# Installation, Operation and Maintenance Manual

OMB Valves S.p.A.

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<th>Rev.</th>
<th>Date</th>
<th>Prepared by</th>
<th>Verified by</th>
<th>Approved by</th>
<th>Description of the revision</th>
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ISO 9001:2008
Certified since July 1990

PED

Installation, Operation and Maintenance Manual for Gate, Globe, Bellows
and Check Valves

IOM rev.3.0
1 Description

This manual is a guide to all final users of OMB valves, in particular it suggests instructions for a correct installation, according to safety rules, and for a correct operation of the valve itself. The manual is a guide for maintenance.

EXPLANATORY NOTES

Throughout this manual safety signs have been included to communicate the following messages

- **DANGER**

  Major hazards which will result in severe personal injury or death.

- **WARNING**

  Hazards or unsafe practices which could result in severe personal injury or death.

- **CAUTION**

  Hazards or unsafe practices which could result in minor personal injury.

- **ATTENTION**

  Hazards or unsafe practices which could result in product or other damage.
2 Safety Notice

Correct installation, operation and maintenance are essential to the safe and reliable operation of all valves. The procedures described in this manual give effective methods of performing the required activities.

To minimize the risk of personal injury or the possibility of damaging the valve, or render it unsafe, it is important to carefully read this manual and follow the given instruction. It is also important to note that the "safety messages" are not exhaustive. Due to the broad application of OMB products, OMB cannot possibly evaluate all the risks connected to the installation, operation and maintenance of its products.

Should anyone decide to install, operate or maintain OMB products not in accordance with the procedures described in this manual, he must make sure that the procedure followed will not jeopardize neither personal safety, nor valve safety and that the personnel has the right instruction level to perform the required operations. Contact OMB at the number shown below if there is any question regarding tools or methods.

The installation, operation and maintenance of valves may involve proximity to fluids at extreme high pressure and high temperature. Consequently, every precaution should be taken to prevent injury to personnel during the performance of any procedure. Due to the various circumstances and conditions, OMB cannot possibly evaluate all conditions that might injure personnel or damage equipment. The safety precautions listed here below are for customer information only.

OMB disclaims any responsibility related to the incorrect installation, operation or maintenance procedures. It is responsibility of the purchaser or user of OMB valves to train all personnel who are to carry out such procedures. Prior to working with the valves, personnel should become familiar with this manual and should be made aware of the hazards related to the procedures.
3 Safety Precautions

I. OMB valves are shipped with the packing gland nuts tightened correctly. However ensure that the packing gland nuts are still tight before pressurizing a valve.

II. Do not attempt to remove the gland flange nuts while the valve is under pressure.

III. Do not attempt to remove the body-bonnet bolts while the valve is under pressure.

IV. All OMB valves supplied with a backseat option are capable of being repacked under pressure. However OMB strongly recommends, due to the inherent dangers involved in working on equipment under pressure, that backseat only be used to prevent the fluid from escaping through the packing chamber.

V. No alteration or modification should be made to any OMB valve, except when sanctioned and/or authorized by OMB.

VI. Extreme care should be taken to ensure that an OMB globe or check valve is installed with the arrow on the valve body pointing in the normal flow direction of the system.

VII. Never install, or attempt to use, any valve that is not properly identified with its material and pressure class.
4 Design Features & Nomenclature

GATE VALVES

The principal design features and parts of OMB Gate valves are illustrated below.

| 1 | Wheelnut |
| 2 | Nameplate |
| 3 | Handwheel |
| 4 | Yoke Nut |
| 5 | Gland Nut |
| 6 | Gland Flange |
| 7 | Gland Stud |
| 8 | Gland |
| 9 | Packing |
| 10 | Bolts |
| 12 | Stem |
| 13 | Bonnet |
| 14 | Gasket |
| 15 | Seat |
| 17 | Wedge |
| 18 | Body |
GLOBE AND CHECK VALVES

The principal design features and parts of OMB Globe and check valves are illustrated below.
INSTRUMENTATION VALVES (NEEDLE)

The principal design features and parts of OMB instrumentation valves are illustrated below.

![Diagram of Instrumentation Valves (Needle)](image-url)

- **1** Wheel Nut
- **3** Handwell
- **8** Gland
- **9** Packing
- **12** Stem
- **16** Integral Seat
- **18** Body
- **19** Needle
- **32** Nut
- **32A** Nut for Inside Screw
- **38** Ring
5 Handling

OMB valves require no special handling.

6 Storage

Indoor storage of valves is always recommended. To avoid damage due to humidity, valves should be stored in a humidity controlled storage area and the end caps should not be removed until immediately prior to valve installation. Long term storage of valves should be done according to OMB’s PP011 Procedure (available on request).

Special and more stringent procedures apply for handling and storage of the following valves:

A. SV001 Bellows Seal Valves
B. SV002 Hydrogen Service Valves
C. SV003 Oxygen Service Valves
D. SV004 Vacuum Service Valves
E. SV005 Valves with actuators
F. SV006 Chlorine Service Valves
G. SV007 Steam Service Valves

Copies of the above procedures are available on request.
7 Pre-Installation

Prior to installation the following steps should be taken:

1. Remove end caps only when ready for installation.
2. Inspect both ports for obstructions or foreign material. Clean if necessary.
3. If valves are shipped with gland flange nuts loose, tighten the nuts before putting the valves in service.
8 Installation

8.1 Position

Gate and globe valves are normally fitted with the stem in the vertical position in horizontal lines as fig. 2A shows. However, if there is restricted access, valves may be installed at any angle between the vertical and the horizontal (fig. 2B).

Swing check valves can be fitted in either vertical or horizontal lines, as can piston check or ball check valves, but ensure that the latter two types are spring loaded. If not then these two types must be fitted in horizontal lines only.

Gate and Globe valves should be fitted into lines in the fully closed position.

Fig. 2A horizontal line, vertical stems

Fig. 2B vertical line, horizontal stem
8.2 Direction

Check and Globe valves are supplied with an arrow stamped on the body which indicates flow direction. When fitting ensure inlet end is fitted against line pressure.

The direction arrow may be embossed or stamped on the valve body

Cryogenic gate valves are unidirectional due to the hole drilled on upstream side of gate. These valves are supplied with an arrow stamped on the body which indicates flow direction.

When fitting ensure inlet end is fitted against line pressure.
8.3 Marking valve body at job site

Place valve on wooden support
Identify where marking shall be placed on valve
Position the punching tool on the valve body surface

Hit the punch tool with the hammer

8.3.1 Safety Precautions

During the marking procedure please ensure that the following protective equipment is used:

1- Work booths with steel tip
2- Protective Glasses
8.4 Welding

Valves supplied by OMB are manufactured in forged carbon, alloy or stainless steel. The valves are manufactured with screwed ends, socket weld ends (S.W.E.), butt weld ends (B.W.E.) or flanged ends.

All steel types used have good welding properties. When welding S.W.E. or B.W.E valves into line care must be taken to ensure that the temperature in the seat zone does not exceed 350°C - 400°C even if the material is suitable for a higher service temperature.

The reason for this is that the heating and subsequent expansion is not uniform and may cause the valve to leak or damage the uniformity of the valve.

Do not use yoke, handwheel or stem for a weld earth.

The welding must be performed only by a qualified welder with all the necessary and correct equipment.

8.4.1 Welding Procedure

The work sequence is the following:

1. open the valve to the half open position.
2. carefully clean the area to be welded.
3. weld avoiding an increase in temperature in the seat zone as explained in the previous section 8.4.

In the case of actuated valves before welding please ensure that the actuator is not connected to the electrical or pneumatic line. The valve can be manually operated in accordance with the actuator instructions in order to reach the half open position as specified in point 1.

(Ref. Appendix A)
8.5 Threaded Valves

For threaded end valves it is important to ensure that the threads are clean and undamaged.

When fitting threaded end valves into the line, never hold either the handwheel or the yoke whilst screwing in and tightening, always hold the body. (Pos. A. Fig.1).

![Fig. 1](image-url)
9 Operating instructions

Incorrectly installed valves or valves installed which do not suit the service conditions will have a limited operational life.

Valves in constant use may eventually leak either through the packing or seating surface due to the normal wear.

OMB valves are manufactured to withstand a closing overtorque which allows a leaking valve to be closed with the aid of a wrench or lever in the event of an emergency (references values from MSS SP 91.).

Newly installed valves occasionally leak through the packing, especially if the temperature is a predominant factor. If this happens it will be necessary to either tighten the gland packing or if this does not stop the leak, add an extra ring of packing.

(The cause of this leaking is the settling of the packing).
10 Maintenance

Under normal conditions maintenance is limited to the complete replacement of the packing or of just a few packing rings, and gasket replacement during the life of the valve whenever the valve has been disassembled (please refer also to the following section).

However is sometimes necessary to repair or replace valve internals. The instructions below should be sufficient to cover most eventualities.

When ordering spare parts, please indicate the following information to ensure receiving the correct replacement parts:

A. Nominal Size
B. Type of valve
C. Pressure/Temperature Class
D. Fig. N. (see Valve Nameplate)

Specify parts required by:

A. Part Name
B. Part Number (if known)
C. Quantity
D. Material

(See table page 28)
10.1 Replacement of packing

This operation is carried out with valve in fully open position (stem in backseat configuration). The line does not need not to be closed down if valves are supplied with back seating facility but we do recommend closing a line containing dangerous fluids. Remove gland nuts and studs, lift packing gland flange and gland and remove packing using a screwdriver to lever it out. Packing rings are usually made from squared braided Graphite cut from a coil, at an angle of 45°, to the length required. No overlap or gap must be left between the ends. When more than one ring is required the joint must be staggered at 120° (See fig. 4)

When packing is inserted, reassemble the gland, gland flange, studs and nuts tighten the packing bolts and allow packing to settle. After sufficient time for the packing to settle check to ensure the stuffing box is completely filled and if not add additional packing rings.
10.2 Replacement of body bonnet gasket

When leakage occurs through the flanged Body/Bonnet joint it is usually due to the result of gasket wear or damage. The gasket should also be replaced every time the valve is disassembled for whatever reason.

The gasket may be replaced with valve in line but the line must be closed down. Be sure that before opening the valve no pressure is trapped inside. On gate and globe valves ensure valve is half open, remove body bonnet studs, remove valve bonnet with care ensuring disc/wedge is not damaged.

Remove the old gasket and clean the gasket contact surface, fit a new gasket, and replace the bonnet in the same position, with care ensuring correct seating onto the gasket. Studs must initially be hand tightened ensuring all the time that the body seats correctly onto the gasket. Finally cross-tightened the nuts using proper wrenches.

Caution - only for gate valves

The Wedge has to be reassembled in the same position as originally assembled: take care not to rotate it 180°. The valve could leak through the seats if wedge is rotated.

10.3 Refurbishing or replacement of seat rings on globe valves, piston or ball check valves and instrumentation valves

Valves need not be removed from the line, however the line must be shut off.

A. If seats are not severely damaged.

A.I Globe valves. Be sure that before opening the valve no pressure is trapped inside. Remove body/bonnet bolts, bonnet, and handwheel and screw stem down out of bonnet. Add emery paste to the seat, for lapping. Using the valve disc/plug lap the seat. Where the disc or plug is the loose type, secure to stem with ordinary insulation tape, which is strong enough to hold in place for the grinding required. Once seat has been sufficiently lapped, remove the paste, reassemble the valve and test.

A.II Instrumentation Valves. Be sure that before opening the valve no pressure is trapped inside. Remove wheel nut, handwell, nut for inside screw, gland, packing, ring and stem. Add
Installation, Operation and Maintenance Manual for Gate, Globe, Bellows and Check Valves

IOM rev.3.0

Emery paste, for lapping, to seats and using the valve disc/plug lap the seat. Where the disc or plug is the loose type, secure to stem with ordinary insulation tape, which is strong enough to hold in place for the lapping required. Once seat has been sufficiently lapped down, remove the lapping paste reassemble the valve and test.

A.III Check Valves. Be sure before opening the valve that no pressure is trapped inside. Remove bonnet and follow the procedure described above using piston or ball in the lapping operation.

B If seats are severely damaged

The seat may be removed rotating clockwise by using an allen spanner , and replaced. When seats are replaced the disc, plug or ball must also be replaced.

10.4 Integral stellited body seats of globe valves, instrumentation valves and check valves

For slightly damaged seats the lapping operation described above may be carried out to repair the seats. For badly damaged seats the valve must be removed from the line and replaced.
10.5 Gate valve seat rings

Seat rings are pressed in with tolerances so tight that the seats are as good as integral. Replacement is possible but the valve must be completely disassembled and the body held in a vice. The seat rings must be removed using a hammer and punch. Inserting new seat rings requires use of taper or the wedge itself, brought to the closed position forcing by pressing after checking correct positioning against seats. Press to ensure a tight fit with a force approx 10/15.000 Kg (follow table below).

Only in extreme circumstances would OMB recommend this operation. OMB would normally recommend replacement of complete valve in the event of damage to the seats.

<table>
<thead>
<tr>
<th>Ø Diameter (inch.)</th>
<th>Pressure to press in the seats (Bar)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>F6</td>
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<tr>
<td>1/4”</td>
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<tr>
<td>3/8”</td>
<td>40</td>
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<td>1/2”</td>
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<td>3/4”</td>
<td>70</td>
</tr>
<tr>
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<td>120</td>
</tr>
<tr>
<td>1 1/4”</td>
<td>130</td>
</tr>
<tr>
<td>1 1/2”</td>
<td>160</td>
</tr>
<tr>
<td>2”</td>
<td>220</td>
</tr>
</tbody>
</table>

(Table from OMB assembly instruction)

½” valve assembly before pressing in

valve assembly after pressing in
10.6 Swing Check Valves

As with gate valves the seat ring is pressed in. Only in extreme circumstances would OMB recommend this operation. OMB would normally recommend replacement of complete valve, in the event of damage to the seats.
10.7 Special tools

Non required – normal tools can be used for maintenance.
11 Lubrication

The valves are supplied with the stem threads engaging the yoke nut greased with BLASOLUBE 301 (see the SMDS on OMB web-site www.ombvalves.com) or equivalent grade. These components should be kept constantly lubricated by applying the grease directly on the stem when the valve is in the open position or through the grease injector in the yoke nut when provided.
12 Utilities

CHECK VALVE SECTION

Check valves are unidirectional valves which automatically open with forward flow and close against reverse flow. They are supplied to meet a wide variety of application with the closing element being in the piston, ball or swing type disc. Piston check valves are normally supplied by OMB with a spring which allows both the vertical and horizontal installation.

GLOBE VALVE SECTION

Globe valves may be used as shut-down valves or throttling valves in which the closure member is moved squarely on and off the seat. The opening of the port is directly proportional to the travel of the disc. This proportional relationship is ideally suited for duties requiring flow regulation, the disc being available as parabolic, needle or V-port. The short travel of the disc makes them suitable for frequently operated valves. Globe valves are unidirectional valves and should be installed so that fluid pressure is under the disc. They are supplied in various models to cover different services.

INSTRUMENTATION VALVE SECTION

Instrumentation valves are shut-down valves or throttling valves in which the closure member is moved squarely on and of the seat. In this way the opening of the port is directly proportional to the travel of the needle. They are globe valves where the angle of the disc and seat enables a greater degree of control of the throttling. These valves are unidirectional valves and are installed so that fluid pressure is under the disc. They are supplied in various models to cover different services.
GATE VALVE SECTION

Gate valves are bi-directional valves ideally suited for on-off duties. These valves have a very low resistance to flow and are suitable for use with fluids at high pressures due to the fact that the upstream pressure helps the sealing between gate and seat. OMB takes great care in the finishing of seating surfaces in order to guarantee their working life with a minimum seat wear under high pressures. Gate valves are supplied in various models to cover different services.
13 Disassembly

This operation shall be carried out only by personnel suitably qualified and experienced in an electrical or mechanical field. Before starting with disassembly ensure that enough space is available to operate freely and proceed as follows:

- disconnect the actuator (if any) from any electrical/pneumatic/hydraulic lines to avoid accidental operation of the actuator;
- follow the instructions indicated in Chapter IX for valve disassembling;
- for any actuator disassembly please follow the actuator manufacturers instructions and if there are any doubts request technical assistance;
- segregate different components in accordance with their materials of construction (metal, graphite, plastic, electrical, etc.) if they are to be disposed of and follow the Country Laws and Regulations existing.

OMB valve components are in non dangerous materials and no particular care needs to be used during valve disassembly. The bodies, bonnets, wedges gland flanges and handwheels are in forged steel materials, and the remaining components such as stems, seats, glands and boltings are manufactured from steel bars. Gaskets and packings are composed of graphite or PTFE materials.

Standard gaskets used in bolted bonnet valves are of the spiral wound type in stainless steel 316 and pure graphite.

Standard packing is composed of a series of rings of pure graphite. The sets can be supplied with two anti-extrusion rings, top and bottom, manufactured in braided graphite. Both internal and external rings are treated with a passive corrosion inhibitor.
14 Standard Valves Spare Parts

Suggested spares for OMB valves are packing and gaskets: We provide below a list, inclusive of the bonnet capscrew specification, which can be used to source spare parts for the most common valves.

All other valves’ spares can be requested directly at OMB or at any of the OMB approved distributors worldwide.

<table>
<thead>
<tr>
<th>Descr</th>
<th>Class</th>
<th>Base Figure No</th>
<th>NPS</th>
<th>Packing Code</th>
<th>Gasket Code</th>
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<td>150-800#</td>
<td>810</td>
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<td>40x30</td>
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<td>0.75”</td>
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# 15 Torque Values for Bonnet Bolting

## Standard ISO

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## Standard UNC

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APPENDIX A

Procedure for field PWHT API602 forged Valves
Scope

The following procedure outlines the requirements for dismantling, PWHT and reassembling of valves when required due to fabrication on site. This applies to OMB valves DN50/2" and smaller.

Pre-Identification

All DN50/2" and smaller, weld end valves shall be dismantled prior to PWHT. Each valve shall be numbered uniquely. Required bonnet gaskets shall be ordered prior to this activity.

Marking

Each valve shall be etched with the identification number on the rim of both the body flange and the bonnet flange. An additional mark shall be etched on each flange rim for purposes during reassembly.

Dismantling

Follow the procedures in Chapter 13 ensuring that all component parts are cleaned and protected and are uniquely identified to help in reassembly.
Post Weld Heat Treatment (PHWT)

PWHT shall be conducted in accordance with Project Specifications, site requirements and the welding approved WPS. Please refer to Chapter 8 for temperature restrictions in the area of the valve seats.

Reassembly

After checking the valve identification and the identification of each of the marked components, all components must be checked for cleanliness.

When satisfied replace the components in the reverse order as shown in Chapter 10 ensuring that during assembly all components are kept clean and free from damage. Follow all identification marks to ensure that on gate valves the gates are installed in their original positions. Install new gaskets on all valves. Torque up body to bonnet bolts as shown in the OMB tables.
Installation, Operation and Maintenance Manual for Gate, Globe, Bellows and Check Valves
APPENDIX B

Procedure for Bellows Seal Valves

ISO 9001          API  6-D  Spec Q1
6-D-0286
Design Features & Nomenclature

BELLOW SEAL VALVES

The principal design features and parts of OMB Bellows Seal Valves are illustrated below.
Installation, Operation and Maintenance Manual for Gate, Globe, Bellows and Check Valves

Maintenance

- **Bellows Seal Valves up to 2”**

B.S. Gate and Globe Valves: Welded Bonnet Type

Maintenance is not possible: the complete valve has to be changed

B.S. Gate and Globe Valves: Bolted Bonnet Type

Remove the bolts between Bonnet and Extension.
Remove the Bonnet from the top taking care not damaging the bellows seal assembly.
Replace the complete assembly unit (Bonnet with welded-on bellows).
For a valve with replaceable seat remove the seat and fit new.
For a valve with an integral seat lap to remove damage or wear as in section 10.3
Remove the body gasket and replace.
Replace the Bonnet and Bellows Assembly
Replace the Body to Bonnet Bolts, tightening to the required torques

Caution - only for gate valves

The Wedge has to be reassembled in the same position as originally assembled: take care not to rotate it 180°. The valve could leak through the seats if wedge is rotated.

It is mandatory to indicate in the request for spare kits the project name and all the information printed on the valve nameplate.
Installation, Operation and Maintenance Manual for Gate, Globe, Bellows and Check Valves
APPENDIX C

Procedure for Eco-L-Valves

ISO 9001
API 6-D Spec Q1
6-D-0286

Forged Steel Valves
Design Features & Nomenclature

ECO-L-VALVES

The principal design features and parts of OMB Eco-L-Valves are illustrated below.
Maintenance

- **Eco-L-Valves up to 2”**

  **Welded Bonnet Type**
  
  Maintenance is not possible: the complete valve has to be changed.

  **Bolted Bonnet Type**
  
  Remove the bolts between Bonnet and Body.
  Remove the Bonnet and unscrew the Bellows Assembly from the stem.
  Replace the Bellows assembly unit.
  Lap the seat to remove damage or wear as in section 10.3.
  Remove the body gasket and replace.
  Replace the Bonnet and Bellows Assembly
  Replace the Body to Bonnet Bolts, tightening to the required torques

  **Caution**

  When assembling the bellows to the stem, screw completely tight.
  and then unscrew 1/4 of a turn so the disc remains loose enough to seat properly.

  It is mandatory to indicate in the request for spare kits the project name and all the information printed on the valve nameplate.
Installation, Operation and Maintenance Manual for Gate, Globe, Bellows and Check Valves

IOM rev.3.0
Installation, Operation and Maintenance Manual for Gate, Globe, Bellows and Check Valves

APPENDIX D

Procedure for Actuated VALVES

ISO 9001          API  6-D  Spec Q1
6-D-0286
Handling

Actuated valves require special handling – see figures below.
Position

In the case of actuated valves sufficient support for the actuator must be provided by the user/contractor to avoid damage to or the misfunctioning of the valve-actuator system.

The connection provided by OMB between the valve and the actuator is for the actuator to valve drive system only. It is not guaranteed to support the actuator total weight off the valve. Additional support for the actuator is necessary.

Assembling sequence in the line must be as follows:

1. Support the actuator
2. Install the valve in the line
3. Connect the actuator to the operating medium supply line

Actuator setting instructions

Take special care in the setting of the torque and end-run micro switches and to the various cabling according to actuator’s manufacturer’s instructions.

Wrong settings may cause serious damage to the valve or to the actuator.

Refer to the actuator instruction for explanations of the setting procedures.

Maintenance

In the case of actuated valves, before carrying out any valve maintenance the actuator should be isolated from any hydraulic, pneumatic or electrical input source and the actuator disassembled from the valve.