







INSTRUCTION MANUAL

# STEEL BALL VALVES

**OMAL S.p.A.**

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 **Environmentally friendly:** under the green leaf icon you can find the instructions for a correct and environmentally friendly handling of the product.

All data and features in this manual may be changed at any time and with no notice for the implementation of technical improvements. Therefore they can not be considered as binding for the delivery.

## 1. FOREWORD

The present User's Installation and Maintenance Manual has been edited in conformity with:

-2014/68/EU Directive "Pressure equipment" PED

-2006/42/EC Directive "Machinery"

-2014/34/EU Directive "Equipment and protection systems designated to be used in potentially explosive atmospheres" (ATEX)

The following standards/technical specifications also apply:

- IEC 61508:2010-1/7 Functional safety of electrical/electronic/programmable electronic safety-related systems. Part 1:7

-UNI CEN/TS 764-6:2005 Pressure equipment Part 6: Operating instructions structure and contents.

It's up to the reader to find his own product, and the correct operating conditions, possibly referring to the attached drawings.

Below you will find the safety instructions, the minimum information for storage / warehousing, the installation, the commissioning, the maintenance and the instructions for disposal of products at the end of their life cycle.

OMAL valves are CE marked in accordance with the Directives 2014/68/EU (PED) and/or 2014/34/UE (ATEX).

The company disclaims any liability for damage caused by improper use, even if partial, in respect to the information contained in this manual.

## 2. OPERATION CONDITIONS

Every type of valve is described in an accurate way through one or more dedicated drawings.

The type of valve, the maximum permitted operating conditions, as well as other important information, are shown in a label or are engraved directly on the valve itself; the appropriate certification (PED, ATEX, API, etc.) is also indicated.

The category identification and compliance assessment have been done in conformity with Annex II, table 6 of the PED Directive; this way the most restrictive conditions have also been considered.

## 3. RISK ASSESSMENT

### Limits of use

OMAL valves are suitable for both indoor and outdoor uses. The technical features of the valves, such as type, size, maximum operating pressure, maximum and minimum operating temperature, flange connection, serial number, are all indicated on the body and/or on the label. Do not use the valves beyond the operating conditions (both the environmental and the performance ones) or beyond the features stated by manufacturer.

The external surface of the valves in carbon steel is not provided with a protective coating but with simple burnishing treatment. It is the end user's responsibility to protect the external surface of the valve against corrosion using a coating that is suitable for the installation environment.

Stainless steel valves can be used in corrosive atmospheres or low temperature conditions. In case of special installations (ex. Off shore applications), it is up to the end user to protect the outer surface of the valve from corrosion with a suitable coating. The valves with ATEX configuration, can be installed in areas with potentially explosive atmospheres (EX II 2 GD c TX X). It is recommended to protect the valve from overpressure generated by the use of volatile gases or from possible pressure increase due to overheating (ex. fire) with appropriate devices. The valves are designed for an on / off type of use and are not safety ones. They must also not be used in an underwater environment and with an external pressure greater than the atmospheric one. Always follow the operating conditions printed on the label or engraved on the valve itself: do not, in any case, exceed such limits as exceeding even one of these limits could lead to dangerous situations and impair the functionality of the valve.

Following conditions are the main hazardous ones that have not been eliminated

- Weather Elements (wind, snow, ice, etc.);
- Vibrations (resulting from the plant or from the fluid passage);
- Water hammer (in case of rapid closure of the valve);
- Corrosion (aggressive atmosphere or not suitably protected valve);
- Stray current;
- Shock waves;
- Uncontrolled chemical reactions.

## 4. TRANSPORTATION AND STORAGE/WEARHOUSING

### Transportation

OMAL valves are properly packaged for an adequate protection during handling and dispatch.

Since it cannot be excluded that the product could accidentally get damaged during transportation, it is recommended to carefully check the same upon receipt, before putting it in stock. Verify, therefore, that the packaging, upon reception, is intact, free of damage due to bumps or falls that may have occurred during transportation. Also check that the product that has been received corresponds exactly to what had been requested. The handling of packages on pallets wrapped in shrink wrap barrier, does not require special care; if the package is damaged check if the product has been also damaged, or if there's anything missing. All handling operations must be carried out with suitable means and by qualified personnel.

### Storage

Choose clean sites for storage, not excessively humid and with temperatures between -10 and +60°C. If the products are to be stored for long

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periods of time, it is best not to remove them from their protective packaging. Keep the valves in the package during storage. If the valves are not packaged, then they must be protected by applying plastic caps to the ends, which are usually supplied with the product, in order to avoid liquid or other to penetrate during storage and thus damage the ball or the seals. Should it appear appropriate to apply products for the preservation and protection of the valve, make sure it is dry also on the inside.

If the valves are to be stored for long periods of time, then they should be inspected periodically: check in particular the possible presence of rust, oxidation, paint nicks or even partial unscrewing of the closures. It is also recommended to perform a complete dry cycle of opening and closing of the valve. The polymer seals are subject to aging and lose of their characteristics: for this reason, after storage periods of more than two years, it is recommended to check the functionality and the seals before mounting the valve in the line.

In the case of flanged valves stored outside, the machined surfaces must be protected with anti-rust varnish and closed with waterproof wood seals, complete with gaskets.

## 5. INSTALLATION INSTRUCTIONS

The design of the valve takes into account the loads arising from the line (axial forces, bending moments, etc.), as required by the reference standards.

Check the condition before assembling the valve on the line, making sure that all the parts are intact. Check also the correct operating conditions written on the label or engraved on the valve. Replace any caps on the ends to preserve the valve interior during the handling. If the valve is supplied with a bare stem, carefully follow the installation instructions provided together with the actuator and possible reducer. Such operations must be carried out by an experienced and qualified staff.

The use of an actuator allows to open and close the valve connected to it, without manual operations by means of levers or hand-wheels, but through an electro-pneumatic remote command. The normal sizing of the actuators requires to consider an appropriate safety margin in order to guarantee the valve maneuvering. The plant design, physical or chemical features of the fluids, special environmental conditions, may require an increase of the safety factor to be applied to the sizing. Prior to installation verify that the valve and the actuator comply with the above described safety standards. Furthermore, utmost cleanliness is required when connecting the air supply to the actuator. All parts of the plant, reductions, joints, plates, brackets and equipment must be thoroughly cleaned. Before mounting the actuator on the valve be sure that both elements are correctly oriented, depending on the rotation direction needed. Always read the specific instructions carefully before operating the actuator, in order to avoid damage to the valve, the plant and the actuator itself.

### Handling

The valves must be handled by experts and with adequate protection devices. The actuated valves must not be handled through the actuator. For valves weighing less than 25 kg, handling can also be done through manual means. For valves with total weight above 25 kg, the unit must be handled with suitable means (such as slots, eyebolts, etc.). If there aren't any holes or eyebolts you can use the ends, appropriately harnessed, to move the valve. Be careful not to damage the machined surfaces with chains or hooks. Always use approved lifting equipment (hooks, straps, etc.) to bear the weight of the valve and actuator together; this weight is indicated in the shipping documents. In any case avoid handling suspended loads above people, or in places where a possible fall can cause damage.

### Assembly

To prevent damage and protect the valve interior, remove the caps only upon installation. Verify that the inside of the pipe is clean and free of any object or particles that can damage the ball or other parts of the valve. If not otherwise indicated, the valves are bi-directional and can be mounted on either side. In the event that the valve is unidirectional, an arrow will clearly show the flow direction. In this case, make sure that the flow direction coincides with the direction of the arrow.

### Flanged valves

It is totally the installer's responsibility to couple the valve in the line. Place the valve with the ball fully open or fully closed, in order to avoid damage to the sealing surface of the seats and of the ball itself. Verify that the surfaces of the flanges of the valve and the piping are parallel and properly coupled with the seals.

Should the exterior painting get damaged during assembly, it is necessary to restore the integrity of the coating.

Take special care during assembly, not to let foreign objects of any type or size inside the line, for this could jeopardize the correct and safe operation of the valve and the system itself.

### Valve with threaded ends

Set up proper supports for the pipes in order to avoid that the valves are loaded with weights heavier than the values reported on the following table, even by accident.

Valves with threaded ends DN	15	20	25	32	40	50	65	80	100
Maximum torque applicable (Nm)	50	85	125	160	200	250	325	400	500
Maximum bending moment (Nm)	70	90	160	260	350	520	630	780	950

### Valves with welded ends

Responsibility for the connection between the valve and the line through permanent joint is up to the person installing the valve. During welding, hold the valve in the open position to prevent damage due to thermal expansion, especially the bonding of seats.

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### Commissioning

The following operations are required before start-up:

- Inspection and testing of the valve and the line;
- Flushing
- Hydraulic test of the line.

### Inspection and testing of the valve and the line

Once the valve is connected in the line, before proceeding to the pressurization of the same, it is necessary to:

- Check the presence of (any) caps, nipples, drain valves and their correct tightening;
- Check the tightness of bolts and/or screws between the body/flange and body and lids;
- Read the instructions and any restrictions regarding the use of the actuator (if any).

### Flushing

The flushing phase is very delicate: if not done properly it may affect the functionality of the valve itself. The cavities of the valve, in fact, can accommodate foreign objects and thus influence its proper functioning. In case fluids carrying abrasive materials are being used, these can be very dangerous, because they can damage the soft seals and the sealing surfaces. The valves with soft seal seats, in fact, are designed to intercept clean fluids, free of solid and abrasive particles. It can be done after completing the installation, cleaning the system with inert gases, vapors or liquids (always checking the compatibility of the fluid that is being used, with the valve), to remove any residue, grease or oil, or foreign objects.

Always use fluids that are compatible with the material of the valve and of the seals; especially if the following materials are being used, consider as follows:

- Amine based corrosion inhibitors may damage the O-ring which is fluorocarbon based;
- The use of methanol may damage some types of O-rings;
- Water, especially without inhibitors, may cause the corrosion of carbon steel parts;
- Fluids containing fluorine and its derivatives can trigger the corrosion of stainless steel parts.

### Hydraulic line test

The hydraulic test of the line should be carried out at a pressure that does not exceed 1.5 times the rating pressure of the valve, indicated on the nameplate or engraved on the body of the valve itself. The test shall be performed with the ball in a half open position so to avoid damaging the seats. If the test is performed on valves that are sealed with polymeric material, keep the ball in a semi open position, during the testing time only and no longer than a few hours. Should it be necessary to test the valve in the closed position, the maximum pressure should not exceed 1.1 times the rating pressure. Once the test is over, depressurize the line and, if possible, vent and discharge the valve.

Once the previous operations have been carried out, the valve is ready to be used; if the valve is manually operated (by lever, wheel or reducer), make at least one complete opening and closing maneuver, so to verify its proper functioning. If the valve is actuated, read the instructions carefully, check the pneumatic or electric diagrams and then proceed with a complete opening and closing cycle, so to verify its proper functioning. In order to avoid a functional failure of the valves it is recommended to perform a partial maneuver at least once a year.

### Shutdown

If problems occur on the valve, if possible, close the valves upstream and downstream and shut the pressure to the line. Then perform a complete inspection of the valve so to identify the fault. After a system shutdown, before maneuvering the valve, empty it out (if possible) and drain it as well.

### Valve removal

Before the valve can be removed from the line, it is necessary to:

- always make sure that the pipeline is not pressurized;
- actuate the valve by performing an opening/closing cycle so to eliminate any residual pressure trapped inside the body. Never and in any case use vent plugs or drains to drain out the pressure from the valve body;
- perform accurate flushing cycles with inert fluids or specific corrosion inhibitors, if the valve intercepts substances that are dangerous, corrosive, explosive etc.. and ensure safety measures;
- use suitable personal protective equipment PPE before opening the valve-pipe connections.

After removing the valve from the line, thoroughly clean it and protect the ends by covering them with caps.

### Inspection

The operating conditions can be very different, therefore it is up to the user to establish an adequate inspection interval that is based on the system, the intercepted fluid, operating conditions, etc.

### Sealing in case of emergency

Some valves are equipped with injectors in correspondence with the stem and the seals in order to seal the valve if needed (usually to stop a leak).

Before proceeding with the sealing operation, make sure the sealer is compatible with the materials of the valve and the intercepted fluid, so

to avoid dangerous chemical reactions that could cause harm to people, the environment and to the system.

The flushing fluids and sealers can be pumped in by a manual or pneumatic pump, checking that the nominal pressure of the pump and accessories is higher than the rating pressure of the valve.

## 6. MAINTENANCE

The efficiency of the product is the result of a good and careful maintenance; check the system efficiency status at least once a year, providing immediate replacement of worn parts, in case leaks are found, both in the ducts and on the outside of the valves.

Normally, for medium duty applications, the replacement time of parts subject to wear for the various types of valves is summarized in the table below. Maintenance operations must be performed by qualified personnel.

		DN 15-25	DN 32-50	DN 65-80	DN 100-200
N° cycles PN ≤ 100		30000	25000	20000	15000
N° cycles PN > 100		20000	20000	8000	5000
	<b>DN 6-10</b>	<b>DN 15-32</b>	<b>DN 40-50</b>		
N° cycles PN ≥ 320	20000	20000	15000		

## 7. DISPOSAL OF PRODUCTS AT THE END OF THEIR LIFE CYCLE

Once that the valve has reached the end of its operating life, it can be removed from the system by following the procedures that are suitable to the type of valve and to the operating conditions. If the valve intercepts toxic, corrosive and/or hazardous substances, it must first be cleared by an appropriate flushing cycle and the waste is to be disposed of according to the applicable regulations. Once removed from the system, protect the ends and all the possible openings (valve drains, nipples, etc.) through an appropriate sealing system, in order to prevent the dispersion and the contact by any pollutants or hazardous materials, left inside the valve. In case a fluid leakage from inside the valve occurs, it is required to act promptly, decontaminate and secure the contaminated environment, as required by the relevant laws and regulations.

The personnel in charge of the product disposal/recovery, must be qualified and equipped with appropriate personal protective equipment (PPE), according to the type of fluid intercepted (polluting, corrosive, etc.). Once disassembled and secured, bring the valve to a site that is designated as the storage site and that complies with the requirements of the European national, regional and municipal environmental and safety standards.

The management of waste generated during the installation, extraordinary maintenance or due to the product disposal, is governed by the rules in force in the country where the product is installed; in any case, the following are the general guidelines:

- The metal components (aluminum/steel) can be restored as raw material;
- Seals/sealing elements (PTFE, PEEK, NBR, EPDM, FKM ...), as contaminated by fluids from other materials and lubrication, must be disposed of;
- The packaging materials that come with the product, should be transferred to the differentiated collection system available in the country.

## 8. SPARE PARTS

Use only original spare parts, for maintenance; always mention, when ordering the spare parts, the part number and date of manufacture stamped on the valve, to be sure to receive spare parts that are compatible with the product in the most recent version possible.

For detailed information on the mounting and dismounting, refer to the specific instructions for each type of valve.

**9. TROUBLESHOOTING**

You can find main failures with possible causes and possible solutions listed here below:

POTENTIAL EFFECT OF FAILURE	POTENTIAL CAUSE OF FAILURE	SOLUTION
Valve leakage on the line	Ball incomplete closure	Check the manoeuvring system
	Worn seats/ ball	Replace worn parts and carry on maintenance as per manual / instructions provided
	Chemical incompatibility with valve building materials or incorrect use (operating conditions exceed the ones established for the project)	Contact OMAL
Leakage on the outside	Damage on the stem seat	Replace worn parts and carry on maintenance as per manual / instructions provided
	Damage on static seats (body seal / terminal-ring & body / lids, if present)	
	Chemical incompatibility with valve building materials or incorrect use (operating conditions exceed the ones established for the project)	Contact OMAL
Blocked valve	Driving system fault	Contact OMAL
	Possible ball / stem gripping	
	Accumulation of solid particulate in the cavities of the body	Replace worn parts and carry on maintenance as per manual / instructions provided
	Stem break	Contact OMAL
	Actuator- valve connection's break	
Increase in maneuvering time / shooting motion	Possible ball / stem gripping	Contact OMAL
	Possible partial actuator gripping	
Insufficient rotation angle	Actuator cannot perform the maneuver	Check actuator dimensioning and verify that actuator fluid pressure is equal to or greater than nominal pressure on plate
	Insufficient air supply to produce the required torque	
	Mechanical stop (if present) not properly adjusted	Adjust the stroke limiters
	Possible ball / stem gripping	Contact OMAL
	Incorrect fixing between actuator outlet hole and valve stem	Check for proper connecting kit between valve and actuator

**10. STATEMENT OF CONFORMITY**

OMAL ball valves have been designed, manufactured and tested to meet the requirements of the following European standards and are marked, where provided, with the relative CE conformity marking:

2014/68/EU Directive "Pressure equipment" PED

2006/42/EC Directive "Machinery"

2014/34/EU Directive "Equipment and protective systems intended for use in potentially explosive atmospheres" (ATEX)

Regulation (EC) No 1907/2006 and successive Concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)