INSTRUCTIONS FOR INSTALLATION,
OPERATION & MAINTENANCE

GAC

GATE VALVE
API 600

TERMOVENT since1963 SC

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1. INSTRUCTIONS for INSTALLATION, OPERATION & MAINTENANCE

1.1 General safety information

- Instructions for installation, start-up and maintenance during the period of exploitation of valves manufactured by TERMOVENT SC should be used as a manual intended for all personnel directly or indirectly involved in dealing with the products.
- Operators in charge of installation, operation and maintenance of GAC during the period of use should be fully trained for the correct/optimal performance of these tasks. If GAC is equipped with mechanical actuators, the operator should be trained for the adequate operation of such valves.
- Information about temperatures and allowable working pressures are shown in Table D.2.8 according to ASME B16.34. Under no circumstances should the valves be operated under conditions outside these tables.
- Before the service or reinstallation of the GAC, the plant or installation should be taken out of operation (zero pressure, 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 is required to undertake all necessary precautions to avoid this by using protective equipment.
- These products are recyclable. No ecological hazard is anticipated with the disposal of these products providing due care is taken.

1.2 Storage & Handling

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

1.2.1 Recommended storage conditions

- Storage conditions shall be: ambient temperature between +10ºC and +35ºC and the humidity is up to 85%
- The valves must be stored in closed, clean, dry and ventilated storage facilities.
- Do not store the valves outside.
- Store the valves in their original shipped packaging.
- Protect the valve from contact with solvents, lubricants, fuels or other chemicals.
- Store the valve in vibration-free conditions.
- Valve should be taken out of crates or removed from the covering of a pallet just before installation.
- Spare parts such as soft sealing elements, plastic or lubricants should be stored in a dry place at room temperature protected from light.

1.2.2 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 of this is found the valves are to be thoroughly cleaned and dried.
- Slight external rusting may occur on valves. This will not affect their performance.
- If valves are stored for more than 6 months we recommend the following:
  - ➔ Valves should 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

1.2.3 Handling requirements

- For valve handling and/or lifting the lifting equipment must be sized and selected while taking into consideration the valve weight indicated on the packing list.
- Do not use the lifting points located on the actuator (Figure D.2.22).
- Do not lift GAC via the handwheel (Figure D.2.23).
- If possible, lift GAC via the lifting lugs or yoke (Figure D.2.24 or Figure D.2.25).
- Caution must be taken during the handling to avoid that this equipment passing over the workers' heads.
- 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.

Figure – D.2.22

Figure – D.2.23

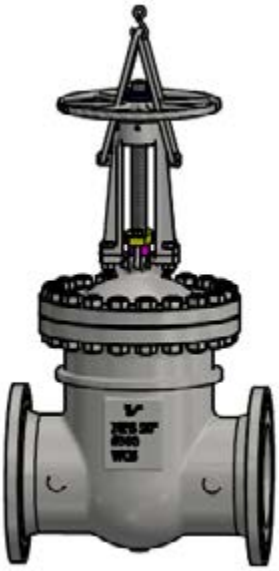

Figure – D.2.24

Figure – D.2.25

WARNING!!!

➔ Lifting and handling must be performed by qualified personnel only.
➔ You must not remove the protection covers from the valve connection ends.
➔ Store the valves in the 'closed' position.
➔ You must not lift the valves using the connection flange holes, handwheel or actuators.

1.3 Installation & Start-up

- GAC 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 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 if it occurs.
- Closure of the valve is performed by turning the handwheel in a CW (clockwise) direction. On the handwheel there 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 by the manufacturer of the gaskets.
- GAC with flanged ends shall be installed in a slightly open to fully open position.
- GAC with welding ends up to NPS 4” should be welded on the pipeline in the CLOSED position.
- GAC with welding ends over NPS 4” shall be welded on pipeline in OPEN position.
- Welding must be performed 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 pipeline load on the valve should be reduced. The same also applies to temperature oscillation, hydraulic impact and similar. The valve should not be used as a support for a pipeline.
- When installing the GAC equipped with an overpressure safety device (described in Section 8) you must take into consideration the permitted flow direction. Allowed flow direction is defined by the arrow located on the GAC body.
- Manually operated gate valves should be relieved of maximum seating force when the gate valve wedge is closed. Relieving of the force shall be provided by moving the handwheel CCW (counterclockwise) to the open position by ¼ of a turn. Regarding this action, contact between the stem and wedge will be disengaged. The action described will prevent damage to the seating surfaces caused by excessive thermal stem expansion.
- We recommend installation of GAC with stem in vertical position. GAC could be installed with the stem in a horizontal position but for vertical pipelines. We do not recommend the installation of GAC over NPS 6” with a horizontal stem on the horizontal pipelines.
- After the installation, start-up and operating parameters are set, it is possible to detect a leakage on the stem packing. In this case, it is necessary to tighten the gland nuts equally. The tightness should not go beyond more than necessary to allow comfortable manipulation of GAC (opening/closing).
- Recommendation: GAC should be installed with a minimum of 5x nominal diameter of straight pipeline in front of and behind the GAC.

WARNING!!!

- ➔ Do not disassemble or modify a valve in any way prior to installation. This will void the factory warranty if it occurs.
- ➔ 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.
- ➔ During the installation, check if there is enough space for normal and safe manipulation.
- ➔ Installation of valves with an overpressure safety device (Section 8 - with a hole in the wedge and with equalizing pipe) must be in accordance with the allowed flow direction.
- ➔ The valve should not be used as support for a pipeline.

1.4 Usage & Maintenance

- The gate-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 (Figure D.2.26). Torque for tightness gland nuts shown in Table D.2.10. 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.

Table D.2.10

	M10	M12	M14	M16	M18	M20	M24	M27	M30	M33	M36
Torque /Nm/	15÷40	26÷65	42÷100	64÷150	100÷175	125÷300	210÷500	305÷730	410÷1000	550÷1350	710÷1720

Figure D.2.26 – Stem packing gland tightening

- Stem packing must be replaced, depending on the working conditions and maintenance level, during packing replacement, special care must be taken to remove all old packing from the packing chamber. The preparation of new packing rings is shown in Figure D.2.27. Packing rings replacement is shown in Figure D.2.28 with a general note that every next packing ring must be rotated relative to the previous one (not less than 90º).

Figure D.2.27 – Stem packing ring

Figure D.2.28

- Lubrication of thread between stem (Pos.8 – Figure D.2.1) / stem nut (Pos.9 – Figure D.2.1) is highly important. To lubricate the bearings (Pos.24 – Figure D.2.1) on manual, gearbox or electric-operated valves, we suggest using quality-level grease, as shown in the following Table D.2.11. 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 performed with lubrication nipples (Pos.25 – Figure D.2.1) on the yoke or bonnet (Pos.4 and Pos.3 – Figure D.2.1).
- 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.27 – Figure D.2.1) and (Pos.28 – Figure D.2.1) it is necessary to remove the protective tube (Pos.29 – Figure D.2.1) then grease the stem (Pos.8 – Figure D.2.1) and return the protective tube. Some of the lubricants we use for lubrication are in the Table D.2.11

Table D.2.11

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

- GAC delivered with an actuator is adjusted for proper work. GAC delivered with connection for later build on it the electric actuator must be adjusted. The closing of GAC should be adjusted by the torque switch and the opening by the limit switch. The torque and limit switch settings must be in accordance with the instructions from “TERMOVENT SC”.

WARNING!!!

➔ During usage, GAC must be completely in an open or closed position.

➔ Valve opening and closing by handwheel should be done without the use of auxiliary means such as a rod or similar.

➔ GAC cannot be used for flow control.

➔ A Strainer being installed before the valve will increase its reliability and proper working.

1.5 Service & Repair

- Only authorized persons should perform service and repair with appropriate tools and, if possible, use original spare parts. Personal protection should be applied in accordance with valid regulations and legalizations.
- Using the wrong or defective spare parts may pose a hazard for personnel, or result in damage, malfunctions or even total failure.
- For GAC standard spare parts are Stem packing and Bonnet gasket.
- Contact “TERMOVENT SC” if You need other spare parts like a Stem, Wedge, Stem nut, etc.
- Every GAC serviced or repaired should be subject to all necessary tests usually performed for a newly produced valve.
- Bolts for connection between body and bonnet should be tightened evenly and crosswise applying appropriate torque when the valve is in the open position.
- Possible torques for tightening are listed in Table D.2.12 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 D.2.12

Bolt diameter	Bolt materials			
	B7	B16	B8	B8M
	Torque [Nm]			
M10	51	51	15	46
M12	89	89	25	81
M14	143	143	41	129
M16	223	224	64	203
M18	305	307	87	278
M20	436	439	124	396
M22	600	605	171	546
M24	755	760	215	687
M27	1116	1123	318	1015
M30	1507	1517	429	1371
M33	2066	2080	588	1880
M36	2644	2663	753	2405
M39	3446	3470	981	3135
M42	4247	4277	1209	3864

- For high temperature and high-pressure applications after 24 hours of operation, all nuts shall be re-tightened diametrically opposite to design stress Figure D.2.29. This action compensates for any relaxation or creep. Periodic inspection is recommended, thereafter.

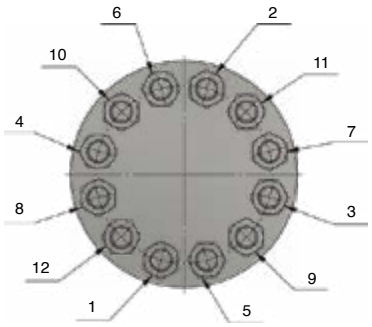

Figure D.2.29 - Recommended re-tighten order

WARNING!!!

➔ 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).

➔ Manipulation with body gasket and stem packing should be with high precautions because they could contain stainless steel wire which can cause severe injuries.

1.5.1 Stem packing rings replacement

Only authorized persons should perform service and repair with appropriate tools and, if possible, using original spare parts. Personal protection should be applied in accordance with valid regulations and legalizations.

Requirements before disassembling:

➔ The plant or installation should be taken out of operation (pressure 0 bar, temperature of valves should be the same temperature as the environment).

➔ GAC must be completely opened.

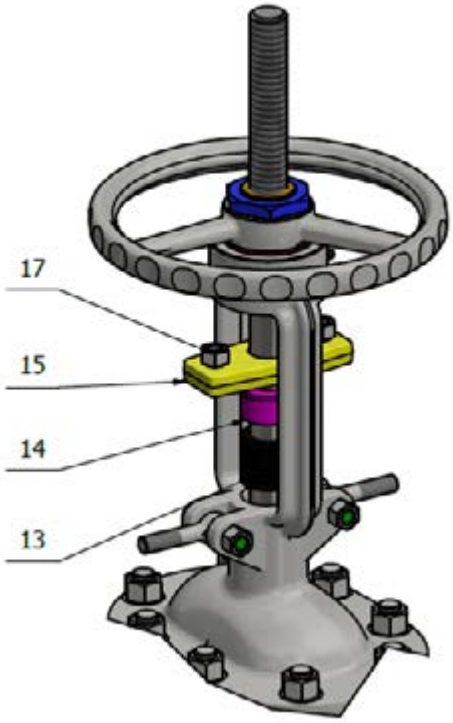

Figure D.2.30 –Stem packing rings replacement

Disassembling

Step 1 ›	Unscrew gland nuts (Pos.17)
Step 2 ›	Lift upwards gland flange (Pos.15)
Step 3 ›	Lift upwards packing gland (Pos.14)
Step 4 ›	Take out stem packing rings (Pos.13). All stem packing rings shall be removed (Pos.13)
Step 5 ›	The packing chamber shall be cleaned.

Assembling

Step 1 ›	The packing chamber shall be filled with new stem packing rings (Pos.13)
Step 2 ›	Put down packing gland (Pos.14)
Step 3 ›	Put down gland flange (Pos.15)
Step 4 ›	Put back and tighten gland nuts (Pos.17)
Step 5 ›	Tighten gland nuts (Pos.17) according to Table D.2.10

1.5.2 Bonnet gasket replacement

Only authorized persons should perform service and repair with appropriate tools and, if possible, use original spare parts. Personal protection should be applied in accordance with valid regulations and legalizations.

Requirements before disassembling:

➔ The plant or installation should be taken out of operation (pressure 0 bar, temperature of valves should be the same temperature as the environment).

➔ GAC must be opened.

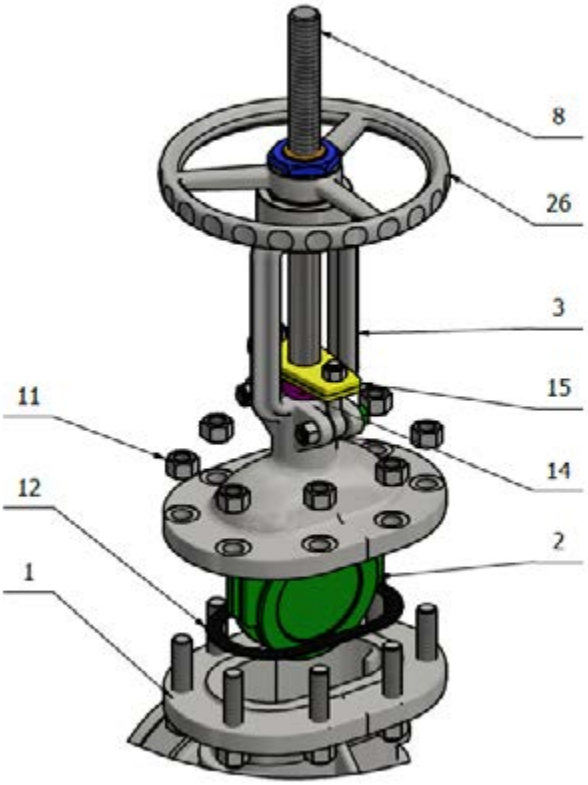

Figure D.2.31 – Bonnet gasket replacement

Disassembling

Step 1 › Unscrew nuts (Pos.11)

Step 2 › Lift upwards bonnet (Pos.3) together with following parts from the body (Pos.1)

- › Stem (Pos.8)
- › Handwheel (Pos.26)
- › Gland flange (Pos.15)
- › Packing gland (Pos.14)
- › Wedge (Pos.2)

Step 3 › Remove old bonnet gasket (Pos.12)

Step 4 › The chamber for bonnet gasket shall be cleaned.

Assembling

Step 1 › The chamber for bonnet gasket shall be filled with new bonnet gasket (Pos.12)

Step 2 › Put down bonnet (Pos.3) to the body (Pos.1)

Step 3 › Put back and screw nuts (Pos.11)

Step 4 › Tighten nuts (Pos.11) according to Table D.2.12

1.6 Possible Malfunctions & 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 D.2.13

Table D.2.13

Failure	Possible cause	Troubleshooting
Absence of flow	GAC is in closed position	Open the GAC completely with the handwheel (Pos.26)
	Protection covers are not removed	Remove protection covers from connection ends
	GAC is not completely open	Open the GAC completely with the handwheel (Pos.26)
Difficult manipulation	Dry stem /stem nut	Grease stem (Pos.8) or stem nut (Pos.9)
	Gland nuts are too tight	Slightly loosen gland nuts (Pos.17) with precaution to preserve sealing of the stem packing rings (Pos.13)
Leakage on stem packing	Gland nuts are not tightened	Tighten gland nuts (Pos.17)
	Stem packing rings are damaged	Completely open the gate valve, remove the worn stem packing and clean the chamber of the stem packing and install the new stem packing rings, the same or similar quality (Pos.13)
Leakage on bonnet gasket	Nuts are not tightened	Tighten nuts (Pos.11)
	Bonnet gasket is damaged	Disassemble the bonnet (Pos. 2) and replace the bonnet gasket (Pos.12) with new one
Leaking on seat	GAC is not completely closed	Turn the handwheel (Pos.26) in the direction indicated for closing without auxiliary means
	Mechanical damage of the seat or wedge	Grind the seats and, if necessary, have damaged components replaced. Check the actuator setting
	The working medium contains solid dirt particles	Clean the Valve thoroughly. We recommend the installation of a Strainer before the Gate Valve
The valve does not function	The electric actuator does not function	Check the electric actuator as specified in the manufacturer's documentation.
	The pneumatic actuator does not function	Check the pneumatic actuator as specified in the manufacturer's documentation.
Malfunction of the valve	Limit switch (for optional electric or pneumatic) is defective	Have the limit switch checked. Prior to readjustment consult with Termovent SC
	Torque switch (with optional electric or pneumatic) is defective	Have the torque switch checked. Prior to readjustment consult with Termovent SC

1.7 Guarantee

- Termovent SC guarantee that each of its products free from defects and work properly for a period of eighteen (18) months from the date of installation or twenty-four (24) months from the date of shipment from the manufacturer, whichever comes first.
- Manufacturer agrees to repair or replace any product which is non-conforming to the Warranty due to defective workmanship or defective material of which the Warranty non-conformance customer notifies the manufacturer in writing during the Warranty Period.
- Warranty does not apply to products that have defects or failures resulting from

  (a) accident, disaster, neglect, misuse, improper handling.

  (b) application of excessive torque to the operating mechanism, presence of foreign matter.

  (c) the products are not being installed or maintained as required by instructions

  (d) modifications or repairs without manufacturer approval.

  (e) natural tears and wear caused by material ageing.

1.8 Packaging

- Termovent SC products are packed in standard boxes to ensure safe transport by truck to their destination. The standard packaging includes boxes made of OSB-3 panels fixed on a heat-treated wooden pallet and further protected by outer nylon foil. It's important to note that standard crates are not stackable. However, upon request, the packaging can be customized to meet specific customer requirements, such as stackable or sea-worthy packaging.

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