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INSTALLATION – OPERATION – MAINTENANCE MANUAL

ITEM 0090 – ITEM 0095 CAST-IRON KNIFE GATE VALVE WITH DISCHARGE

ITEM 0100 – ITEM 0105 CAST-IRON KNIFE GATE VALVE WITHOUT DISCHARGE

ITEM 0120 – ITEM 0125 STAINLESS STEEL KNIFE GATE VALVE WITHOUT DISCHARGE

ISTR 0090_EN	EDITION 1/2015

CONTENTS

1. Overview

Gate valve with vertical closing element (knife), manually actuated by lever (items 0100-0120 only) or handwheel and with hydraulic and pneumatic actuators.
Item 0090 (0095) differs from item 0100 (0105) for the discharge pipe downstream the closing knife.
Items 0090, 0100 and 0120 have DIN PN10 flanges (for the European market) whereas items 0095, 0105 and 0125 have ANSI 150 flanges (for the American market)

1.1 Type of products

1.1.1 Cast-iron gate valves

ART. 0090 – ART. 0095
Knife gate valve with discharge - manual model. Available DN: 3”- 4”- 5”- 6”- 8”.

ART. 0092 – ART. 0097
Knife gate valve with discharge - handwheel model. Available DN: 3”- 4”- 5”- 6”- 8”.

ART. 0090/0500 – ART. 0095/0500 – ART. 0090/0501 – ART. 0095/0501
Knife gate valve with discharge actuated by hydraulic cylinder item 0500 (0501 for 8”), opening with oil, closing with gas spring. Available DN: 3”- 4”- 5”- 6”- 8”.

ART. 0090/0550 – ART. 0095/0550 – ART. 0090/0551 – ART. 0095/0551
Knife gate valve with discharge actuated by double-acting hydraulic cylinder item 0550 (0551 for 6” and 8”)
Available DN: 3”- 4”- 5”- 6”- 8”.

ART. 0090/0570 – ART. 0095/0570 – ART. 0090/0575 – ART. 0095/0575
Knife gate valve with discharge actuated by double-acting pneumatic cylinder item 0570 (0575 for 6” and 8”).
Available DN: 3”- 4”- 5”- 6”- 8”.

ART. 0090/0571 – ART. 0095/0571 – ART. 0090/0576 – ART. 0095/0576
Knife gate valve with discharge actuated by double-acting magnetic pneumatic cylinder item 0571 (0576 for 6” and 8”). Available DN: 3”- 4”- 5”- 6”- 8”.

ART. 0100 – ART. 0105
Knife gate valve without discharge - manual model. Available DN: 4”- 6”- 8”-10”.

ART. 0102 – ART. 0107
Knife gate valve without discharge - handwheel model. Available DN: 4”- 6”- 8”-10”.

ART. 0101 – ART. 0106
Knife gate valve without discharge - opening lever model. Available DN: 4”- 6”- 8”-10”.

ART. 0100/0500 – ART. 0105/0500 – ART. 0100/0501 – ART. 0105/0501
Knife gate valve without discharge actuated by hydraulic cylinder item 0500 (0501 for 8”), opening with oil, closing with gas spring. Available DN: 4”- 6”- 8”-10”.

ART. 0100/0550 – ART. 0105/0550 – ART. 0100/0551 – ART. 0105/0551
Knife gate valve without discharge actuated by double-acting hydraulic cylinder item 0550 (0551 for 6”- 8”-10”)
Available DN: 4”- 6”- 8”-10”.
ART. 0100/0570 – ART. 0105/0570 – ART. 0100/0575 – ART. 0105/0575
Knife gate valve without discharge actuated by double acting pneumatic cylinder item 0570 (0575 for 6”- 8”-10”).
Available DN: 4”- 6”- 8”-10”.

ART. 0100/0571 – ART. 0105/0571 – ART. 0100/0576 – ART. 0105/0576
Knife gate valve without discharge actuated by double-acting magnetic pneumatic cylinder item 0571 (0576 for 6” - 8”-10”). Available DN: 4”- 6”- 8”-10”.

1.1.2 Stainless steel knife gate valves

ART. 0120 – ART. 0125
Knife gate valve without discharge - manual model. Available DN: 4”- 6”.

ART. 0122 – ART. 0127
Knife gate valve without discharge - handwheel model. Available DN: 4”- 6”.

ART. 0121 – ART. 0126
Knife gate valve without discharge - opening lever model. Available DN: 4”- 6”- 8”-10”.

ART. 0120/0500 – ART. 0125/0500
Knife gate valve without discharge actuated by hydraulic cylinder item 0500, opening with oil, closing with gas spring. Available DN: 4”- 6”.

ART. 0120/0550 – ART. 0125/0550 – ART. 0120/0551 – ART. 0125/0551
Knife gate valve without discharge actuated by double-acting hydraulic cylinder item 0550 (0551 for 6”)
Available DN: 4”- 6”.
ART. 0120/0570 – ART. 0125/0570 – ART. 0120/0575 – ART. 0125/0575
Knife gate valve without discharge actuated by double acting pneumatic cylinder item 0570 (0575 for 6”).
Available DN: 4”- 6”.

ART. 0120/0571 – ART. 0125/0571 – ART. 0120/0576 – ART. 0125/0576
Knife gate valve without discharge actuated by double-acting magnetic pneumatic cylinder item 0571 (0576 for 6”). Available DN: 4”- 6”.

1.2 Key of symbols

this symbol draws attention to additional information and/or instructions to be followed in the event that the gate valve is employed in potentially explosive atmospheres.

this symbol draws attention to important information and/or instructions to prevent serious injuries to the operator and/or serious damages to the system and the environment.

1.3 Marking and certifications

1.3.1 Pressure Equipment Directive (97/23/CE)

Gate valves are considered pressure vessels. Therefore they are subject to the PED (97/23/EC). PED equates valves to pipes. The applicable compliance assessment scheme for cast-iron gate valves is Table No 9, “pipe as per art. 3, paragraph 1, letter c, point 2, second dash”. It refers to “pipes for liquids having a vapour pressure at the maximum allowable temperature of not more than 0.5 bars above normal atmospheric pressure (1013 mbars), within the limits below:
group 2 fluids, when PS is more than 10 bars, DN is more than 200 and PS × DN is more than 5,000 bars.
In particular, these gate valves are subject to Article 3, Section 3, thus they do not require CE marking.

The applicable compliance assessment scheme for stainless steel gate valves is Table No 8 “pipe as per art. 3, paragraph 1, letter c, point 2, first dash”. It refers to “pipes for liquids having a vapour pressure at the maximum allowable temperature of not more than 0.5 bars above normal atmospheric pressure (1013 mbars), within the limits below:
group 1 fluids, when DN is more than 25 and PS X DN is more than 2,000 bars.
In particular, these gate valves are classified in Class I, subject to Norm A and they have CE marking.

1.3.2 ATEX Directive (94/9/CE) (currently waiting for approval, available from January 2016)

Gate valves series 0090, 0100 and 0120 can be supplied, upon request, in Atex version thus fit to meet the requirements of Directive 94/9/EC for protection against explosion. The reference framework is the following:

EN 13463-1 “Non-electrical equipment for use in potentially explosive atmospheres – basic method and requirements”
EN 13463-5 “Non-electrical equipment for use in potentially explosive atmospheres – protection by constructional safety”

Atex gate valves bear the following marking:

METALTECNICA s.r.l.

CE II 2 G/D TX

1370 – n.00000000

T.F. 0090

Thus gate valves are:

- certified for use on equipment of **Group II, category 2**
- certified for use in the **GAS zones 1 and 2** and in the **DUST zones 21 and 22**
- Temperature class: **TX** resulting from the room temperature or the temperature of the operating fluid because the cylinders are not provided with internal heat sources.

The **1370** number identifies the Notified Body (Bureau Veritas Italia S.p.A.) the **T.F. 0090** Metaltecnica technical file has been filed with; the following number is the registration receipt issued by the Notified Body.

1.3.3 Machinery Directive (2006/42/EC)

Gate valves with hydraulic or pneumatic actuators are considered machinery, thus they are subject to Directive 2006/42/EC. Gate valves meet the minimum safety requirements required by the directive

2. Handling

The indications below must be followed when handling the products:

- Use personal protective equipment (gloves, safety glasses, safety shoes, etc.)
- ⚠ handle gate valves that weigh more than 20 Kg by means of cranes, hoists or forklifts with the proper slings. If necessary, use the proper eyebolts screwed into the threaded holes on machine body.
- Never handle the gate valve using the plastic protection casing
- Handle the gate valves with care to prevent impacts and damages. Handle taking care not to cause any impacts or damages to the gate valve.

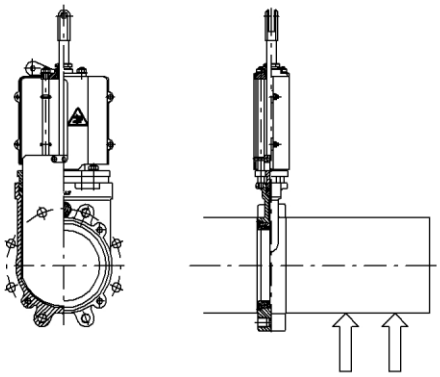
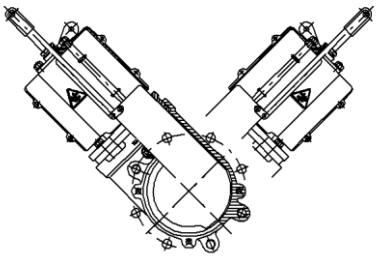
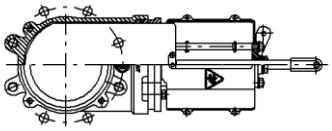
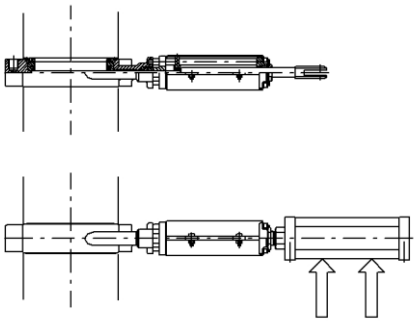
3. Installation

The indications below must be followed during installation:

- handle the gate valves complying with the instructions under 2 “Handling”
- check the valve for overall integrity and internal part cleaning
- check that there is the proper space between the connecting flanges of the two pipe sections. Also check that the flanges are parallel and properly aligned. Otherwise, during assembly gate valve body may suffer heavy stresses that would negatively affect gate valve proper operation.
- During installation, gate valves must feature the proper support. The two pipe sections must be properly supported, too, in order to prevent gate valve body from suffering system stress.

- Check gate valve proper orientation considering the flow direction. Gate valve body is marked with an arrow indicating flow direction (or the direction of the higher pressure)
- Check the position of installation considering that, if possible, it would be better to install the gate valve vertically on horizontal pipes. However, the gate valve can be installed inclined on horizontal pipes (please install in this position only if it is strictly necessary) or horizontal on vertical pipes. In this last case, a properly sized supporting frame must be provided for the gate valve and/or the hydraulic or pneumatic actuators. Any other different position of installation may require specific measures to be undertaken and may cause use restrictions. Therefore, these cases are to be assessed with Metaltecnica Technical Department.

Tab.1 diagram of the position of installation

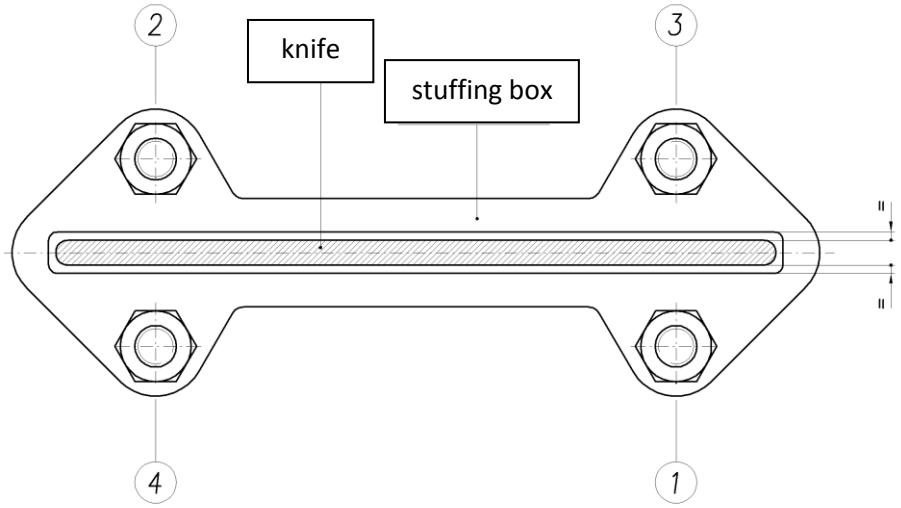
	
Vertical gate valve on horizontal pipes. The two pipe sections must be properly supported in order to prevent gate valve body from suffering system stress.	Inclined gate valve on horizontal pipes The two pipe sections must be properly supported in order to prevent gate valve body from suffering system stress.
	
Horizontal gate valve on vertical pipes The two pipe sections must be properly supported in order to prevent gate valve body from suffering system stress.	Horizontal gate valve on vertical pipes. Provide the proper supporting frame for the gate valve and/or the hydraulic or pneumatic actuators.

- Place the fixing screws and tighten them alternatively and uniformly as follows: tighten one screw, than the diametrically opposed one and so on for all the screws. The proper tightening torque is reported in the table below.

Tab.2 recommended tightening torque

DN (NPS)	3”	4”	5”	6”	8”	10”
SCREW (DIN PN10 flanges)	M16	M16	M16	M20	M20	M20
SCREW (ANSI 150 flanges)	5/8” UNC	5/8” UNC	5/8” UNC	3/4” UNC	3/4” UNC	3/4” UNC
Tightening torque (Nm)	60	60	70	70	70	110

- Once the gate valve has been installed, check that all the accessories -such as hydraulic actuators, pneumatic actuators, manual control levers- are properly connected.
- Before gate valve commissioning, carry out some no-load opening and closing cycles checking proper operation and seal.
- If necessary, adjust the stuffing box to prevent leaks. Adjust the stuffing box by gradually tightening the pressure nuts following the order in the following drawing. During this stage, make sure that the knife does not touch the stuffing box.



- ⚠ Before disassembling the gate valve from the system for maintenance and/or replacement purposes, the electrical supply and the hydraulic and pneumatic feed must be disconnected, releasing the pressure of the lines and of the gate valve itself.

In the event that the gate valve is used in potentially explosive atmospheres, follow the indications below:

- Ⓔx Consider whether the gate valve is suitable to the hazard zone in which it will be installed (see Directive 99/92/EC).
- Ⓔx Additional electric, mechanical, magnetic equipment can be applied exclusively when they are compliant with the Atex Directive and provided with declaration of conformity and a classification suitable to the area in which they will be installed.
- Ⓔx Remember that the maximum surface temperature does not depend on the gate valve; it depends, instead, on the operating conditions such as the temperature of the process fluid used, temperature of the environment, external heat sources.
- Ⓔx Do not disassemble the gate valve close to heat sources which, through radiation, conduction or convection, may heat the gate valve and increase its surface temperature above the minimum ignition temperature of the potential explosive atmosphere.
- Ⓔx Carry out the proper gate valve grounding. Gate valves are provided with a screw on the upper head to which an electric cable shall be connected. It will, thus, act as a conductor and discharge any possible electrostatic currents in the system.
- Ⓔx Before disassembling the gate valve, check that there is electrical continuity between the two pipe sections.
- Ⓔx During installation, maintenance and disassemble, avoid mechanical impacts, which may cause sparks.

4. Gate valve actuation

Supplied gate valves can be actuated as follows:

a. by hand lever (item 0100 - 0120 only)
steel control lever that can be blocked in the "gate valve closed" position by using chain and padlock. For additional information on the lever, please request the datasheet of item 117.

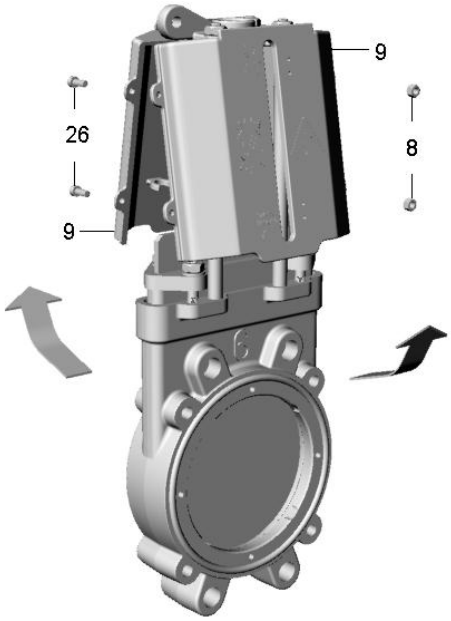
b. by handwheel
Handwheel actuated gate valves are non rising stem type. Gate valve is opened by rotating the handwheel anticlockwise. It is closed by rotating it clockwise. Gate valve upper head with handwheel is set for blocking handwheel rotation by chain and padlock.

c. single-acting or (items 0500 – 0501) or double-acting (items 0550 – 0551) hydraulic actuator
Gate valves can be supplied with single- or double-acting hydraulic cylinders. As for the technical details and conditions for operation of the hydraulic cylinders, please refer to the relevant datasheets. Information on the installation, use and maintenance is included in manual ISTR 0550_EN

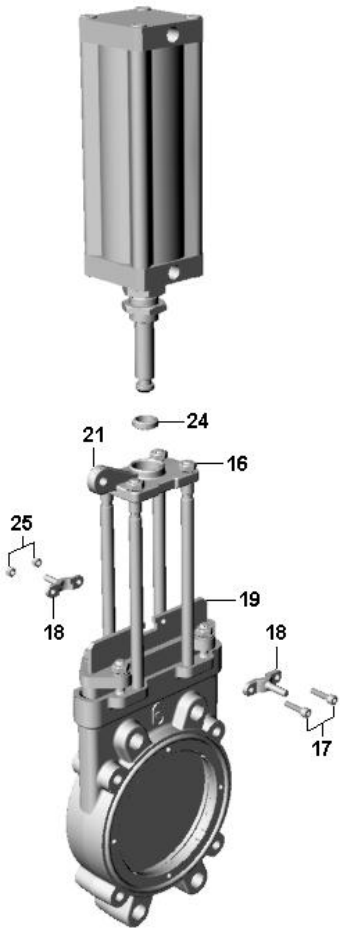
d. double-acting (items 0500 – 0501) and magnetic double-acting (items 0571 – 0576) pneumatic actuator
Gate valves can be supplied with double-acting pneumatic cylinders, both standard and magnetic. As for the technical details and conditions for operation of the hydraulic cylinders, please refer to the relevant datasheets. Information on the installation, use and maintenance is included in manual ISTR 0500_EN
Below is an example of assembly procedure for fitting a cylinder to the gate valve.

4.1 Cylinder-gate valve assembly procedure

The procedure below explains how to assemble the cylinder item 0570, but basically applies to all Metaltecnica cylinders.

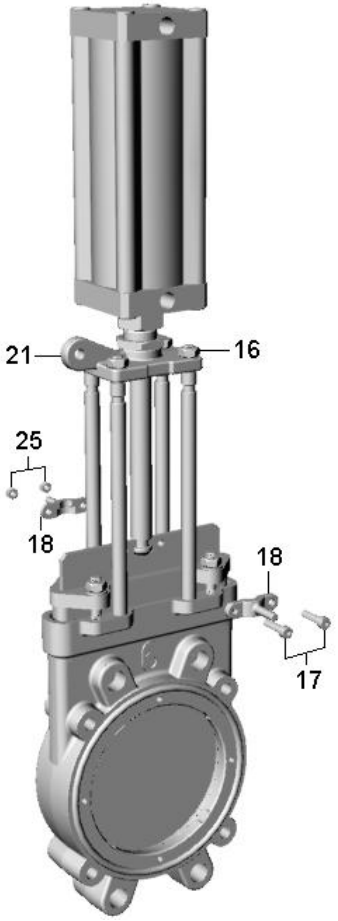


- Unscrew the nuts (8). Remove the screws (26).
- Remove the protection covers (9) by grabbing cover bottom and carefully lifting it upwards. Avoid pulling them sideways in order not to brake the internal couplings. Stainless steel gate valves are equipped with special stainless steel covers than can be easily disassembled.



- Disassemble the clamp (18), unscrewing the nuts (25) and removing the screws (17).
- Loosen the four nuts (16) on the head (21). You only need to unscrew them 5 mm in order to enable the insertion of cylinder stem end into the knife.
- Insert the white gasket (24) into the head.
- Fit the cylinder into gate valve head, taking care to engage stem end into the T-shaped slot on the knife (19).
- Screw the cylinder to the head and avoid pressing the gasket too much. Pressing the gasket too much may block stem movement.

- Block the knife onto cylinder stem by means of the riser clamp (18) and the relevant screws (17) and nuts (25).
- Completely tighten the four nuts (16) onto the head (21).
- Use a hexagon wrench to put the cylinder into place, further turning it by 90° (180° max).
- Fasten the cylinder to the head by unscrewing the ring until it stops against the head.
- Reassemble the two protection covers fitting them to the steel rods, and securing them with the relevant screws and nuts.



5. Size - materials – operating conditions

The technical information on the overall sizes, the material used and the operating conditions are available in the company catalogue or on our web-site www.metaltecnicazanolo.com. The technical data sheets for each item can be requested to the Metaltecnica's technical office.

6. Limits of use

- Gate valves cannot be used under pressure and temperature conditions other than those indicated in the specific datasheets.
- Cast-iron gate valves cannot be used with group 1 fluids (97/23/EC DIR) or with fluids whose chemical composition is not compatible with gate valve material.
- Stainless steel gate valves can be used with group 1 fluids (97/23/EC DIR)
- Gate valves cannot be used in explosive atmospheres other than those indicated in paragraph 1.3.2

7. Maintenance

The gate valve only requires few and simple maintenance procedures, which must be carried out by qualified operators using proper personal protective equipment.

7.1 Ordinary maintenance

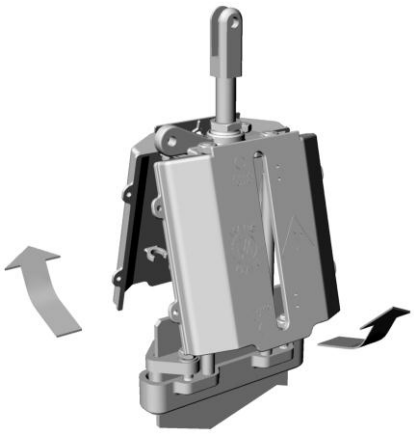
- Periodically check that no fluid is leaking from the stuffing box and no oil is leaking from hydraulic actuators.
- In order to avoid knife blockage, the scheduled maintenance tables shall include, at regular intervals, some opening and closing cycles of the normally closed gate valves and of the valves actuated manually by the lever, especially if thick fluids or liquids that tend to encrust are used.
- ⟨Ex⟩ When necessary, clean the external surfaces of gate valve and actuators using a damp cloth, thus preventing dust from accumulating. Do not clean using compressed air, thus preventing potentially dangerous dust from being scattered into the surrounding atmosphere.
- ⟨Ex⟩ Check monthly the external condition of the gate valve-cylinder unit and make sure that no part has been eaten by rug. In this case, replace the eaten parts immediately.
- ⟨Ex⟩ Check monthly the integrity of the connections to the earthening terminals.

7.2 Extraordinay maintenance

Basically, extraordinary maintenance operations are those reported below:

7.2.1 Replacement of the upper sealing assembly, to be carried out as follows:

a) Discharge system residual pressure and close the valve completely
b) Unscrew the fixing screws (26) of the protection covers (9) and remove the covers by lifting them from the bottom, as shown in the following diagram.



c) Remove the fixing screws (17) of the clamp (18) or the fixing screws of knife coupling block, in case of handwheel actuated gate valves.
d) Unscrew the nuts (16) fixing the head (21) to the columns (10) and remove the head assembly complete with the stem (20) or, depending on the model, with the handwheel or actuator.
e) Unscrew the 4 columns (10) by using a hex wrench on column top surface.
f) Unscrew the nuts (16) of the stuffing box (13) and remove the stuffing box.
g) Remove damaged gaskets (11+12+11) and clean their seats.
h) Position new gaskets by observing the order braid ring - o-ring - braid ring, taking care to carefully overlap the inclined ends of the braid. The position of the second braid ring must be such as to cause the overlapping point to be opposite to the one of the first ring.
i) Put the stuffing box (13) into place again and press the sealing assembly.
j) Screw the four columns (10) checking that they perfectly rest onto gate valve body (1)
k) Put again the head assembly into place, complete with the accessories
l) Secure the stem (20) to the knife (19) by means of the clamp (18) (or knife coupling block, in case of handwheel actuated gate valves).
m) Put the protection cover (9) again into place by securing them to the columns (10) and then fix them with the relevant screws (26) and nuts (8).
n) Put the pipe under pressure and carry out some opening and closing cycles checking the absence of leaks from the stuffing box. If necessary, adjust the stuffing box as reported under 3.

7.2.2 Replacement of gate valve seat gasket (sealing ring) to be carried out as follows:

a) Remove the gate valve from the pipe
b) Completely open the gate valve
c) Unscrew the fixing screws (26) of the protection covers (9) and remove the covers by lifting them from the bottom, as shown under 6.2.1.
d) Unscrew the nuts (16) of the stuffing box (13).
e) Completely unscrew the nuts (16) fixing the head (21) to the columns (10).
f) Pull out the knife (19), stem (20), head (21) assembly (complete with the relevant handwheel or actuator) of at least 20 mm
g) Unscrew pipe coupling (6) from gate valve body (1)
h) Remove the o-ring (5) between valve body and pipe coupling.
i) Remove the locking ring (3) by using a punch alternatively on the four preset points.
j) Remove the worn sealing ring (4) and carefully clean pipe coupling (6).
k) Put the new sealing ring (4) into place in the relevant seat on pipe coupling (6).
l) Repair any dents of the locking ring (3) and put it into place again on pipe coupling (6) by using a punch.
m) Put the o-ring (5) into place and completely tighten pipe coupling to gate valve body.
n) Put the knife (19) and fix the head (21) onto the upper part of the four columns (10).
o) Adjust the stuffing box (13) by tightening the pressure nuts (16). Put the protection covers (9) again into place by securing them with the relevant screws (26) and nuts (8).

7.2.3 Kit gaskets replacement procedure for pneumatic and hydraulic actuators

For hydraulic and pneumatic actuators maintenance, please refer to the installation - use - maintenance manual ISTR 0500_EN.

8. Storage

When storing before installing or in the event of long-term storage, it is recommended to store the gate valves in a cool (maximum 40°C), well-ventilated place, away from direct sunlight or other heat sources and keep it dry.

9. Decommissioning

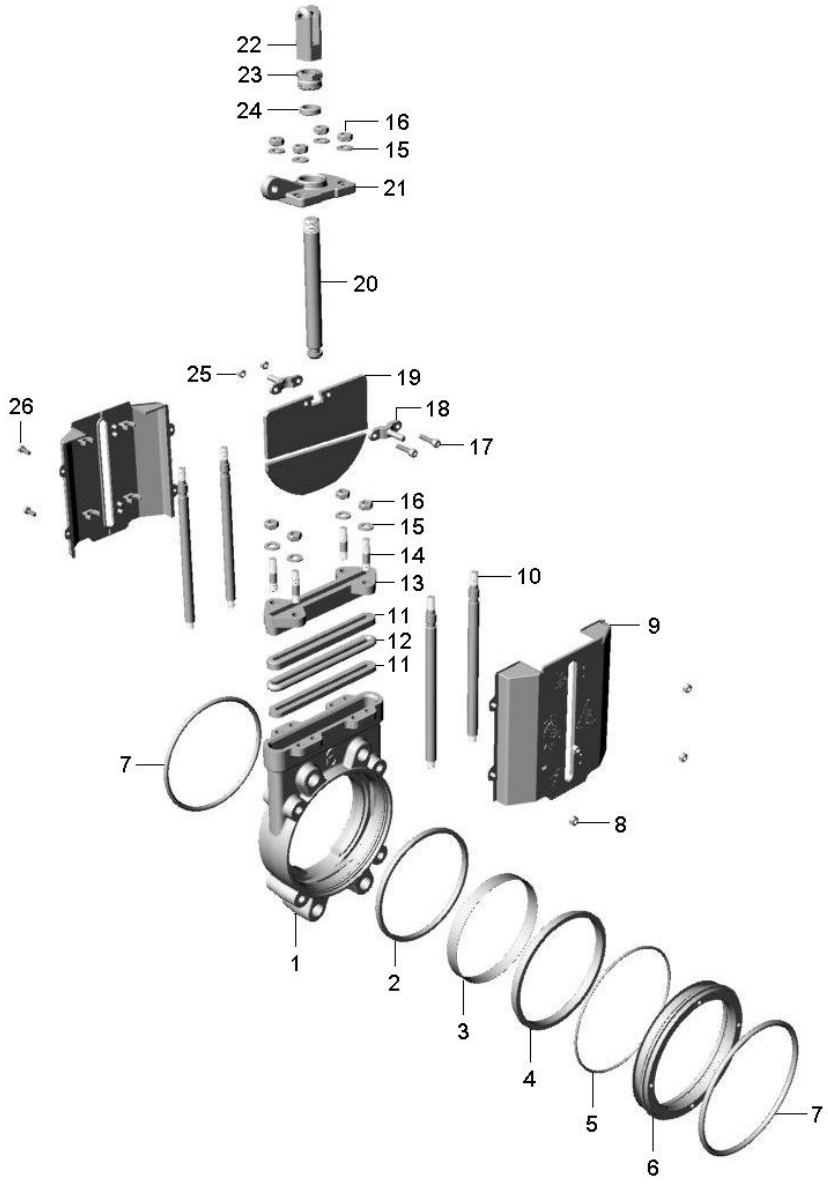
Before being decommissioned, the gate valves must be disassembled from the system following the procedure below:

- open the gate valve and empty the pipes on which it is assembled.
- cut off any power supply, pneumatic or hydraulic feed
- Disassemble the gate valve by using suitable personal protective equipment (gloves, safety glasses, safety shoes, etc.)
- Clean the gate valve in order to avoid leaks of the treated fluid which may cause damages to persons, property and environment. For the same reason, the hydraulic oil of the hydraulic cylinder, if any, must be carefully removed.
- After the cleaning, recyclable materials (metal parts, plastic parts) must be separated from special waste (P.T.F.E. gaskets, rubber parts, etc.) according to the local existing law.

The scrapping of assembled and not cleaned gate valves can cause emissions and damages to the environment.

10. List of components

Below is an example of general part list. It refers to item 0900. The exploded diagrams of the spare parts of all gate valve types and of the relevant actuators can be requested from Metaltecnica Technical Department.



Pos.	Name	Pos.	Name
1	Body	14	stud bolt
2	thrust bearing ring	15	washer
3	gasket locking ring	16	nut
4	sealing ring	17	TCEI screw / socket head cap screw
5	o-ring	18	clamp
6	Screwed pipe coupling	19	Knife
7	o-ring	20	Stem
8	self-locking nut	21	Head
9	closing cover	22	Fork
10	Column	23	Gland
11	braid ring	24	Gasket
12	o-ring	25	self-locking nut
13	stuffing box	26	TCEI screw / socket head cap screw