

Instructions for the operation of

GÄBLER-piston slide valves in gaseous oxygen pipelines

1. General:

GÄBLER-piston slide valves are shut-off valves of a high standard that are produced with the most possible care and precision. In order to keep the safety and the reliability and in order to reduce the necessary maintenance to a minimum a few but important rules must be followed.

GÄBLER piston slide valves that are intended for the use in pipelines for oxygen are free of oil and grease and are marked correspondingly on the valve body. The valves have been tested for the behaviour in adiabatic pressure shocks at the German Federal Institute for the Testing and the Research of Materials (BAM) where they have been found suitable for the use in gaseous oxygen within an operating range of max. 100 bar pressure at max. 100°C – provided the strength of the valves acc. to their nom. pressure allows that high pressure. The European Industrial Gases Association recommends to use valves that have been found reliable acc. to adiabatic pressure shock tests for an operation range of 30 bar up. The minimum operation temperature for the ambient air as well as for the flowing medium is -20°C.

The metallic materials chosen for the pressure bearing parts in contact with gaseous oxygen are exempt materials according to the EIGA document for oxygen pipelines 13/02/E. They are excluded from the limitation of flow velocity up to a pressure of 210 bar.

Valves that are intended for the use in pipelines in the European Community and that are falling under the validity of the Pressure Equipment Directive PED 97/23 can only be installed into new pipelines if the valves are marked with the required markings such as nominal bore, nominal pressure, manufacture no., direction of flow etc. and if the conformity with the PED 97/23 is visibly confirmed by a **CE**-sign in combination with the number of the Notified Body.

Oils and greases have to be kept away from the valve during the operation of the valve as well as during maintenance. Further on in case of a leakage oxygen might get in contact with materials lying nearby leading to a sudden combustion. Therefore such materials should be kept in safe distance from the valve. No oils and greases should be stocked near oxygen pipelines and valves.

- 1) The GÄBLER-piston slide valve has to be installed in direction of flow according to the arrows on the valve body. This direction provides a comparatively low pressure drop. Further on the direction of the pressure difference over the closed valve is important for the tightness in the valve seat.
- 2) If a flow in both directions is intended, spring closing valves as well as handlever-operated valves may open by themselves, if the pressure on the outlet side of the valve is higher (the pressure difference depends on the nominal bore) than on the inlet side of the valve. If this might be the case (at pressure vessel shut-off valves or within circle pipelines where the medium can flow in both directions) the company H. GÄBLER ARMATUREN GMBH & Co. KG should be contacted. In these cases a closing cylinder is recommended for the valve to support the force of the closing spring in cases of an own medium operation or an operation with auxiliary medium instead of own medium might be the solution with an double acting actuator cylinder in order to grant tightness within the valve seat.

- 3) If automatically operated valves are actuated with oxygen as own medium operation, at each operation a small amount of oxygen is deaerated through the piloting solenoid valve. This amount of oxygen must be vented into safe areas. The minimum requirement is that this venting oxygen cannot hit combustible materials or persons working or walking next to the valve.
- 4) Especially the GÄBLER-piston slide valves that are shut or opened pneumatically should be arranged at a place where no direct rain, spray water or deep sea may flow into the valve leading to a corrosion of the compression spring specially for valves exceeding DN 100 where stainless steel can not be used due to tension reasons. A shelter is recommended which is including electrical equipment like solenoid valves or limit switches.
- 5) To increase the reliability of the valve and to avoid impingement it is necessary to use suitable dirt traps in the pipeline in order to keep away abrasive particles from the piston slide valve. The filter mesh size should not exceed 70 µm. As described very detailed in the EIGA doc. 13/02/E and as mentioned in point 2) oxidizable particles like rust, welding pearls etc. are one of the main reason for oxygen fires. Therefore despite the tightness and reliability of the valve it is important for the whole pipeline itself to remove the particles out of the pipeline.
- 6) To protect the GÄBLER-piston slide valve as well as the pipeline the valve should be opened and shut quickly but smoothly. The valves that are piloted pneumatically or hydraulically by own or auxiliary media should have a pressure regulator or a filter pressure reducer in order to adjust the pressure and the corresponding opening or closing speed. Manually operated valves with handwheels are closed by turning the handwheel clockwise, they are opened by turning it counterclockwise. If the piston is kept in a throttling position at a small degree of opening the flow velocity in the valve seat might be very high leading to a warming up of the seat sealing o-ring. This could – in the worst case in combination with combustible particles that are hitting the o-ring with high impact value – lead to a ignition of the O-Ring which in consequence would lead to a leakage in the valve seat.
- 7) To check the operating ability of the GÄBLER-piston slide valve the piston should be operated regularly, at least once a month. By moving the piston the smoothness of the sealings is improved thus extending the life of the sealing rings as well as the tightness of the valve towards the atmosphere and within the valve seat. Presupposed the medium is almost free of particles, if the valve is installed according to the H. GÄBLER Armaturen GmbH & Co. KG installation instructions and if the valve is operated regularly at least for checking purposes the period between acts of maintenance could be at least five years or one million operations.
- 8) After long periods of not operating the valves the seals might have settled down in the liners a bit and the valve needs a small increase in operation force. On the ground the FKM seal elements are quite elastic this process is reversible by moving the piston with operation pressure several times so that it can be secured that the valve shuts tight again.

- 9) It is only allowed to operate the automatically operated valves with the right power supply which is shown in the data sheet as well as it is marked on the solenoid and on the limit switches.
- 10) If the valve is auxiliary medium operated the GÄBLER piston slide valve itself must be equipped with an additional actuation cylinder to separate the flowing medium within the pipeline and the auxiliary medium in case of a leakage. The actuator cylinder is not allowed to be operated with oxygen, if this has not been ordered explicitly. In this case FKM sealings would be used instead of the standard NBR sealings for the actuator cylinder. Nonetheless the parts of the actuator cylinder are degreased.
- 11) The auxiliary medium pressure is limited to 10 barg. The auxiliary medium pressure should be disconnectable through an small piston valve, for example a GÄBLER GKS 200.
- 12) Automatically operated valves can not be operated while for an optional additional manual operation with handwheel the activator bolt is still locked or while for emergency operation via handlever the locking pin is still resting in its bore. If pressure is applied to operate the valve automatically with pneumatic force while the manual emergency operation is still activated the valve will get seriously damaged. Please look at the additional operation for the additional emergency operation.
- 13) If a valve that has been purchased and supplied by the manufacturer for a certain medium like oxygen and if it is intended for the use within another medium the manufacturer has to be contacted for assistance whether the materials are suitable, approved and allowed for the intended flowing medium.
- 14) The operation range of pressure and temperature as well as the nominal bore, the nominal pressure, the direction of flow, the sign of the manufacturer is marked on the valve body either as cast-on figures or as engraved data. The marking could be placed on the valve body itself and on the rim of the flanges.
- 15) Valves are only allowed to be operated within the range of pressure and temperature which is marked on the valve itself and which is named in the data sheet.
- 16) Maintenance and repair work must be carried out using original GÄBLER spare parts through the manufacturer himself or through authorized maintenance companies.
- 17) Especially for automatic valves with an emergency manual operation with hand lever it must be taken care that during the operation of the valve nobody is in the angular freedom of the hand lever or in the stroke of the position indication trolley in order to avoid becoming jammed or getting struck.

If the instructions mentioned above are followed the GÄBLER-piston slide valve has almost no considerable abrasive effects for the sealing elements and guarantees a long life of operation, which has been proved in a huge number of cases of use in plants all over the world.