TOP ENTRY BALL VALVE
Series T2
Installation, Maintenance and Operating Instructions
READ THESE INSTRUCTIONS FIRST!
These instructions provide information about safe handling and operation of the valve.
If you require additional assistance, please contact the manufacturer or manufacturer’s representative.
Addresses and phone numbers are printed on the back cover.
SAVE THESE INSTRUCTIONS!

Subject to change without notice.
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1 GENERAL

1.1 Scope of the manual
This manual provides the essential information on the T2 series ball valves. For further information on actuators and other instruments, which are covered only briefly, please refer to separate manuals on their installation, use and maintenance.

NOTE:
As the use of the valve is application-specific, a number of factors should be taken into account when selecting the application. Therefore, some of the situations in which the valves are used are outside the scope of this manual. If you have any questions concerning the use or application of the valve, contact Metso’s Automation business for more information.

1.2 Valve description
The T2 series ball valve has flanges or welding ends, Top entry body construction, one-piece body and one-piece ball and stem (stem ball) supported by the bearings.

The T2 valve series is intended for either control or shut-off applications.

Fig. 1 Construction of T2 series valve

1.3 Valve markings
Body markings are cast or stamped on the body.
The identification plate (Fig. 2) is on the valve flange or in the valve body.
Identification plates have the following markings:
1. Body material
2. Shaft material
3. Trim material
4. Seat material
5. Maximum and minimum operating temperatures
6. Maximum shut-off pressure differential/temperature
7. Pressure class
8. Type code
9. Serial manufacturing number
10. Valve ID code

Fig. 2 Identification plate

1.4 Technical specifications
Face-to-face length: ASME B.16.10
Body rating: ASME Class 900, 1500
Max pressure differential: see Fig. 3
Temperature range for body: see Figs. 3 and 4
Flow direction: dependable on ball seat configuration

Leakage rates:
Soft seated ISO 5208, leakage rate B
Dimensions: see Section 11
Weight: see Section 11

Fig. 3 Pressure/temperature curves of valve body, CF8M

Fig. 4 Pressure/temperature curves of valve body, WCB
1.5 Valve certifications

A tightness certificate and an EN/DIN 50049 3.1 B certificate for the valve body and bonnet can be supplied on request.

1.6 CE marking

The valve meets the requirements of the European Directive 97/23/EC relating to pressure equipment, and has been marked according to the Directive.

1.7 Recycling and disposal

Most valve parts can be recycled if sorted according to material. Most parts have material marking. A material list is supplied with the valve. In addition, separate recycling and disposal instructions are available from the manufacturer. A valve can also be returned to the manufacturer for recycling and disposal against a fee.

1.8 Safety precautions

**CAUTION:**
Do not exceed the valve performance limitations!
Exceeding the limitations marked on the valve may cause damage and lead to uncontrolled pressure release. Damage or personal injury may result.

**CAUTION:**
Do not dismantle the valve or remove it from the pipeline while the valve is pressurized!
Dismantling or removing a pressurized valve will result in uncontrolled pressure release. Always isolate the relevant part of the pipeline, release the pressure from the valve and remove the medium before dismantling the valve. Be aware of the type of medium involved. Protect people and the environment from any harmful or poisonous substances. Make sure that no medium can enter the pipeline during valve maintenance. Failure to do this may result in damage or personal injury.

**CAUTION:**
Beware of the ball cutting movement!
Keep hands, other parts of the body, tools and other objects out of the open flow port. Leave no foreign objects inside the pipeline. When the valve is actuated, the ball functions as a cutting device. Close and detach the actuator pressure supply pipeline for valve maintenance. Failure to do this may result in damage or personal injury.

**CAUTION:**
Beware of noise emission!
The valve may produce noise in the pipeline. The noise level depends on the application. It can be measured or calculated using the Metso Nelprof computer program. Observe the relevant work environment regulations on noise emission.

2 TRANSPORTATION, RECEPTION AND STORAGE

Check the valve and the accompanying device for any damage that may have occurred during transport. Store the valve carefully. We recommend storing indoors in a dry place.

Do not remove the flow port protectors until installing the valve. Move the valve to its intended location just before installation. The valve is usually delivered in the open position.

**CAUTION:**
Beware of extreme temperatures!
The valve body may be very hot or very cold during use. Protect people against cold injuries or burns.

**CAUTION:**
When handling the valve or the valve package, bear in mind its weight!
Never lift the valve or valve package by the actuator, positioner, limit switch or their piping. Place the lifting belts securely around the valve body (see Fig. 5). Damage or personal injury may result from falling parts. The weights are shown in Section 11.

**CAUTION:**
Follow the proper procedures when handling and servicing oxygen valves.

![Fig. 5 Lifting the valve](image-url)
3 INSTALLATION AND USE

3.1 General
Remove the flow bore protectors and check that the valve is clean inside. Clean the valve if necessary.

3.2 Installing in the pipeline

CAUTION:
When handling the valve or the valve package as a whole, bear in mind the weight of the valve or the entire package!

NOTE:
Use screws, nuts, bolts and gaskets equivalent to the fastenings used elsewhere in the pipeline. Center the flange gaskets carefully when fitting the valve between flanges.

NOTE:
Do not attempt to correct pipeline misalignment by means of flange bolting or welding.

Flush or blow the pipes clean before mounting the valve. Impurities, sand and parts of welding electrodes may damage the ball and seats surfaces.

There are three marks to indicate the open-closed position of the valve.
- an indicator on the actuator's drive centre
- a groove at the end of the ball stem
- the keyway of the ball stem
If you feel uncertain about the indicator, check by the groove and the keyway.

The valve can be mounted in any position. If possible, mount the valve in such a position that the actuator can, if necessary, be detached without removing the valve from the pipeline. The actuator must not touch the pipeline, as pipeline vibrations may damage it or cause disturbance.

Fig. 6 Supporting the valve

3.2.1 Assembly of welding end valve

The valves are mounted in the pipeline by using standard welding methods.

When welding or annealing the joints, assure that the temperature of body in PTFE or the rubber sealings is not higher than that allowed for this type of sealing material, e.g. 120 °C. The increase of temperature can be prevented by winding wet protection cloth around the body during the welding. Fig. 7.

Valves with welding ends are, if necessary, supported by flaky, arched supports on the machined part or preferably (Fig. 8) on the part of pipeline next to the valve.

After welding, the piping should be carefully cleaned and flushed before operating the valve.

After trial operation, the valve should be left in the 'Open' position until the process is started up.

If the valve is found to jam during test operation, open it and flush again with a powerful flow.

Fig. 7 Valve body covered with wet protection cloth during welding

Fig. 8 Supporting the welding end valve

3.3 Actuator

NOTE:
When installing the actuator on the valve, make sure that the valve package functions properly. Detailed information on actuator installation is given in Section 6 or in the separate actuator instructions.

The valve open/closed position is indicated as follows:
- by an indicator on the actuator or
- by a groove at the end of the ball shaft (parallel to the ball flow opening).

If there is any uncertainty about the indicator, check the ball position by the groove.

The actuator should be installed in a manner that allows plenty of room for its removal.
The upright position is recommended for the actuator cylinder.

The actuator must not touch the pipeline, because pipeline vibration may interfere with its operation.

In certain cases it may be considered advantageous to provide additional support to the actuator. These cases will normally be associated with large actuators, extended shafts, or where severe vibration is present. Please contact Metso’s Automation business for advice.

3.4 Start-up

3.4.1 Before start-up

❑ If there is a long period between installation and start-up during which piping installation or alterations have been carried out, it is advisable to check the valve operation again to ensure that it is working perfectly.

❑ At the start-up stage the valve should be kept in the completely 'Open' or 'Closed' position. Any pressure impact on a valve left in mid position will damage the seat.

❑ At the beginning of start-up it is advised to verify the tightness of the gland packing and tighten if necessary.

4 SERVICING

4.1 General

CAUTION:
Observe the safety precautions mentioned in Section 1.8 before servicing!

CAUTION:
When handling the valve or the valve package as a whole, bear in mind the weight of the valve or the entire package.

NOTE:
Always use original spare parts to make sure that the valve functions as intended.

It is recommended that the gland packing is checked regularly for tightness. If the valve requires maintenance, then the following service measures should carried out. This section outlines the service operations that can be carried out by the end user.

The numbers in parentheses refer to the parts list and the exploded view of the valve in Section 10, if not otherwise stated.

NOTE:
If you send the valve to the manufacturer for servicing, do not dismantle it. Instead, clean the valve carefully of all medium and inform the manufacturer of any dangerous medium involved.

CAUTION:
Do not dismantle the valve or remove it from the pipeline while the valve is pressurized!

If the gland packings leak even after being tightened, they must be replaced. The packings are made of graphite or PTFE.

❑ To replace the packings, unscrew the bracket nuts, see installation parts list, and remove the actuator and key from the shaft.

❑ Remove the gland.

❑ Remove the graphite gland packings with a sharp pointed tool, e.g. proper size screw driver.

❑ Carefully clean the inside of the gland and the shaft. The screws can be removed to make cleaning easier.

❑ Install the new gland packing taking care that the edges of the key groove do not damage the inner face on the packing.

❑ Install the gland and tighten to the torque given in the Table 1.
4.3 Repairing a jammed or stiff valve without removing it from the pipeline

Jamming or stiff function may be caused by a flow medium clogging the seat (7) and the ball (3). The ball and the seats can be cleaned without removing the valve from the pipeline by turning the ball to a partly open position and flushing the pipes. If this does not help, follow the instructions below.

<table>
<thead>
<tr>
<th>Nut size</th>
<th>Torque, Nm</th>
<th>Torque lbf-ft</th>
</tr>
</thead>
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<tr>
<td>5/16 UNC</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>3/8 UNC</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>1/2 UNC</td>
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<td>140</td>
</tr>
<tr>
<td>1 UNC</td>
<td>300</td>
<td>220</td>
</tr>
</tbody>
</table>

Table 1 Tightening torques for PTFE gland packing (for information only)

CAUTION: When handling the valve or the valve package as a whole, bear in mind the weight of the valve or the entire package!

CAUTION: Do not detach a spring-return actuator unless a stop-screw is carrying the spring force!

NOTE: Before dismantling, carefully observe the position of the valve with respect to the actuator and positioner/limit switch so as to make sure that the package can be properly re-assembled.

It is usually easiest to detach the actuator and support equipment before removing the valve from the pipeline. If the valve/actuator unit is small or not easily accessible, it is advised better to remove the whole unit at the same time.

- Close and detach the actuator pressure supply and disconnect the control cables and pipes.
- Loosen the bracket screws.

4.4 Detaching the B series actuator

CAUTION: When handling the valve or the valve package as a whole, bear in mind the weight of the valve or the entire package!

CAUTION: Do not detach a spring-return actuator unless a stop-screw is carrying the spring force!

NOTE: Before dismantling, carefully observe the position of the valve with respect to the actuator and positioner/limit switch so as to make sure that the package can be properly re-assembled.

It is usually easiest to detach the actuator and support equipment before removing the valve from the pipeline. If the valve/actuator unit is small or not easily accessible, it is advised better to remove the whole unit at the same time.

- Close and detach the actuator pressure supply and disconnect the control cables and pipes.
- Loosen the bracket screws.
4.6 Dismantling the valve

- Remove the valve from the pipeline.
- Remove the actuator as explained in 4.4.
- Loosen the gland nuts. Do not remove the gland.
- Remove the bonnet gland nuts and lift off the bonnet. If necessary use an extractor to grip the gland. See Fig. 11.

4.7 Checking the parts of a dismantled valve

4.7.1 Seats

Seat T

- Check the sealing and back surfaces of the seat ring (7), the support ring (35) and the o-ring (63). Sealing surfaces may require lapping.
- If damage is extensive, the parts should be replaced. Check the spring groove for any impurities which may jam the support ring (35).

Seat S

- Check the sealing and back surfaces of the seat ring (7), the support ring (35) and the o-ring (63). Sealing surfaces may require lapping. The sealing surface of the seat (7) is lapped against ball surface.
- If damage is extensive, the parts should be replaced. Check the spring groove for any impurities which may jam the support ring (35).
Seat H

![Diagram of Seat H](image)

**Fig. 16  Seat H**

- Check the sealing surfaces of seat (7) and bellows (62). The sealing surfaces may require lapping. Parts with extensive damage must be replaced.
- Check the bellows for any impurities which may effect operation.
- If necessary, the sealing surface of the seat (7) may be lapped against ball surface. The back surface of the seat (7) and straight edges of the bellows (62) may be lapped on. Also the body may be lapped if the sealing surface is damaged.

### 4.7.2 Ball

- Lift the ball with ball seats from the body onto a soft surface for cleaning. Check the sealing and bearing surfaces of the ball stem. Remove smaller scratches and impurities with emery cloth. The ball may require lapping. See also Section 4.6. File off any burrs from the stem keyway.
- If there are deep scratches on the ball it shall be replaced.

### 4.7.3 Bearings

**Standard construction**

Bearings are of PTFE with stainless steel net.

- Check that the bearing strips and replace if necessary.

**Hi-temp construction**

- Bearings are of stainless steel with hard coating or solid cobalt based alloy.
- Replace if necessary.

### 4.8 Reassembling the valve

- Clean all the inside parts. If there is any rust inside, the surfaces can be sprayed with an anti-rust agent after cleaning. Check the reactions of the agent to flowing medium.
- Install first the spring, into the support ring.

![Diagram of Mounting the spring](image)

**Fig. 17  Mounting the spring**

- Lubricate the O-rings, for example with silicone. Locate them into their grooves.
- Place the support ring, made of two rounds of PTFE strip, into the O-ring groove. The strip must be one-piece with the ends cutted as shown in Figure.
- Install the support rings or bellows (C and H constructions) in both flow ports and press them into the back position by using extractor tool.

![Diagram of O-ring as backseal](image)

**Fig. 18  O-ring as backseal**

- Hold the tool in place until the locking tools are installed.

![Diagram of Using extractor tool](image)

**Fig. 19  Using extractor tool**
Place the locking tools in position and tighten as shown in Fig. 19. Remove the extractor tool.

Lower the ball with bearings and seats into the body, in the 'Open position'. Check that the back face of the seat does not damage the support ring seat when lowering the ball into the ball body. See Fig. 20.

Remove the locking tools.

Install the bonnet gasket. This graphite gasket should always be replaced.

Remove the bonnet tools.

Install the bonnet gasket. This graphite gasket should always be replaced.

Place the bonnet in position. If the gland packings are in place and in good condition, lower the bonnet carefully, ensuring that the shaft key groove does not damage them. If necessary replace the gland packings as explained in 2.6.12.

Tighten the bonnet nuts by using the torques given in Table 2. Tighten in the order shown in Fig. 22.

Fig. 20 Lowering the ball into the body

Assemble the gland packing as described in 4.2.

5 TESTING THE VALVE

CAUTION:
Pressure testing should be carried out using equipment conforming to the correct pressure class!

The hydraulic body test shall be carried out after the reassembly.

Test pressure shall be in accordance with an applicable standard. Use the pressure required by the pressure class or the flange bore. Keep the valve in the half open position during the test.

If the tightness of the closure member is also to be tested, please contact the manufacturer.
6 INSTALLING THE ACTUATOR

6.1 General
Use suitable mounting parts and couplings when you install the actuators.

[CAUTION: Beware of ball cutting movement!]

6.2 Installing the M-type manual gear operator
- The mark at the end of the shaft indicates the direction of the ball flow bore. Turn the valve to the closed position.
- Lubricate the key groove of the actuator and the couplings. Install the coupling on the shaft and lock it. Install the bracket(s) on the valve. A plate should be installed between the valve flange mounting face or bracket and the actuator mounting face, see actuator’s instructions for details.
- Lubricate the actuator screws. Install and tighten all screws.
- Adjust the ball fully open and fully closed positions with the hexagon screws located on both sides of the housing (see Fig. 23). The stop-screw for the open position is nearest to the handwheel on the side of the housing and the screw for the closed position is at the opposite end. The turning directions for the handwheel are marked on the wheel.
- Check the valve by turning the handwheel to the extreme positions. The indicator on the top of actuator shows the direction of the ball flow bore.

6.3 Installing the B1C-series actuator
- Operate the actuator to the same position as the valve (fully open or fully closed).
- File off any burrs and clean the shaft bore.
- The line at the end of the shaft indicates the direction of the ball flow bore.
- Lubricate the actuator shaft bore. Fasten the bracket loosely to the valve.
- Slip the actuator carefully onto the valve shaft. Avoid forcing it since this may damage the ball and seats. We recommend mounting the actuator so that the cylinder is pointing upwards.
- Position the actuator parallel or vertical to the pipeline as accurately as possible. Lubricate the actuator mounting screws and then fasten all screws.
- Adjust the ball open and closed positions by means of the actuator stop screws located at both ends (see Fig. 24). An accurate open position can be seen in the body flow bore.
- Check that the yellow arrow on the actuator indicates the ball flow opening position. Keep fingers out of the flow bore!
- There is no need for stop screw adjustment if the actuator is re-installed in the same valve. Drive actuator piston to the housing end (open position). Turn the actuator by hand until the valve is in the open position. Fasten the actuator in this position as explained above.
- Check the stop screw thread tightness. An O-ring is used for sealing.
- Check that the actuator is functioning correctly. Drive the actuator piston to both cylinder ends and check the ball position and its movement with respect to the actuator (close: clockwise; open: counterclockwise). The valve should be closed when the piston is in the extreme outward position.
- If necessary, change the position of the actuator pointing cover to correctly indicate the valve open/closed position.

6.4 Installing the B1J-series actuator
Spring-return actuators are used in applications where valve opening or closing movement is needed in case the air supply is interrupted. The B1J type is used for spring-to-close operation; the spring pushes the piston towards the cylinder end, the extreme outward position. In turn, the B1JA type is used for spring-to-open operation; the spring pushes the piston towards the housing. Spring-return actuators are installed in a manner similar to B1 C-series actuators, taking into account the following.

6.4.1 B1J-type
- Install the actuator so that the piston is in the extreme outward position. The cylinder must not be pressurized and air supply connections must be open. The valve must be in the closed position.
6.4.2 B1JA-type

- Install the actuator so that the piston is in the cylinder end position at housing side. The cylinder must not be pressurized and air supply connections must be open. The valve must be in the open position.

The rest of the installation procedure is the same as in Section 6.3.

6.5 Installing other than Metso actuators

**NOTE:** Metso accepts no responsibility for compatibility of actuators not installed by Metso.

Other actuators can be installed only if they have an ISO 5211 actuator connection and taking account the stem and keyway dimensions.

7 MALFUNCTIONS

The following Table 4 lists malfunctions that might occur after prolonged use.

8 TOOLS

In addition to standard tools, the following special tools might be needed.

- For removal of the actuator:
  - extractor

9 ORDERING SPARE PARTS

When ordering spare parts, always include the following information:

- type code, sales order number, serial number (stamped on a valve body)
- number of the parts list, part number, name of the part and quantity required

This information can be found from the identification plate or documents.

**Table 3 Malfunctions**

<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Possible cause</th>
<th>Action</th>
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</thead>
<tbody>
<tr>
<td>Leakage through a closed valve</td>
<td>Wrong stop screw adjustment of the actuator</td>
<td>Adjust the stop screw for closed position</td>
</tr>
<tr>
<td></td>
<td>Damaged ball surface</td>
<td>Replace the ball</td>
</tr>
<tr>
<td></td>
<td>Damaged seat(s)</td>
<td>Replace seat(s)</td>
</tr>
<tr>
<td></td>
<td>Ball cannot move freely</td>
<td>Clean the inside of the valve</td>
</tr>
<tr>
<td>Stick valve movement</td>
<td>Impurities between the ball and seats</td>
<td>Flush the valve from the inside</td>
</tr>
<tr>
<td></td>
<td>Clean the sealing surfaces and seats</td>
<td></td>
</tr>
<tr>
<td></td>
<td>mechanically</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Damaged bearings</td>
<td>Replace bearings</td>
</tr>
<tr>
<td></td>
<td>Damaged seat</td>
<td>Replace seat(s)</td>
</tr>
<tr>
<td></td>
<td>Over-tightened gland packing</td>
<td>Untighten the nuts</td>
</tr>
<tr>
<td>Leakage through gland packing</td>
<td>Loose packing</td>
<td>Tighten the nuts</td>
</tr>
<tr>
<td></td>
<td>Worn-out or damaged packing</td>
<td>Replace the gland packing</td>
</tr>
<tr>
<td>Leakage through bonnet sealing</td>
<td>Loose bonnet nuts</td>
<td>Re-tighten the bonnet nuts</td>
</tr>
<tr>
<td></td>
<td>Damaged body gasket</td>
<td>Replace the body gasket</td>
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## EXPLODED VIEW AND PARTS LIST

<table>
<thead>
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<th>Qty</th>
<th>Description</th>
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<tr>
<td>3</td>
<td>1</td>
<td>Ball</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Trunnion bearing</td>
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<tr>
<td>5</td>
<td>1</td>
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<tr>
<td>7</td>
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<td>1</td>
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<td>Gland</td>
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<td>ID plate</td>
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<td>35</td>
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<td>Secondary seat (S, T, G)</td>
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<tr>
<td>60</td>
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<td>Bearing strip</td>
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<td>61</td>
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<td>Bellows spring (H)</td>
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<td>Back seal (G)</td>
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## 11 DIMENSIONS AND WEIGHTS

### Valve T2H, ASME 1500

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<th>TYPE</th>
<th>DN</th>
<th>A</th>
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<th>øD</th>
<th>E</th>
<th>M</th>
<th>N</th>
<th>øD</th>
<th>P</th>
<th>ØUL</th>
<th>ØG1</th>
<th>ØG2</th>
<th>øU</th>
<th>J1</th>
<th>J2</th>
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<td>50.4</td>
<td>201</td>
<td>70</td>
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<td>-</td>
<td>225</td>
<td>ø300</td>
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<td>T2H-04</td>
<td>100</td>
<td>546</td>
<td>311.1</td>
<td>150</td>
<td>100.1</td>
<td>507</td>
<td>12.7</td>
<td>90</td>
<td>55</td>
<td>60.6</td>
<td>218</td>
<td>80</td>
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<td>-</td>
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<td>16.6</td>
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<td>705</td>
<td>393.7</td>
<td>240</td>
<td>146.2</td>
<td>730</td>
<td>22.22</td>
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<td>85</td>
<td>415.2</td>
<td>216.2</td>
<td>-</td>
<td>440</td>
<td>575</td>
<td>-</td>
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<td>T2H-08</td>
<td>200</td>
<td>832</td>
<td>462.6</td>
<td>305</td>
<td>25.4</td>
<td>850</td>
<td>25.4</td>
<td>180</td>
<td>105</td>
<td>116.1</td>
<td>358</td>
<td>95</td>
<td>480</td>
<td>128</td>
<td>-</td>
<td>545</td>
<td>625</td>
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</table>
## TYPE CODING

### TOP ENTRY BALL VALVE, Series T2

<table>
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<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-</td>
<td>T2</td>
<td>G</td>
<td>H</td>
<td>20</td>
<td>D</td>
<td>H</td>
<td>H</td>
<td>03</td>
<td>01</td>
</tr>
</tbody>
</table>

#### Q-CODE

**PRODUCT DESIGN**

- **Q-** Standard low noise trim for gas and liquid application, single seat construction

#### Q-CODE

**SPECIAL PRODUCT OPTIONS**

- **QLF-** Feedwater trim, single set construction
- **QX-** Multichannel Q-ball for gas and liquid applications
- **QXA-*)** Multichannel Q-ball + attenuator plate in downstream flow port of body for gas applications

*) For liquid applications customized baffle plates are used. Code "A" replaced with "Y".

#### 1. sign

**SERIES / DESIGN**

- **T** Top entry body, trunnion mounted, gland packing (except subsea)

#### STANDARD

- **T2** Full bore, flanged

#### NON-STANDARD

- **T3** Full bore, weld ends
- **T4** Reduced bore, weld ends

#### 2. sign

**PRESSURE RATING**

- **G** ASME Class 900
- **H** ASME Class 1500

#### 3. sign

**CONSTRUCTION**

- **A** General, PTFE bearings, double-seated
- **B** Single-seated, metal bearings, one-way tight
- **E** Single-seated, PTFE bearings, one-way tight
- **H** High temperature, metal bearings, double-seated
- **S** Subsea-construction
- **Y** Special

#### 4. sign

**SIZE (in)**

- **02, 03, 04, 06, 08, 10, 12, 14, 16, 18, 20, 24, 28, 30**

#### 5. sign

**BODY**

- **A** CF8M
- **B** B8M
- **D** WCB
- **F** LCC
- **G** WCC
- **J** LC2
- **Y** Special

**BOLTING**

- **STANDARD MATERIALS**
  - **A** CF8M / AISI 316 + Chrome *)
  - **D** CF8M / AISI 316 + NiBo

- **NON-STANDARD MATERIALS**
  - **B** CF8M / AISI 316 + Cobalt based hard facing
  - **G** Type AISI 329 (SS 2324) + Chrome *)
  - **H** CA-6NM (or F6NM) + Chrome *)
  - **Y** Special

*) Ball without Chrome with soft seats

#### 6. sign

**BALL**

- **STANDARD MATERIALS**
  - **A** CF8M / AISI 316 + Chrome *)
  - **D** CF8M / AISI 316 + NiBo

- **NON-STANDARD MATERIALS**
  - **B** CF8M / AISI 316 + Cobalt based hard facing
  - **G** Type AISI 329 (SS 2324) + Chrome *)
  - **H** CA-6NM (or F6NM) + Chrome *)
  - **Y** Special

#### 7. sign

**SEAT**

- **H, S** Standard metal seat
- **T** Standard soft seat
- **G** Metal seat

#### 8. sign

<table>
<thead>
<tr>
<th>Seat seal</th>
<th>Bonnet gasket</th>
<th>Gland packing</th>
<th>Back seal of support ring</th>
<th>Spring / Bellows</th>
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</thead>
<tbody>
<tr>
<td>02</td>
<td>(Polyamide)</td>
<td>Graphite</td>
<td>Graphite</td>
<td>Viton GF</td>
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<tr>
<td>03</td>
<td>(Polyamide)</td>
<td>Graphite</td>
<td>Graphite</td>
<td>Wno. 1.4418 (Avesta 248SSV)</td>
</tr>
<tr>
<td>18</td>
<td>Graphite</td>
<td>Graphite</td>
<td>GR660 / F6NM</td>
<td></td>
</tr>
</tbody>
</table>

#### 9. sign

**Construction code**

- **Y** Special flanges

#### 10. sign

- **Y** Special flanges

*) Ball without Chrome with soft seats

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1. sign SERIES / DESIGN

2. sign PRESSURE RATING

3. sign CONSTRUCTION

4. sign SIZE (in)

5. sign BODY

6. sign BALL

7. sign SEAT

8. sign Seat seal

9. sign Construction code

10. sign