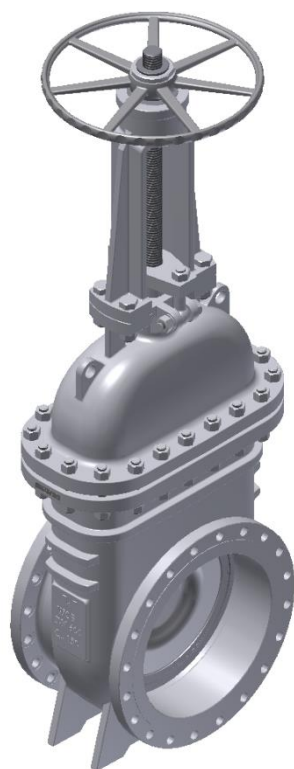


IOM - Instructions for installation,  
operation and maintenance of:

**Gate Valves**  
according to API 600  
**[GAC]**



**“TERMOVENT” SC**  
**Temerin**  
**Republic of Serbia**

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## 1. General safety information's

- Instructions for installation, start-up and maintenance during the period of exploitation of valves manufactured in the "TERMOVENT" SC should be used as a manual intended for all personnel directly or indirectly involved in dealing with the aforementioned goods.
- These instructions are only related to Gate Valves.
- Operators in charge of installation, operation and maintenance of gate valves during the period of use, should be fully trained for the correct / optimal performance of these tasks. If gate valves are equipped with mechanical actuators, the operator should be trained for the adequate operation of such valves.
- Information about temperatures and allowable working pressures shown in our technical data sheets are according to ASME B16.34, Table 2. Under no circumstances should the valves be operated at conditions outside these tables.
- Before the service or reinstallation of the gate valves, the plant or installation should be taken out of operation (pressure 0 bar, temperature of valves should be the same temperature as the environment).
- Because valves in working conditions have hot parts (handwheel, body and bonnet) and may cause burns, the operator has an obligation to undertake all necessary precautions to avoid such by using protective facilities.
- These products are recyclable. No ecological hazard is anticipated with the disposal of these products providing due care is taken.

## 2. Product description

- The main purpose of the gate valves is to isolate fluid flow through pipeline.
- If anything is unclear at the time of installation, start-up or during use, and not covered in these instructions, the departments of the "TERMOVENT" SC should be contacted directly in order to obtain the required support.

All gate valves manufactured in "TERMOVENT" SC are marked with following marks:

- Identification of manufacturer ("TERMOVENT" SC logo);
- Nominal diameter of gate valve NPS (inch) or DN (mm);
- Nominal pressure Class rating (#);
- Material designation of body and bonnet;
- Body and bonnet melt identification/heat number;
- Trim identification- material grade for stem, wedge and seat;
- Unique serial number;
- Date of manufacture (month and year) ;
- Maximum allowable pressure at maximal temperature according to ANSI B16.34
- The product standard designation: API 600
- Valve ends flanges and body/bonnet flanges grooved with ring joints corresponding ring number;
- API monogram marking (if it is manufactured in accordance with API Specification)
- Other marks in accordance with customer request or product standard.

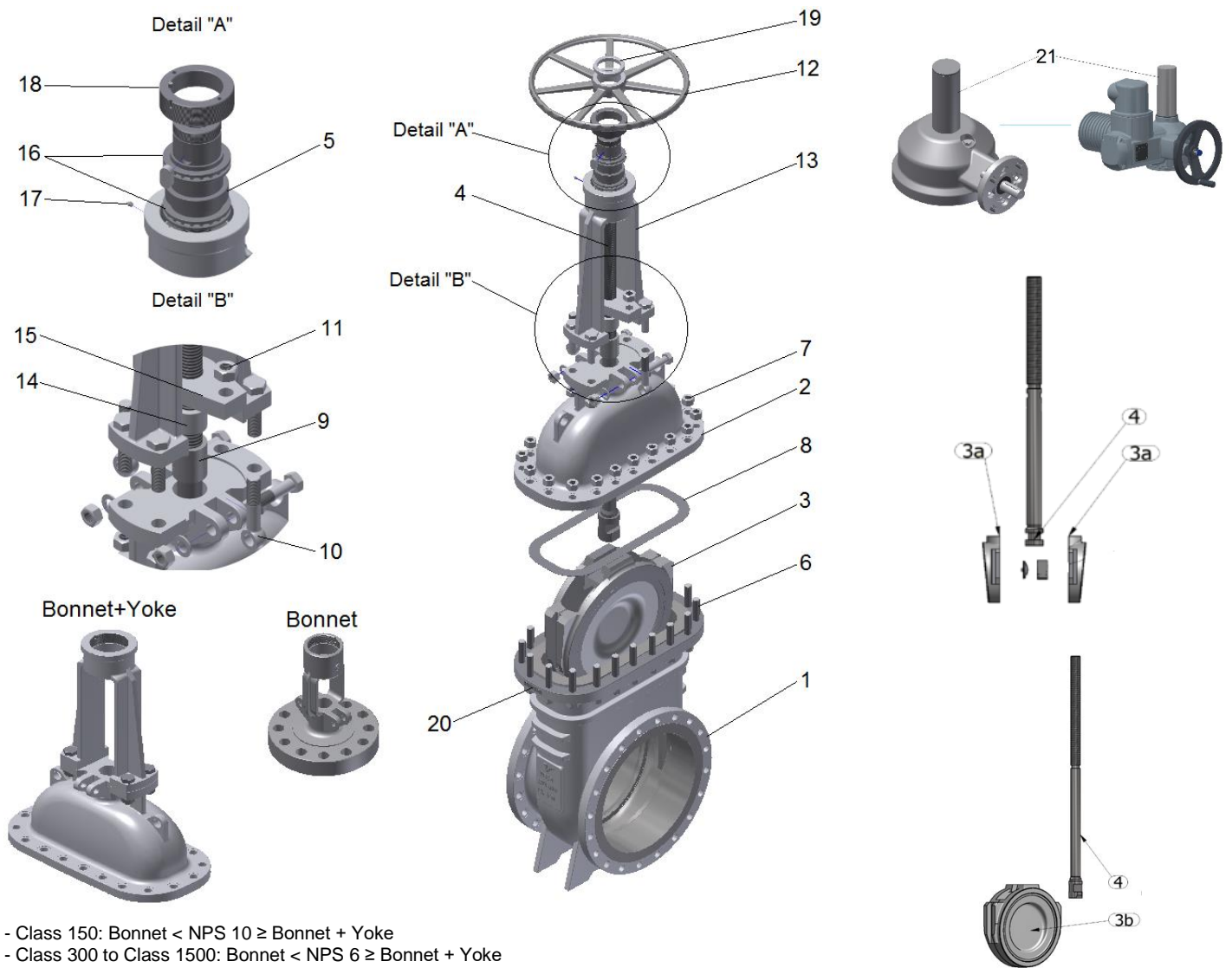


Fig. 1 Parts name

Table 1.

Pos.	Part Name	Quantity	Spare Parts	Pos.	Part Name	Quantity	Spare Parts
1	Body	1		11	Gland Nuts	2	
2	Bonnet	1		12	Handwheel/Gear/Actuator	1	
3	Wedge*	1		13	Yoke	1	
4	Stem	1		14	Packing gland	1	
5	Stem Nut	1		15	Gland flange	1	
6	Stud bolts	**		16	Bearings	2	
7	Nuts	**		17	Steam nut grease injector	1	
8	Bonnet Gasket	1	YES	18	Bearing cover	1	
9	Stem Packing	1 set	YES	19	Handwheel nut	1	
10	Gland Bolts	2		20	Nameplate	1	
				21	Protective tube	1	

\* 3a- split wedge, 3b-solid wedge

\*\* Quantity depend from NPS (DN) and Class

### 3. Storage and handling

#### General information

Gate valves are delivered in their wedge in closed position with protective covers on their ends. During storage period protective covers shall not be removed.

#### 3.1 Recommended storage facilities

- The valves have to be stored in closed, clean, dry and ventilated storage facilities.
- Storage conditions shall be: ambient temperature in the range +10°C to +35°C and the humidity up to 85%
- Store the valves in their original shipped packing.
- Gate valves should be taken out of crates or removed from the covering of a pallet just before installation.

#### 3.2 Storage inspection

- Periodical inspection should be performed on all stored valves. At the minimum, all valves should be inspected every 3-4 months for dirt, moisture or any other type of contamination. If any is found the valves is to be thoroughly cleaned and dried.
- Slight external rusting may occur on valves. This will have no effect on their performance.
- If valves are stored for more than 6 months we recommend following:
  - Valves shall be cycled open to close 2-3 times every 6 months to keep packing from adhering to the stem and help lubricate the stem and stem nut.
  - Preservation of inner surfaces, inner parts, stem, flange facing, butt welding ends and threads shall be repeated every 6 months with appropriate corrosion preventive coating
  - Re-tighten diametrically opposite all the bolts as per factory specifications to overcome possible bolt relaxation during long-term storage (Fig.4)

#### 3.3. Handling requirements

- For valve handling and/or lifting the lifting equipment must be sized and selected while taking into account the valve weight indicated at packing list. Lifting and handling must be made only by qualified personnel. Do not use the lifting points located on the actuator. Caution must be taken during the handling to avoid that this equipment passes over the workers. For valve handling or lifting the lifting equipment must be sized and selected while taking or over any other place where a possible fall could cause damage.

#### **WARNING!!!**

- You must not lift the valves using the connection flange holes or the handwheel – you should use lifting straps
- You must not remove the protection covers from the valve connection ends;
- Store the valves in the 'closed' position.

### 4 Installation and start-up

- Gate valves are delivered with their wedge in the closed position and they are ready for use. After the removal of the protection covers it is necessary to thoroughly clean inside the gate valve with compressed air without first opening the valve.
- Do not disassemble or modify a valve in any way prior to installation. This will void the factory warranty.

- Closure of a valve is performed by turning the handwheel in a clockwise direction. On the handwheel is an arrow and the letter “C” indicating the closing direction, and another arrow and the letter “O” indicating the opening direction.
- When installing valves with flanged ends it is necessary to take into consideration the selection of adequate bolt material and the appropriate type of gasket depending on the type of working fluid, pressure, temperature, and the type of flange facing. It is necessary to install gaskets strictly in accordance with instructions given from the manufacturer of the gaskets.
- Gate valves with flanged ends shall be installed in slightly open to fully open position.
- Gate valves with welding ends should be welded onto the pipeline in the slightly closed position by an expert and with appropriate WPS. After welding, if necessary, local normalization should be performed and the inside of the pipeline should be cleaned to remove possible welding remains.
- At the moment of installation the influence of the load of the pipeline on the gate valve should be reduced. The same also applies for temperature oscillation, hydraulic impact and similar. The valve should not be used as a support for a pipeline.
- Each product after assembling is hydraulically tested leading to wetting the sealing of the package. As a result, before installation, may be difficult manipulation with handwheel. This phenomenon does not affect the functionality of the product.
- Manually operated gate valves should be relieved of maximum seating force when left in the closed position. By relieving this force, it may help prevent damage caused by excessive thermal stem expansion. Care should be taken however to ensure that the valve is not opened, only that the torque/thrust has been removed from the stem.
- **We recommend installation of gate valves with stem in vertical position. Gate valves could be installed with stem in horizontal position but for vertical pipelines. We do not recommend installation of gate valves over NPS 6“ with horizontal stem on the horizontal pipelines.**
- It is possible after the installation, start-up and operating parameters are set to detect a leakage on the stem packing. In this case it is necessary to tighten the gland nuts equally. The tightness should not exceed more than necessary to allow comfortable manipulation of the valve (opening/closing). If it is necessary, new stem packing rings of the same quality should be added to the packing.

### WARNING!!!

- **We recommend installation of gate valves with stem in vertical position. Gate valves could be installed with stem in horizontal position but for vertical pipelines. We do not recommend installation of gate valves over NPS 6“ with horizontal stem on the horizontal pipelines.**
- Do not disassemble or modify a valve in any way prior to installation. This will void the factory warranty.
- Each product after assembling is hydraulically tested the result of which is “wetting” of the sealing package. As a result, may be difficult manipulation with handwheel before installation. This does not effect on the functionality of product and this phenomenon will be eliminated after installation gate valve on the pipeline;
- You must not lift the valves using the connection flange holes or the handwheel at the moment of the installation on the pipeline – you should use lifting straps to secure the valves to the lifting equipment;
- Before installation the impurities should be removed from the pipeline or from the appliance;
- Remove protecting covers from the valve ends, degrease and clean the inside of the valve, and in case of a flanged connection, carefully clean the sealing surfaces;
- Confirm that the marks on the valve correspond to the projected parameters of the plant (e.g. size, pressure, material etc.) and installation is according to allowable flow direction;

- Confirm that the velocity of the fluid at the place of the installation is in range of the recommended velocity;
- During the installation check if there is enough space for normal and safe manipulation;
- At the moment of testing of a pipeline or an installed appliance valve; take care about the predicted maximal differential pressure.
- **The valve should not be used as a support for a pipeline.**

## 5 Usage and maintenance

- It is convention during usage of the gate valves that all minor defects, if operating conditions allow, should be repaired on the spot. If not, the gate valve should be dismantled from the site in order to perform a full repair. If the gate valve is severely damaged it should be replaced with a new one. Such repairs protect gate valves against further deterioration, being permanently out of work and being the cause of severe accidents in the plant.
- The valve stem packing should be the subject of particular attention as it is important for the qualitative maintenance of tightness and shall be checked every 3 months. If leakage at the stem packing is detected, the gland nuts should be tightened slowly (Fig. 2). When gland nuts are tightened, if the gland falls down more than twice the packing ring height, new packing rings should be added to the stem packing.

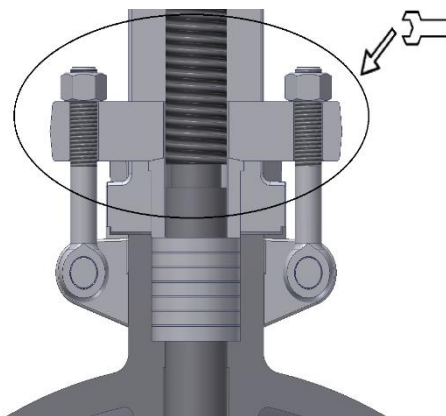


Fig. 2 Stem packing gland tightening

- After a longer period of use, the valve stem packing becomes rigid and unusable so a replacement should be done. When the replacement of stem packing is performed, remains of the old packing should be removed carefully and the sealing chamber should be thoroughly cleaned before the new packing is installed. The packing rings of the new stem packing should be identical in quality as before, especially for valves with high working parameters. Individual packing rings should be used for stem packing (Fig. 3) and arranged in a manner that the connection of one ring is at angle of 90° to the connection of next one.



Fig. 3 Stem packing ring

- In case of leakage through gaskets between gate valve connection flanges or between the bonnet and body, it is necessary to make replacements of the gaskets as soon as possible to prevent damage of the sealing surfaces due to erosion.

- Lubrication of thread between stem/stem nut is highly important. Lubrication shall be performed every month, or twice a year, if they are rarely used. Valves used in high temperature applications, use appropriate lubricants to support the temperature range. Lubrication is performing with nipples on the yoke.
- It is recommended to replace the grease in bushes during every general overhaul or during the pipeline revision. The type of grease depends on the temperature in the plant. Remote controls, bushings and gearboxes should be lubricated depending on how frequently they are used, every 3 months. For the lubrication of the actuator (Pos. 12) it is necessary to remove the protective tube (Pos. 21), then grease the stem (Pos. 4) and return the protective tube (Pos. 21). Some of the lubricants we use for lubrication are in the table. 2

Table 2.

Manufacturer	Quality level
AGIP	ISO 6743-9:L-X CCHA 2/ DIN 51 502:K 2K-30
MOBIL	
SHELL	
TOTAL	

- In case in the gate valve in the closed position the temperature of the fluid (mainly water) increase in the chamber above the wedge impermissibly high pressure can occur. In order to prevent failure or damage of pressure-relating parts gate valves should be equipped with some of the presented constructive solutions (Figure 4). For gate valves where flow is always in one direction simplest overpressure safety device should be provided with hole in the wedge / seat (Figure. 4.1) or by equalizing pipe (Fig. 4.2). When gate valve is bidirectional overpressure safety device should be provided by equalizing pipe and bypass valves (Figure 4.3). One of approved execution is installation of safety valve in the gate valve body (Figure. 4.4).

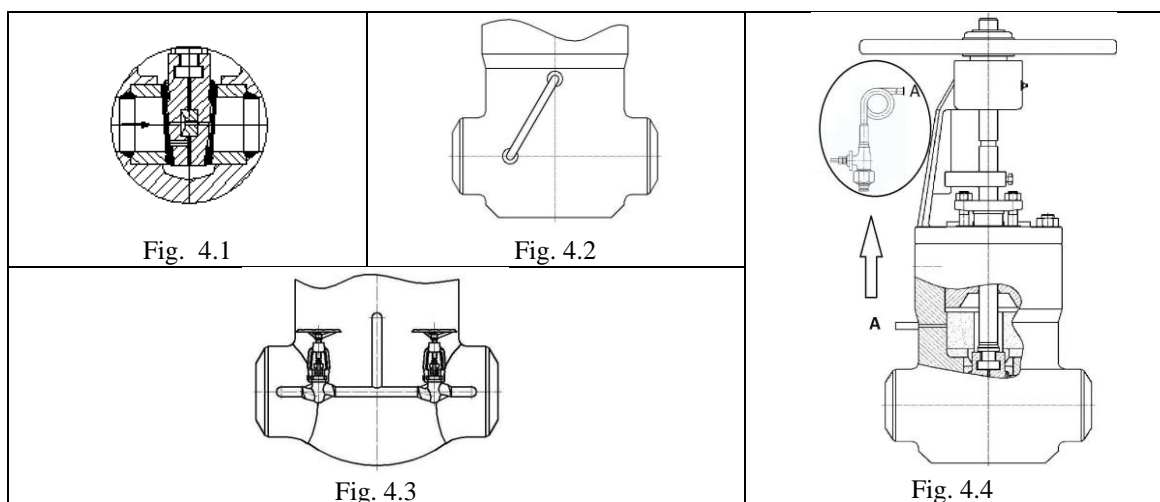


Figure 4. Overpressure safety executions

- Gate valves delivered with actuator is adjusted for proper work. Gate valves delivered with connection for later build on it actuator must be adjusted. Closing of gate valves should be adjusted by torque/thrust switch and the opening by limit switch. The setting of torque/thrust and limit switches must be in accordance with the instructions from Termovent SC.





### WARNING!!!

- During usage gate valves must be completely in an open or closed position;
- If, when a gate valve is overhauled, a decrease of wall thickness of more than 30% is detected at any of the ports (due to erosion) the valve should stop being used;
- Any time when a gate valve is dismantled or reinstalled the gaskets should be replaced with new ones with the appropriate quality;
- Valve opening and closing by handwheel, should be done without use of auxiliary means such as a rod or similar;
- Gate valve maintenance and manipulation during use should be done only by experts and persons well trained for such purpose;
- At the moment of installation of the plant sudden and extreme change of pressure and temperature should be avoided;
- **Gate valve can not be used for flow control.**
- A Strainer being installed before the valve will increase its reliability and proper working.

## 6 Service and repair

- Only authorized persons should perform service and repair with appropriate tools and, if it is possible, using original spare parts. Personal protection should be applied in accordance with valid regulations and legalizations.
- Attention should always be paid to the reliability of the valves and parameters of the working implementation / plant, and only materials which can successfully replace those originally installed should be used.
- For highly reliable valves (valves which work with high temperatures, high pressures or with dangerous fluids) any service, repair or replacement should be done professionally and responsibly in accordance with valid regulations for safe working conditions at the plant.
- Before the service or reinstallation of the valves, the plant or installation should be taken out of operation (pressure 0 bar, temperature of valves should be the same temperature as the environment).
- Every Gate valve serviced or repaired should be subject to all necessary tests usually performed for a newly produced Gate valve.
- Bolts for connection between body and bonnet should be tightened evenly and crosswise applying appropriate torque when the Gate valve is in the open position.
- For high temperature and high pressure applications after 24 hours of operation, all nuts shall be re-tighten diametricly opposite up to design stresses (Fig.5). This action compensate any relaxation or creep. Periodic inspection is recommended, thereafter.

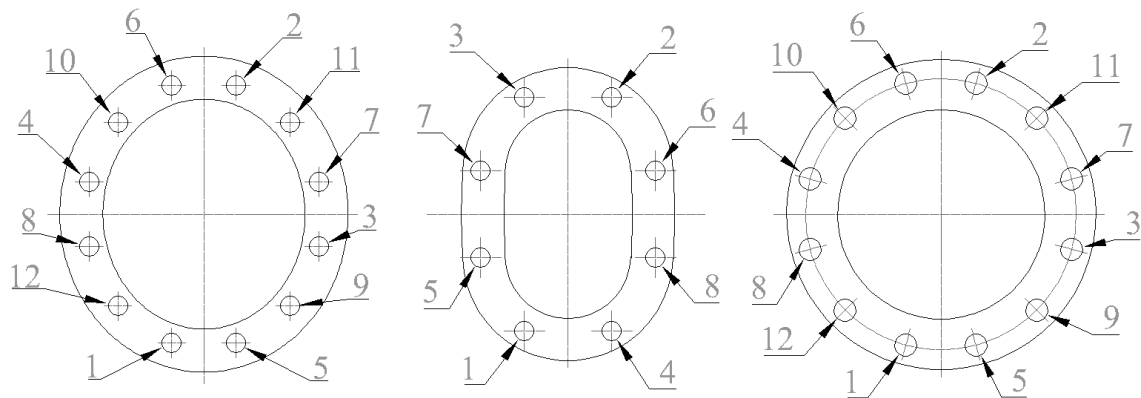


Fig. 5 Recommended re-tighten order

- Possible torques for tightening are listed in Table 3 and the selection of torque depends on the material grade of bolts and nuts used, as well as the quality of the gasket of the bonnet.

Table 3.

Nominal bolt diameter	Material of bolts: <b>B7</b>	Material of bolts: <b>B16</b>	Material of bolts: <b>B8</b>
	Torque [Nm]	Torque [Nm]	Torque [Nm]
M10	55	55	20
M12	90	90	30
M14	140	140	45
M16	215	215	65
M18	270	275	85
M20	410	415	125
M22	555	555	170
M24	700	705	215
M27	1015	1020	310
M30	1375	1385	420
M33	1850	1865	570
M36	2380	2395	730
M39	2885	2905	885
M42	3555	3580	1090
M45	4430	4460	1360
M48	5310	5345	1630
M60	10620	10695	3260

**WARNING!!!**

- Gaskets between the body and bonnet should be manipulated with high precautions because they could contain stainless steel wire which can cause severe injuries.

## 7 Possible malfunctions and solutions

During the period of usage of the installed gate valve malfunctions may occur. Only experts in the premises of the user should undertake repairs. The most common cause of malfunctions and how to overcome such situations is listed in Table 4.

Table 4.

Failure	Possible cause	Troubleshooting
Absence of flow	Gate valve is in closed position	Open the gate valve
	Protection covers are not removed	Remove protection covers from connection ends
	Gate valve is not completely open	Open the valve completely with handwheel (Pos.12)
	Dirty Gate valve or pipeline	Check and clean gate valve or pipeline
Difficult manipulation	Dry stem (Pos. 4)/stem nut (Pos.5)	Grease stem (Pos.4)
	Gland nuts (Pos.11) are too tight	Slightly loosen Gland nuts (pos.11) with precaution to preserve sealing of the stem packing (Pos.9)
Leakage on bonnet gasket	Nuts (Pos.7) are not tightened	Tighten Nuts (Pos.7)
	Bonnet gasket (Pos.8) is damaged	Disassemble bonnet (Pos.2) and replace bonnet gasket (Pos.8) with new one
Leakage on stem packing	Gland nuts (Pos.11) are not tightened	Tighten Gland Nuts (Pos.11)
	Stem packing (Pos.9) lost own functionality	Completely open the valve and carefully add new stem packing rings to original stem packing (Pos.9) or replace whole stem packing (Pos.9) with new one
Leaking on seat	Gate valve isn't completely closed	Turn handwheel (Pos.12) in direction indicated for closing without auxiliary means
	Mechanical damages of seat or wedge	Contact the manufacturer
	Working medium contains solid dirt particles	Clean Valve thoroughly. We recommend installation of Strainer before Gate Valve

## 8 Guarantee

- The Guarantee issued by “TERMOVENT” SC confirms the safe working of its products under conditions when these products are properly installed in accordance with the instructions in the documentation given to the customer, and usage is in accordance with approved technical conditions and working parameters.
- The Guarantee is void if inappropriate parts from other manufacturers are implemented, if the user changes construction, or if there is any decline in function or malfunction due to natural wear and tear.

### Guarantee conditions:

- The Guarantee is valid for defective parts or defective products, when any such defect is confirmed by an expert engaged by the customer and approved by experts from our company. In such a situation “TERMOVENT” SC will replace the defective part(s) or defective product(s).
- Replacement of defective part(s) or defective product(s) with new one(s) should be done only by an expert engaged by the customer upon approval or by instruction of our experts and in accordance with the instructions for installation.
- The Guarantee period is not valid if installation and manipulation of the valves isn't in accordance with these instructions. The Guarantee period for all replaced parts or product(s) starts from the moment the replacement(s) is/are done.

**The Guarantee is valid only if the valves are handled, stored, installed, used and maintained in full accordance to the Instructions and recommendation listed in this Document.**

**WARNING!!!**

- After detection of mistakes "Termovent" SC should be informed immediately.
- Claims must be made in writing.