the Type 2006 knife gate valves in sheltered rooms.

3.4 TRANSPORT

Transport the Type 2006 knife gate valves on sheltered vehicles. The manufacturer recommends slings for transport and installation of valve sizes from DN125 to DN1000.



4 ASSEMBLY AND INSTALLATION

4.1 ASSEMBLY GUIDELINES

The Type 2006 flange-to-flange knife gate valves can be installed in underground pipelines both in horizontal or vertical orientation. The knife gate valves are designed for mounting between flange ends of the pipelines sized for the PN10 bolt hole layout acc. to PN-EN 1092-2: 1999. Note that the system must not expose the valve to bending or tensile stress from loading with the unsupported pipeline sections. Assemble with consideration to pressure and temperature compensation of the pipeline.

The knife gate valve allow adjusting the gland (by retightening) to eliminate all leaks through the valve. This requires removing the guards first. Reseal the gland by tightening the nuts diagonally to the torque value appropriate for the nut size (see the table below).

Once installed and adjusted as above, the gate valve is ready for commissioning.

Any other work related to disassembly of the valve components (except for the guards and the gland) may result in loss of seal and warranty rights.

CAUTION!

If the knife gate valve is installed at a system termination, use counterflanges at the connection.

Bolt thread size	Bolt tightening torque		
	Bolt strength class		
	6.9	8.8	10.9
	[Nm]		
M4	2.7	3	4.3
M5	5	6	8.5
M6	9	11	15
M8	20	25	35
M10	42	51	70
M12	73	87	120
M14	115	135	195
M16	180	210	300
M18	245	290	410
M20	350	410	580
M22	470	560	780
M24	560	710	1000
M27	900	1050	1480
M30	1200	1430	2010
M33	1630	1940	2700
M36	2100	2490	3500
M39	2720	3220	4550

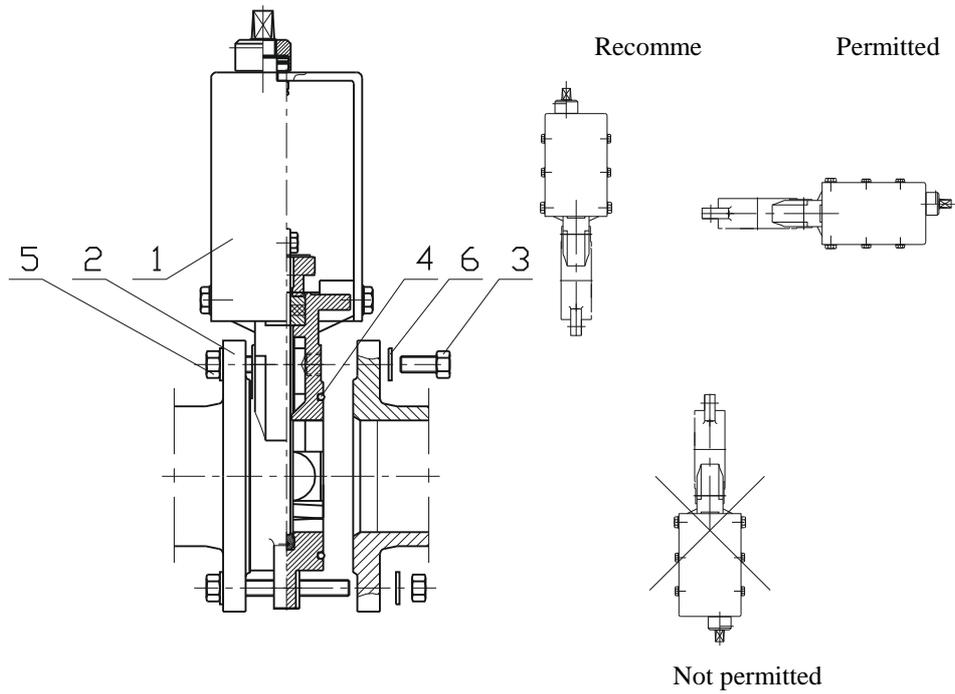
The table above lists the maximum tightening torques for individual bolts for tightening the knife gate valve gland.

4.2 ASSEMBLY INSTRUCTIONS

Before attempting to install the valve, check the technical and commercial documents delivered with the product to verify that the media and pipeline operating parameters comply with the manufacturer's declaration. Any change in the operating conditions must be consulted with the valve manufacturer beforehand. Before attempting to assemble the valve, remove the main bore plugs, check the inner surfaces of the valve and thoroughly flush with water, if necessary.

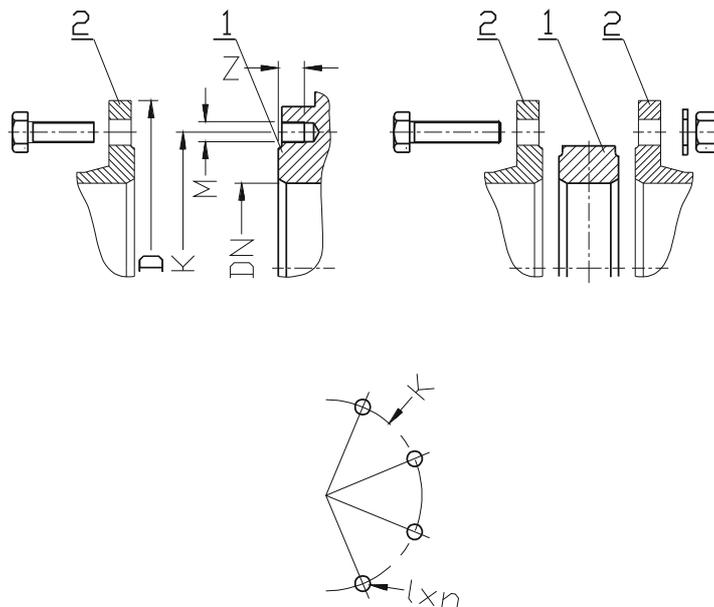
CAUTION! If mechanical damage is found on the product, do not install it in the pipeline.

The assembly method is shown in the following figure:



1. - Knife gate; 2. - Pipeline flange end; 3. - Assembly bolt; 4. - Seal; 5. - Nut; 6. - Washer

List of fastening bolts for Type 2006 knife gate valves



DN [mm]	50	65	80	100	125	150	200	250	300
D [mm]	165	185	200	220	250	285	340	395	445
K [mm]	125	145	160	180	210	240	295	350	400
l_{xn}	4x18	4x18	6x18	6x18	6x18	6x22	10x2 2	8x22	8x22
Thread- in bolts (1 x M x length)	4 M16 x25	4 M16 x25	4 M16 x30	4 M16 x30	4 M16 x40	4 M20 x40	4 M20 x40	8 M20 x40	8 M20 x40
Z [mm]	11	11	12	12	12	13	13	13	15
Bolts with nuts (1 x M x length)	4 M16 x90	4 M16 x90	6 M16 x110	6 M16 x110	6 M16 x120	6 M20 x130	10 M20 x140	8 M20 x150	8 M20 x150

DN [mm]	350	400	500	600	700	800	900	1000
D [mm]	505	565	670	780	895	1015	1115	1230
K [mm]	430	515	620	725	840	950	1050	1160
l_{xn}	10x2 2	10x2 6	12x2 6	12x3 0	14x3 0	14x3 0	16x3 0	16x33
Thread- in bolts (1 x M x length)	6 M20 x55	6 M24 x55	16 M24 x55	16 M27 x55	20 M27 x60	20 M27 x60	24 M30 x60	24 M33x 60
Z [mm]	15	20	20	25	40	40	50	55
Bolts with nuts (1 x M x length)	10 M20 x150	10 M24 x200	12 M24 x200	12 M27 x250	14 M27 x280	14 M27 x280	16 M30 x300	16 M33x 300

4.3 OPERATION

The type 2006 knife gate valve shall be operated according to all relevant requirements for cut-off valves, i.e. either in fully open or fully closed positions. Leaving the knife gate valve partially opened (or closed) may result in seal failure. In order to guarantee full operating fitness, switch the gate valve periodically (at least every 6 months) (from fully open to fully closed) with the installation on line to self-clean the valve. At the same time visually inspect the gland assembly. If leaks are found, repair it by following Section 4.1.

Exceeding the operating limits of the valve may result in damage that will not covered by the suretyship granted by the manufacturer.

4.4 OCCUPATIONAL HEALTH AND SAFETY

The Type 2006 knife gate valves are eligible for the OHS guidelines and recommendation concerning installation of pipelines and devices for water supply stations, heat power plants, water treatment plants, sewage treatment plants, pumping stations and other facilities, and eligible for the Polish Regulation concerning general OHS laws (use of personal protective equipment for hands, legs and head, and safety garment), especially at work with low or high temperature hazard.

Misuse of this product is prohibited.

5 WARRANTY TERMS AND CONDITIONS

The product assembled, installed and operated in compliance with this Manual is covered by a commercial warranty from the manufacturer.

The warranty terms, conditions and period are specified in the relevant Warranty Sheet.