

Neles™ India

Trunnion-mounted ball valve

DN50 – DN1400

2-piece side entry, 3-piece side entry, top-entry,
and fully welded body configurations

Installation, maintenance and
operating instructions



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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.

SAVE THESE INSTRUCTIONS!

Addresses and phone numbers are printed on the back cover.

1. GENERAL

1.1 SCOPE OF THE MANUAL

This instruction manual contains important information regarding the installation, operation and maintenance of Neles India trunnion mounted ball valves. Please read these instructions carefully and save them for future reference.

WARNING:

THE USE OF THE VALVE IS APPLICATION SPECIFIC. BE SURE THAT THE VALVE IS SUITABLE FOR ITS INTENDED SERVICE. IF YOU HAVE ANY QUESTIONS CONCERNING THE USE, APPLICATION OR COMPATIBILITY OF THE VALVE WITH THE INTENDED SERVICE, CONTACT VALMET FOR MORE INFORMATION.

1.2 VALVE MARKINGS

The valve has a identification plate attached to the valve body. The identification plate markings identify the size, materials of construction, pressure rating, month and year of construction, and a unique serial number for the valve.

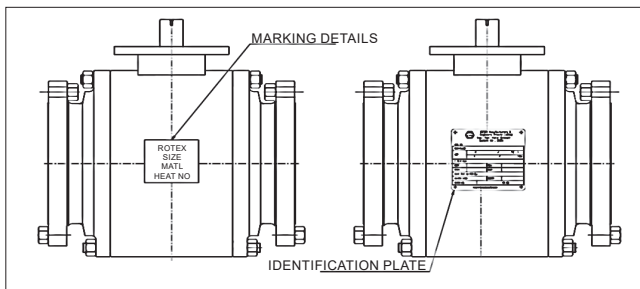


Figure 1.

1.3 SAFETY PRECAUTIONS

WARNING:

DO NOT EXCEED THE VALVE PERFORMANCE LIMITATIONS!

EXCEEDING THE PRESSURE OR TEMPERATURE LIMITATIONS MARKED ON THE VALVE LABEL PLATE MAY CAUSE DAMAGE AND LEAD TO UNCONTROLLED PRESSURE RELEASE. DAMAGE OR PERSONAL INJURY MAY RESULT.

WARNING:

SEAT AND BODY RATINGS!

THE PRACTICAL AND SAFE USE OF THIS PRODUCT IS DETERMINED BY BOTH THE SEAT AND BODY RATINGS. READ THE LABEL PLATE AND CHECK BOTH RATINGS. SOME SEAT MATERIALS HAVE PRESSURE RATINGS THAT ARE LESS THAN THE BODY RATING. ALL OF THE BODY AND SEAT RATINGS ARE DEPENDENT ON VALVE TYPE AND SEAT MATERIAL. DO NOT EXCEED THESE RATINGS!

WARNING:

BEWARE OF BALL 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. DISCONNECT ANY PNEUMATIC SUPPLY LINES, ANY ELECTRICAL POWER SOURCES AND MAKE SURE SPRINGS IN SPRING-RETURN ACTUATORS ARE IN THE FULL EXTENDED/RELAXED STATE BEFORE PERFORMING ANY VALVE MAINTENANCE. FAILURE TO DO THIS MAY RESULT IN DAMAGE OR PERSONAL INJURY!

WARNING:

VALVE MAY BE HOT OR COLD!

THE VALVE BODY MAY BE VERY HOT OR COLD DURING USE. BE AWARE OF THE VALVE OPERATING CONDITIONS. PROTECT PEOPLE AGAINST BURNS OR COLD INJURIES.

WARNING:

WHEN HANDLING THE VALVE OR VALVE/ACTUATOR ASSEMBLY, TAKE ITS WEIGHT INTO ACCOUNT!

NEVER LIFT THE VALVE OR VALVE/ACTUATOR ASSEMBLY BY THE ACTUATOR, POSITIONER, LIMIT SWITCH OR THEIR PIPING. PLACE LIFTING DEVICES SECURELY AROUND THE VALVE BODY. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN DAMAGE OR PERSONAL INJURY FROM FALLING PARTS (SEE FIGURE 2).

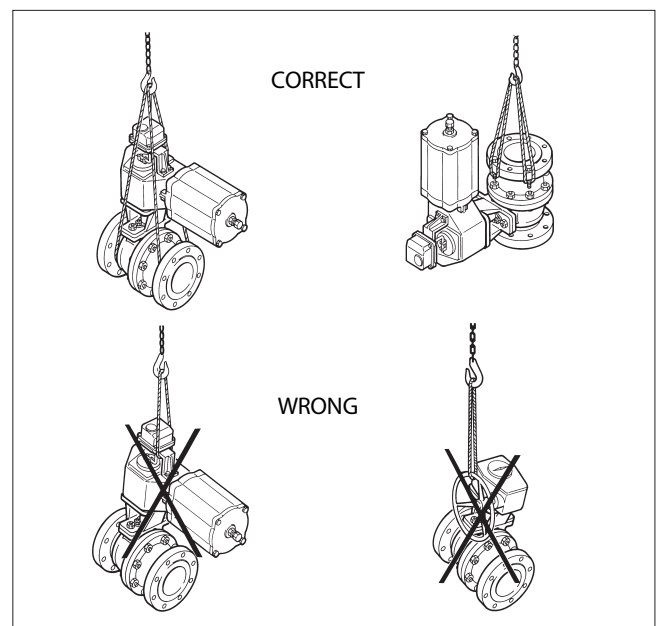


Figure 2. Lifting of the valve

WARNING:

INTERNAL PRESSURE AND HAZARDOUS MEDIA!

THREADED CONNECTIONS IN THE VALVE BODY FOR DRAIN AND VENT LINES ARE SEALED WITH THREADED PLUGS. DO NOT REMOVE THESE PLUGS WHEN THE VALVE IS CONTAINING PRESSURE.

2. TRANSPORTATION AND STORAGE

Check the valve and the accompanying devices for any damage that may have occurred during transport.

CAUTION: Placing the valve directly on the ground or on a concrete floor should be avoided.

Store the valve carefully. Storage indoors in a cool, dry place.

Valves are delivered with the ball port in the fully open position and ends protected with covers to avoid entry of debris and to protect flange facing.

NOTE: When the valve is delivered with a single acting pneumatic actuator mounted, where the spring closes the ball port, the valve is supplied with the ball in the closed position. Special care must be taken to avoid entry of debris which can damage the seats and ball sealing surface.

Valve open and closed position is indicated on the handle for lever operated valves, or on top of the gearbox for manually operated valves.

CAUTION: The valve shall not be stored with the ball in an intermediate position between fully open and fully closed as it can damage the seats.

Follow safety instructions for lifting and handling of the valve. To lift, place a lifting strap with a sufficient rating for the weight to be carried around the valve body or use lifting hooks (provided for valves greater than 250 kg). Special care must be taken not to damage the paint coating, lever, gearbox, actuator, or other components.

Move the valve to its intended location just before installation.

Do not remove the flow port protectors until installing the valve.

If the valve(s) are to be stored for a long duration, follow the recommendations of IMO-S1.

3. INSTALLATION

3.1 GENERAL

Remove the flow port protectors and check that the valve is clean inside. Clean valve if necessary.

Flush the pipeline carefully before installing the valve. Foreign objects, such as sand or pieces of welding electrodes, will damage the ball and seats.

3.2 INSTALLING IN THE PIPELINE

WARNING:

BEFORE INSTALLING A VALVE IN THE PIPELINE, CHECK THE IDENTIFICATION TAG AND ENSURE THAT THE INFORMATION MATCHES THE PURCHASE AND PIPING SPECIFICATIONS. THE IDENTIFICATION PLATE ON THE VALVE PROVIDES THE NECESSARY INFORMATION.

When taking the valve from storage, carefully check to ensure that the valve was not damaged during the storage period.

Ball valves are designed for bi-directional flow unless the ball is drilled for cavity relief. When the ball has a cavity relief hole, ensure that the installation of the valve is correct with respect to the flow direction arrow marked on the valve.

The valve can be mounted in a horizontal or vertical position. When installed in a horizontal line, it is not recommended to install the valve with the stem on the underneath side because debris in the pipeline may enter the body cavity and damage the gland packing. See **Figure 3**.

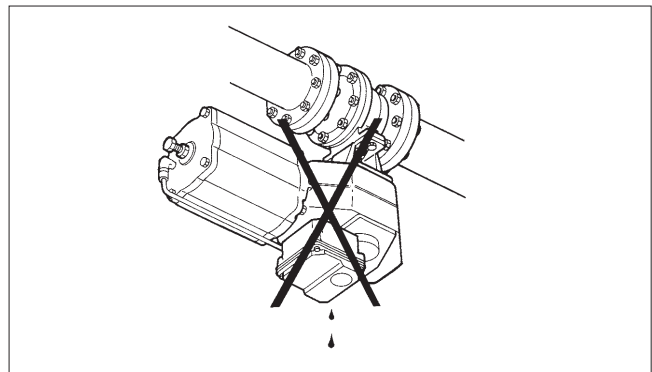


Figure 3. Avoid this mounting position

It is preferred to firmly support the pipeline to protect the valve from excessive stress and to reduce pipeline vibration. To facilitate servicing, it is preferable that the valve be supported by the body using pipe clamps and supports. Do not fasten supports to the flange bolting, body bolting, or to the actuator. See **Figure 4**.

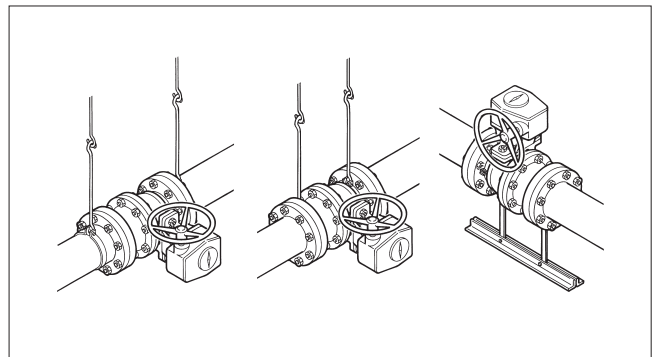


Figure 4. Supporting the valve

FLANGED VALVE INSTALLATION

WARNING:

THE VALVE SHOULD BE TIGHTENED BETWEEN FLANGES USING GASKETS AND FASTENERS COMPATIBLE WITH THE APPLICATION, AND IN COMPLIANCE WITH APPLICABLE PIPING CODES AND STANDARDS. CENTER THE VALVE AND FLANGE GASKETS CAREFULLY BETWEEN FLANGES. DO NOT ATTEMPT TO CORRECT PIPELINE MISALIGNMENT BY MEANS OF FLANGE BOLTING!

During flange bolt tightening, ensure that piping stresses are not transferred to the valve.

Excessive overtightening of flange bolting can cause damage and/or leaks on the end flange or body joints.

WELD END VALVE INSTALLATION

NOTE: A qualified welder must do the installation welding. The welder and welding procedure should be qualified in accordance with the ASME Boiler and Pressure Vessel Code Section IX.

CAUTION: To prevent damage to the seat and seals, do not allow the temperature of the valve body seat and body seal area to exceed 200 °F (94 °C). It is recommended that thermal chinks be used to check the temperature in these areas during welding.

CAUTION: Ensure that any weld splatter does not fall onto the ball or seats. This may damage critical sealing surfaces and cause leaks.

After welding, flush the pipeline with the valve in the fully open position to remove any weld splatter. Operate the valve 3 to 4 times to ensure proper operation of the valve.

When butt welding, ensure a gap of 0.08 to 0.12 inches exists between the valve end and pipe in accordance with ASME welding standards. Tack weld the pipe to the valve end in several locations. Check for proper alignment between the pipe and valve before completing welding the pipe to the valve.

3.3 VALVE INSULATION

Ball valves do not require insulation. If desired, the valve may be insulated; however, the insulation must not continue above the upper level of the valve. See **Figure 5**.

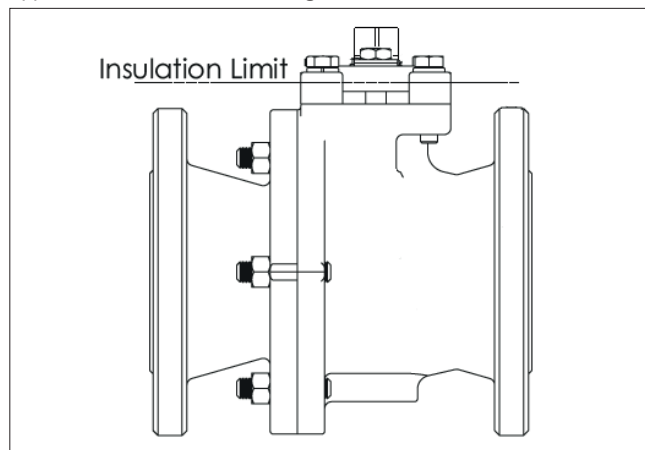


Figure 5. Insulation of the valve

3.4 ACTUATOR

WARNING:

WHEN INSTALLING AN ACTUATOR ON THE VALVE, MAKE SURE THAT THE VALVE ASSEMBLY FUNCTIONS PROPERLY. INFORMATION ON ACTUATOR INSTALLATION IS GIVEN IN SEPARATE ACTUATOR INSTRUCTIONS.

The actuator should be installed in a manner that allows plenty of room for its removal.

The actuator must not touch the pipeline, tanks, walls, or other equipment because vibration may interfere with its operation.

3.5 COMMISSIONING

Ensure that there is no dirt or foreign objects left inside the valve or pipeline. Flush the pipeline carefully. Make sure that the valve is fully open when flushing.

Ensure that all nuts, fittings, and cables are properly fastened.

If so equipped, check that the actuator positioner and/or switch(s) are correctly adjusted. Actuator adjustment is in **Section 5**. To adjust any accompanying device(s) refer to the separate control equipment instruction manuals.

4. OPERATION

CAUTION: Open and close the valve slowly to avoid hammering effect from abrupt pressure changes on the valve and pipeline.

CAUTION: Do not keep the valve partially open in an intermediate position as it may damage the seat and lead to erosion of the ball and body.

For lever operated valves, the hand lever is either assembled with the valve or shipped loose depending upon the size of the valve and hand lever.

For valve operated with a gearbox, the gearbox open and closed position adjustment has been set prior to shipment from the factory. Do not disturb this adjustment. Rotation of the hand wheel in the clockwise direction closes the valve and counter clockwise rotation opens the valve (rotation direction is when facing the hand wheel end).

CAUTION: Ensure that the force applied on the hand wheel of the gearbox or lever does not exceed 360 N.

NOTE: Do not apply extra leverage using an extension pipe or pry bar. When the end stops of the lever or gearbox are reached, the valve is at its final position. Applying additional torque will not improve shut-off tightness.

The valve always closes by rotating the stem (when viewed from top) in the clockwise direction. The ball should always be rotated a full 90 degrees to the fully open or fully closed position.

5. MAINTENANCE

5.1 GENERAL

Although Neles valves are designed to work under severe conditions, proper preventative maintenance can significantly help to prevent unplanned downtime and reduce the total cost of ownership. Valmet recommends inspecting valves at least every five (5) years. The inspection and maintenance frequency depend on the actual application and process condition. Routine maintenance consists of tightening the gland flange bolts periodically to compensate for stem seal wear.

Always loosen and tighten fasteners with the appropriate wrench to avoid damaging the valve, handle, linkage, actuator, fittings or flats.

Overhaul maintenance consists of replacing seats and seals. Always replace parts with genuine and recommended parts only. These parts may be obtained from Valmet or an Authorized Valmet Distributor.

WARNING:

FOR YOUR SAFETY, IT IS IMPORTANT THE FOLLOWING PRECAUTIONS BE TAKEN PRIOR TO REMOVAL OF THE VALVE FROM THE PIPELINE OR BEFORE ANY DISASSEMBLY:

1. BE SURE YOU KNOW WHAT FLUID IS IN THE PIPELINE. IF THERE IS ANY DOUBT, DOUBLE-CHECK WITH THE PROPER SUPERVISOR.
2. WEAR ANY PERSONAL PROTECTIVE EQUIPMENT (PROTECTIVE CLOTHING OR EQUIPMENT) REQUIRED WHEN WORKING WITH THE FLUID INVOLVED.
3. DEPRESSURIZE THE PIPELINE AND CYCLE THE VALVE AS FOLLOWS:
 - A. PLACE THE VALVE IN THE OPEN POSITION AND DRAIN THE PIPELINE.
 - B. CYCLE THE VALVE TO RELIEVE RESIDUAL PRESSURE IN THE BODY CAVITY BEFORE REMOVAL FROM THE PIPELINE
 - C. AFTER REMOVAL AND BEFORE DISASSEMBLY, CYCLE THE VALVE AGAIN SEVERAL TIMES.

NOTE: When sending the valve to the manufacturer for repair, do not disassemble. Clean the valve carefully and flush the valve internals. For safety reasons, inform the manufacturer of the type of medium used in the valve (include material safety datasheets (MSDS) for the medium).

NOTE: For safety reasons, replace pressure retaining bolting if the threads are damaged, have been heated, stretched, or corroded.

5.2 PREVENTATIVE MAINTENANCE

In order to avoid valve failure during operation, the valve should be periodically inspected thoroughly to detect the wear and/or corrosion of the ball, seats, seals and body. Whenever the valve is disassembled, it is recommended to replace the seats, gaskets, seals, and packing.

Check the electrical continuity of the valve to the pipeline.

NOTE: Before removing the valve from the pipeline, it is important to mark the relative position of the valve flange with respect to the pipeline flange and any flow direction arrow to ensure valve is reinstalled in the same position.

It is generally most convenient to detach the actuator and its auxiliary devices before removing the valve from the pipeline. If the valve package is small or if it is difficult to access, it may be more practical to remove the entire assembly.

NOTE: To ensure proper reassembly, observe the position of the actuator and positioner/limit switch with respect to the valve before detaching the actuator.

WARNING:

ALWAYS DISCONNECT THE ACTUATOR FROM ITS POWER SOURCE, PNEUMATIC, HYDRAULIC OR ELECTRICAL, BEFORE ATTEMPTING TO REMOVE IT FROM THE VALVE!

WARNING:

DO NOT REMOVE A SPRING-RETURN ACTUATOR UNLESS A STOP-SCREW IS CARRYING THE SPRING FORCE!

1. Detach the air supply, electrical supply, hydraulic supply and control signal cables or pipes from their connectors.
2. Remove the actuator mounting bracket screws.
3. Lift the actuator straight up in line with the valve stem until the connection between actuator drive and valve stem is completely disengaged.
4. Place actuator in a safe location to avoid damage or personal injury.

5.3 SEALANT INJECTION

Secondary sealant injection system is used only when damage has been caused to the seat rings or stem seals and a temporary tight shut-off is required for maintenance or other purposes. Use standard grades of valve sealants that are suitable for contact with the media inside the valve. Sealant is to be pushed with a hand pump onto the seal surface through the sealant injection port provided on the valve body or stem housing. Prior to injecting the sealant, flush the sealant port with suitable valve cleaner. This will purge any residual old sealant and debris.

NOTE: Sealant injection is to be carried out only if the valve seats or stem seal are leaking.

Valves sizes NPS 6 (DN 150) and larger have two sealant injection ports on the body/body adapter for individual seats and one sealant injection port on the stem housing. Each port on the body permits sealant entry to the valve seats. The single port of the stem housing permits sealant entry to the stem sealing area. All injection ports include double-check one-piece fittings.

Injection of the sealant is done by connecting the outlet fitting of the hand pump to the sealant injection port and pumping the handgun. See **Figure 6**. Slide the button head coupler which is integral to the hose of the sealant injection pump over a double check one-piece fitting.

NOTE: Sealant should only be injected when the valve is in the closed position to ensure effective distribution of the sealant onto the damaged seal.

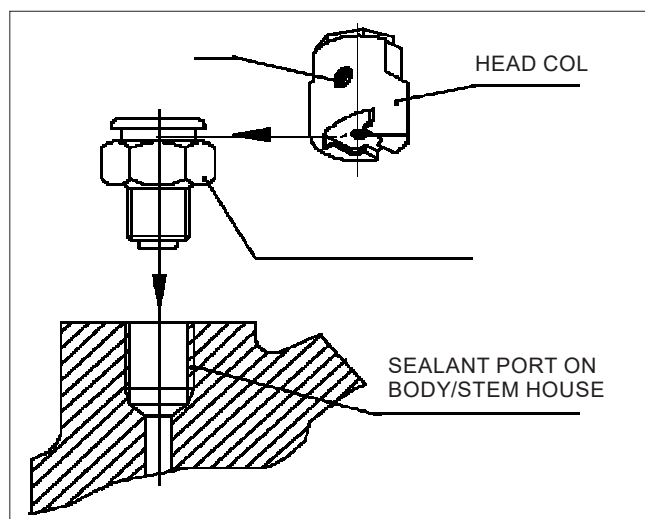


Figure 6. Sealant injection

5.4 LUBRICATION OF GEARBOX

Gearbox is supplied fully lubricated with grease. The grease is normally suitable for -20 °C (-4 °F) to +80 °C (+176 °F). For temperatures outside this range, consult the Factory or Authorized Distributor. Grease should be changed every 3 years if operated frequently, or every 5 years if operated infrequently.

CAUTION: Disassembly of the gearbox should be done only by trained technicians.

5.5 2-PIECE SIDE ENTRY VALVE DISASSEMBLY

NOTE: It is good practice to replace all seats and seals any time a valve is disassembled.

NOTE: Always use original OEM parts to make sure that the valve functions properly.

Numbers in () refer to items shown in the exploded view.

Follow these steps to disassemble the valve:

1. Read and follow all instructions in the **WARNING** sections above before performing any work on the valve.
2. Ensure the valve is in the closed position.
3. Remove the valve from the pipeline.
4. Place the valve on a clean bench or other suitable working surface with the valve closed and in the vertical position. Take care not to damage to flange facing.
5. Secure bottom flange to working surface to prevent movement during disassembly.

6. For gear operated valves, remove gearbox by removing the mounting nuts and studs to the bracket. Remove the bracket by removing the nuts and studs to the valve. Remove the coupling and key on the stem.

NOTE: Take care not to damage the stem or key.

7. For lever operated valves, remove the handle coupler with the lock and stop plate by removing the hex bolt/grub screw from the stem.
8. Remove the body nuts in a crisscross pattern and lift the body adapter along with the seat, taking care not to damage the parts.
9. Remove the gland by removing the cap screws.
10. Remove the stem housing nuts and studs.
11. Lift the stem along with the stem housing from the valve body.
12. Remove the stem housing o-ring and gasket.
13. Remove the stem from the stem housing.
14. Remove the stem o-ring and thrust washer.
15. Remove the trunnion by removing the cap screws.
16. Remove the anti-static spring, the trunnion thrust washer, trunnion gasket, and trunnion o-ring.
17. Carefully lift the ball from the body

NOTE: Take care not to damage the ball and body sealing areas. Damage may cause leaks, even when new seats and seals are installed. Always place the ball on a clean surface and prevent it from rolling.

18. Remove the bush bearing from the ball on both the stem and lower trunnion sides.
19. Remove the o-ring and gasket from the body adapter.
20. Remove the seat insert from the body and body adapter.
21. Remove the springs and o-ring from the seat.
22. When installed, sealant injection fittings may be removed for cleaning.

NOTE: After the complete disassembly of the valve, all the components should be inspected for damage or wear and stored in a clean safe place.

5.6 CHECKING PARTS

1. Clean all disassembled parts.
2. Check the stem and ball for damage. Pay particular attention to sealing surfaces.
3. Check all sealing and gasket surfaces on the body and body adaptor.
4. Replace any damaged parts.
5. Replace any fastener where the threads are damaged or have been heated, stretched or corroded.
6. Replace any parts that have scratches, gouges, or pits that will affect sealing.

NOTE: When ordering spare parts, always include the following information:

- a. Valve catalog code from label plate,
- b. If the valve is serialized – the serial number (stamped on the valve body or label plate),
- c. From exploded view, the ballooned part number, part name and quantity required.

5.7 2-PIECE SIDE ENTRY VALVE ASSEMBLY

NOTE: It is good practice to replace all seats and seals any time a valve is disassembled.

NOTE: Always use original OEM parts to make sure that the valve functions properly.

NOTE: All o-rings should be lightly lubricated at assembly with lubricant that is compatible with the o-ring material and media in the valve.

Numbers in () refer to items shown in the exploded view.

Follow these steps to disassemble the valve:

1. Clean all valve components, if not previously done.
2. Place body with end flange resting on a clean surface that will not damage the flange facing.
3. Coat body studs with anti-corrosion grease.
4. Place the body adaptor with end flange surface resting on a clean surface that will not damage the flange facing.
5. Place the springs in the holes provided in the body and body adapter.
6. Fit the o-rings on the seats.
7. Lower the seats into the body and body adaptor.
8. Place the body adaptor o-ring and the body gasket on the body adaptor.
9. Place the stem o-ring and stem thrust washer on the stem.
10. Insert the stem into the stem housing.
11. Place the stem housing o-ring and gasket.
12. Place the anti-static spring, trunnion thrust washer, trunnion gasket, and trunnion o-ring.
13. Place the bush bearing into the recess in the ball on both the stem and trunnion side.
14. Carefully lift the ball and lower it into the body in the appropriate position, ensuring the stem connection is on the same side as the body stem bore.
15. Locate the trunnion in the ball recess and tighten the cap screws.
16. Lift the valve and place it so the direction of the flow arrow is horizontal.
17. Locate the dowel pins and place the stem housing on the body so the stem housing fits into the bush bearing and stem flats fit into the ball slot.

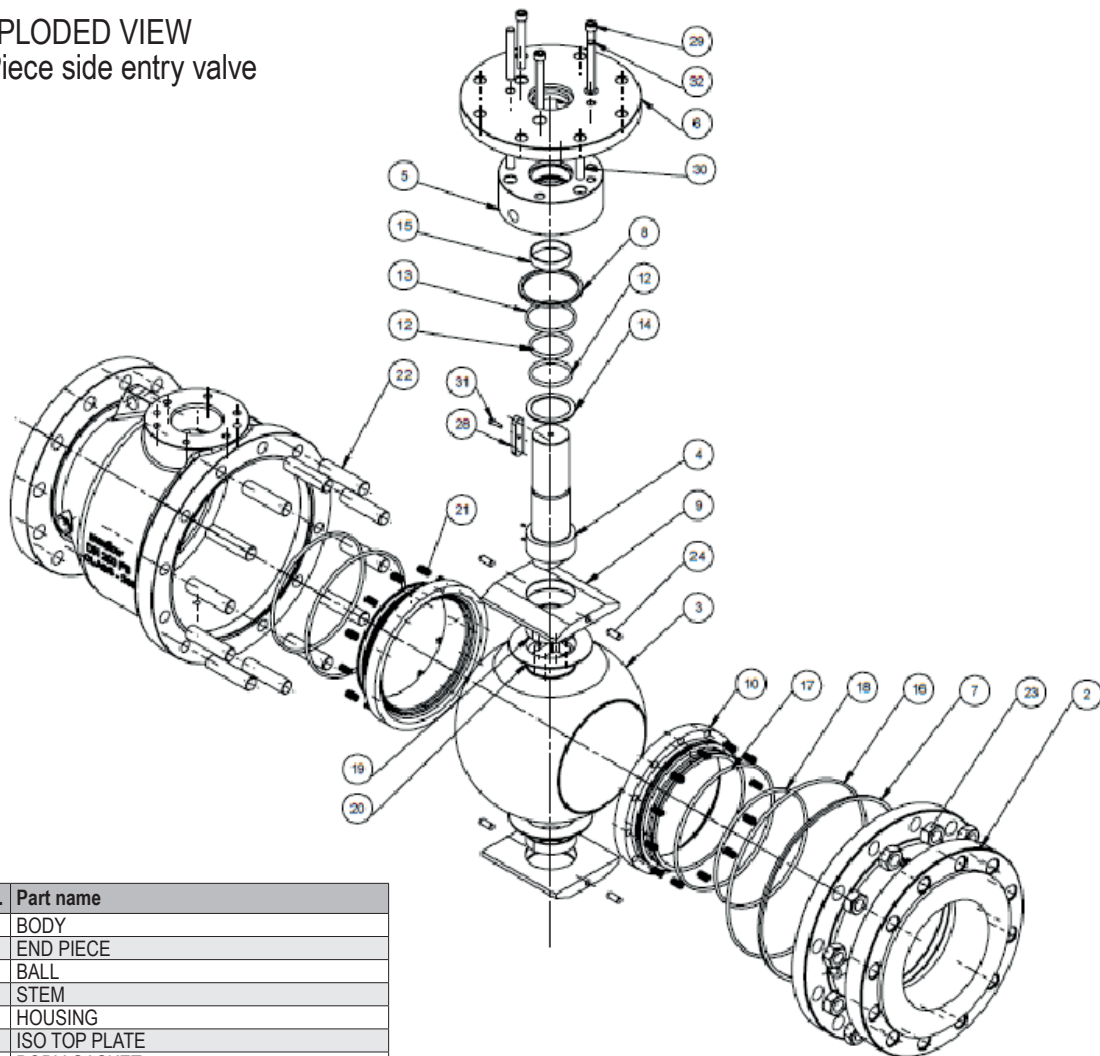
18. Install and tighten the cap screws for the stem housing.
19. Fit the body adaptor with the seat into the body and tighten the nuts.
20. Fit the stem gasket in the stem housing and tighten the cap screws.
21. Fit the stem key into the key slot.
22. For lever operated valves, place the hand coupler with lock and stop plate on the stem and tighten the hex bolt/grub screw.
23. For gearbox operated valves, place the coupling on the stem. Place the mounting bracket on the stem housing and install the studs and tighten the nuts to secure to the body. Fit the gearbox onto the coupler and install the studs and tighten the nuts that secure to the mounting bracket.
24. Where applicable, fit sealant injection fittings for the stem and seats as well as the drain and vent plugs.
25. Rotate the ball slowly back and forth a full quarter turn to allow the seat to settle into position. A fast-turning motion may damage the seat.

NOTE: When the hand lever or gearbox is mounted onto the valve, it may be necessary to adjust the travel stops to ensure correct setting of the ball open and closed position. Check proper assembly of the key in the key slot.

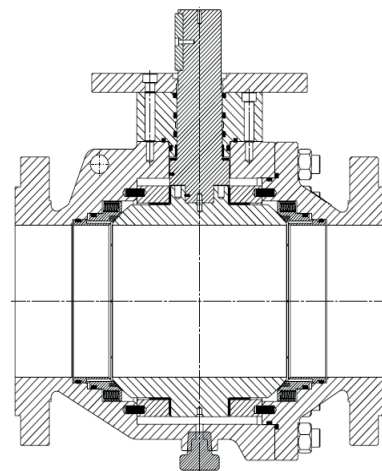
Fastener Tightening Torque, Nm			
Thread size	Class 8.8	Class 10.9	Class B7 / B7M / B8 / B8M
M8	20	30	6
M10	40	55	12
M12	70	100	22
M14	110	160	35
M16	170	240	55
M18	240	340	75
M20	330	460	110
M24	570	800	180
M27	860	1200	270
M30	1140	1600	360

NOTE: Ensure that all nuts and cap screws are tightened to the torque values specified in this **Table**.

EXPLODED VIEW
2-Piece side entry valve



Item No.	Part name
1	BODY
2	END PIECE
3	BALL
4	STEM
5	HOUSING
6	ISO TOP PLATE
7	BODY GASKET
8	GASKET FOR HOUSING
9	'T' PLATE
10	SEAT ASSEMBLY
11	GASKET FOR ISO TOP PLATE
12	STEM O-RING
13	HOUSING O-RING
14	THRUST WASHER FOR STEM
15	BEARING FOR STEM
16	BODY O-RING
17	PRIMARY O-RING
18	SECONDARY O-RING
19	BEARING FOR 'T' PLATE
20	THRUST WASHER FOR 'T' PLATE
21	SPRING
22	STUD FOR BODY
23	NUT FOR BODY
24	DOWEL PIN FOR 'T' PLATE
25	ANTISTATIC SPRING
26	ANTISTATIC BALL
27	SEAT INSERT
28	KEY
29	SOCKET HEAD SCREW FOR ISO TOP PLATE
30	SOCKET HEAD SCREW FOR HOUSING
31	SOCKET HEAD SCREW FOR KEY
32	DOWEL PIN FOR ISO TOP PLATE



5.8 3-PIECE SIDE ENTRY VALVE DISASSEMBLY

NOTE: It is good practice to replace all seats and seals any time a valve is disassembled.

NOTE: Always use original OEM parts to make sure that the valve functions properly.

Numbers in () refer to items shown in the exploded view.

Follow these steps to disassemble the valve:

1. Read and follow all instructions in the **WARNING** sections above before performing any work on the valve.
2. Ensure the valve is in the closed position.
3. Remove the valve from the pipeline.
4. Place the valve on a clean bench or other suitable working surface with the valve closed and in the vertical position. Take care not to damage to flange facing.
5. Secure bottom flange to working surface to prevent movement during disassembly.
6. For gear operated valves, remove gearbox by removing the mounting nuts and studs to the bracket. Remove the bracket by removing the nuts and studs to the valve. Remove the coupling and key on the stem.

NOTE: Take care not to damage the stem or key.

7. For lever operated valves, remove the handle coupler with the lock and stop plate by removing the hex bolt/grub screw from the stem.
8. Remove the ISO flange by removing the cap screws and dowel pin.
9. Remove the body nuts in a crisscross pattern and lift the body adapter along with the seat, taking care not to damage the parts.
10. Carefully lift the valve and flip so the end flange surface of the second body adaptor is facing upwards and repeat step 9.
11. Remove the stem housing cap screws and dowel pin.
12. Lift the stem along with the stem housing from the valve body.
13. Remove the stem housing o-ring and gasket.
14. Remove the stem from the stem housing.
15. Remove the stem o-ring and thrust washer.
16. Remove the trunnion by removing the cap screws.
17. Remove the anti-static spring, the trunnion thrust washer, trunnion gasket, and trunnion o-ring.
18. Carefully lift the ball from the body

NOTE: Take care not to damage the ball and body sealing areas. Damage may cause leaks, even when new seats and seals are installed. Always place the ball on a clean surface and prevent it from rolling.

19. Remove the bush bearing from the ball on both the stem and lower trunnion sides.
20. Remove the o-ring and gasket from the body adapter.
21. Remove the seat insert from the body and body adapter.
22. Remove the springs and o-ring from the seat.
23. When installed, sealant injection fittings may be removed for cleaning.

NOTE: After the complete disassembly of the valve, all the components should be inspected for damage or wear and stored in a clean safe place.

5.9 CHECKING PARTS

1. Clean all disassembled parts.
2. Check the stem and ball for damage. Pay particular attention to sealing surfaces.
3. Check all sealing and gasket surfaces on the body and body adaptor.
4. Replace any damaged parts.
5. Replace any fastener where the threads are damaged or have been heated, stretched or corroded.
6. Replace any parts that have scratches, gouges, or pits that will affect sealing.

NOTE: When ordering spare parts, always include the following information:

- a. Valve catalog code from label plate,
- b. If the valve is serialized – the serial number (stamped on the valve body or label plate),
- c. From exploded view, the ballooned part number, part name and quantity required.

5.10 3-PIECE SIDE ENTRY VALVE ASSEMBLY

NOTE: It is good practice to replace all seats and seals any time a valve is disassembled.

NOTE: Always use original OEM parts to make sure that the valve functions properly.

NOTE: All o-rings should be lightly lubricated at assembly with lubricant that is compatible with the o-ring material and media in the valve.

Numbers in () refer to items shown in the exploded view.

Follow these steps to disassemble the valve:

1. Clean all valve components, if not previously done.
2. Place body on a clean surface.
3. Coat body studs with anti-corrosion grease.
4. Place the body adaptor with end flange surface resting on a clean surface that will not damage the flange facing.
5. Place the springs in the holes provided in the body and body adapter.
6. Fit the o-rings on the seats.
7. Lower the seats into the body and body adaptor.
8. Place the body adaptor o-ring and the body gasket on both body adaptors.
9. Place the stem o-ring and stem thrust washer on the stem.
10. Insert the stem into the stem housing.
11. Place the stem housing o-ring and gasket.
12. Place the anti-static spring, trunnion thrust washer, trunnion gasket, and trunnion o-ring.
13. Place the bush bearing into the recess in the ball on both the stem and trunnion side.

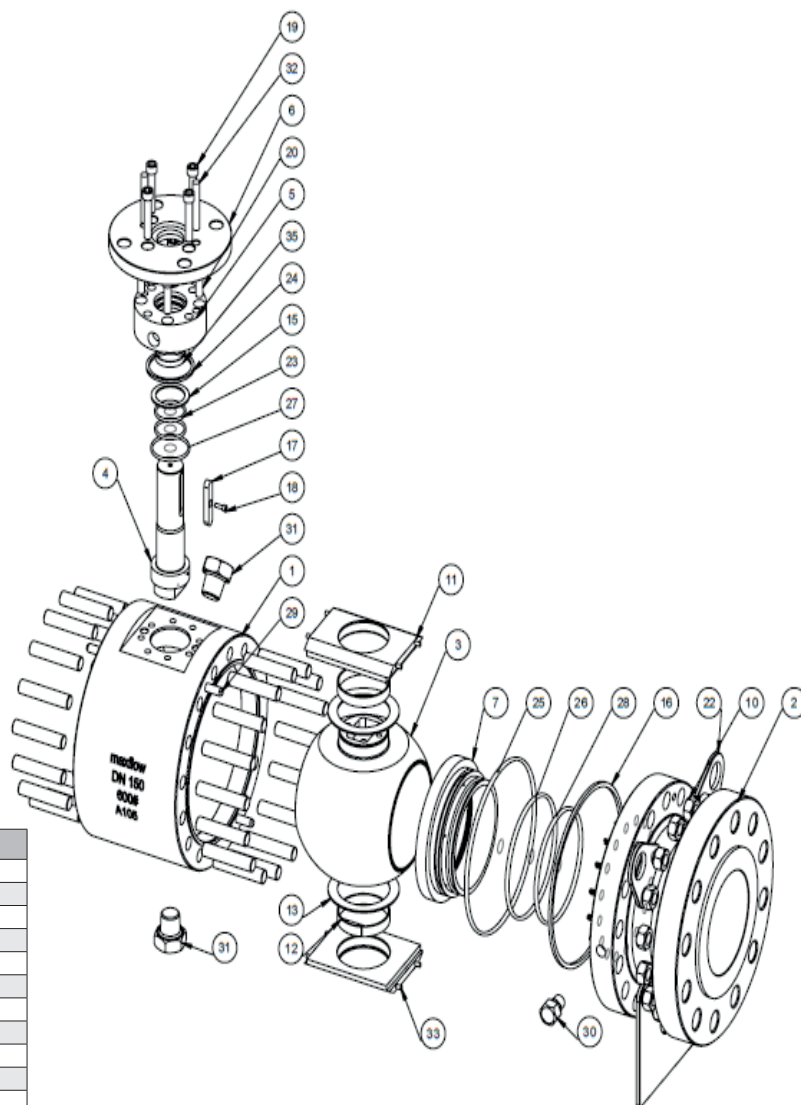
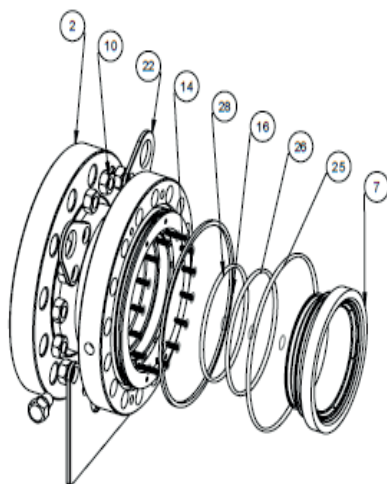
14. Carefully lift the ball and lower it into the body in the appropriate position, ensuring the stem connection is on the same side as the body stem bore.
15. Locate the trunnion in the ball recess and tighten the cap screws.
16. Lift the valve and place it so the direction of the flow arrow is horizontal.
17. Locate the dowel pins and place the stem housing on the body so the stem housing fits into the bush bearing and stem flats fit into the ball slot.
18. Install and tighten the cap screws for the stem housing.
19. Fit both body adaptors with the seat into the body and tighten the nuts.
20. Fit the stem gasket in the stem housing recess.
21. Locate the dowel pins, place the ISO mounting flange on the stem housing and tighten the cap screws.
22. Fit the stem key into the key slot.
23. For lever operated valves, place the hand coupler with lock and stop plate on the stem and tighten the hex bolt/grub screw.
24. For gearbox operated valves, place the coupling on the stem. Place the mounting bracket on the stem housing and install the studs and tighten the nuts to secure to the ISO mounting flange. Fit the gearbox onto the coupler and install the studs and tighten the nuts that secure to the mounting bracket.
25. Where applicable, fit sealant injection fittings for the stem and seats as well as the drain and vent plugs.
26. Rotate the ball slowly back and forth a full quarter turn to allow the seat to settle into position. A fast-turning motion may damage the seat.

NOTE: When the hand lever or gearbox is mounted onto the valve, it may be necessary to adjust the travel stops to ensure correct setting of the ball open and closed position. Check proper assembly of the key in the key slot.

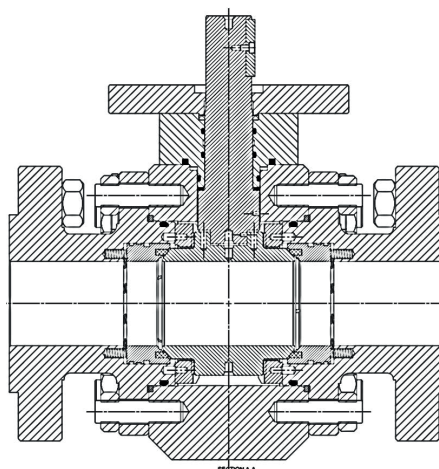
Fastener Tightening Torque, Nm			
Thread size	Class 8.8	Class 10.9	Class B7 / B7M / B8 / B8M
M8	20	30	6
M10	40	55	12
M12	70	100	22
M14	110	160	35
M16	170	240	55
M18	240	340	75
M20	330	460	110
M24	570	800	180
M27	860	1200	270
M30	1140	1600	360

NOTE: Ensure that all nuts and cap screws are tightened to the torque values specified in this **Table**.

EXPLODED VIEW 3-Piece side entry valve



Item No.	Part name
1	BODY
2	END PIECE
3	BALL
4	STEM
5	HOUSING
6	ISO TOP PLATE
7	SEAT INSERT
8	SEAT
9	STUD FOR BODY
10	NUT FOR BODY
11	TRUNNION PLATE
12	BEARING FOR 'T' PLAT
13	THRUST WASHER FOR 'T' PLATE
14	SPRING
15	THRUST WASHER STEM
16	BODY GASKET
17	KEY
18	SOCKET HEAD SCREW FOR KEY
19	SOCKET HEAD SCREW FOR ISO TOP PLATE
20	SOCKET HEAD SCREW FOR HOUSING
21	STAND
22	LIFTING PLUG
23	STEM O-RING
24	GASKET FOR HOUSING
25	BODY O-RING
26	PRIMARY O-RING
27	HOUSING O-RING
28	SECONDARY O-RING
29	DOWEL PINS
30	PLUG
31	DRAIN PLUG
32	DOWEL PINS FOR HOUSING
33	DOWEL PIN FOR 'T' PLATE
34	GASKET FOR ISO PAD
35	STEM BEARING BUSH



6. TESTING THE VALVE

WARNING:

WHEN PRESSURE TESTING, EXERCISE CAUTION AND MAKE SURE ALL EQUIPMENT USED IS IN GOOD WORKING CONDITION AND APPROPRIATE FOR THE INTENDED PRESSURE.

If the valve is to be tested prior to returning to service, make sure the test pressures are in accordance with an applicable standard.

When testing the valve for external tightness, keep the ball in the half open position.

If testing for seat tightness, please contact Valmet for advice.

WARNING:

WHEN PERFORMING ANY TESTS, NEVER EXCEED THE MAXIMUM OPERATING PRESSURE OR MAXIMUM SHUT-OFF PRESSURE LISTED ON THE IDENTIFICATION PLATE

7. ACTUATOR

WARNING:

BEFORE INSTALLING THE VALVE AND ACTUATOR, BE SURE THAT THE INDICATOR POINTER ON TOP OF THE ACTUATOR IS CORRECTLY INDICATING THE VALVE POSITION. FAILURE TO ASSEMBLE THESE PRODUCTS TO INDICATE CORRECT VALVE POSITION COULD RESULT IN DAMAGE OR PERSONAL INJURY.

CAUTION: When installing or servicing a valve/ actuator assembly, the best practice is to remove the entire assembly from service.

CAUTION: An actuator should be remounted on the valve from which it was removed. The actuator must be checked and readjusted for proper open and close position each time it is remounted.

WARNING:

THE VALVE BODY AND MOUNTING INTERFACE HAS BEEN DESIGNED TO SUPPORT THE WEIGHT AND OPERATION OF NELES ACTUATORS AND RECOMMENDED ACCESSORIES. USE OF THIS INTERFACE TO SUPPORT ADDITIONAL EQUIPMENT SUCH AS PEOPLE, LADDERS, ETC. MAY RESULT IN THE FAILURE OF THE VALVE OR ACTUATOR AND MAY CAUSE PERSONAL INJURY.

WARNING:

BEWARE OF BALL MOVEMENT!

KEEP HANDS, OTHER PARTS OF THE BODY, TOOLS AND OTHER OBJECTS OUT OF THE OPEN FLOW PORT. LEAVE NO FOREIGN OBJECTS INSIDE THE VALVE OR PIPELINE. WHEN THE VALVE IS OPERATED, THE BALL FUNCTIONS AS A CUTTING DEVICE.

8. TROUBLE SHOOTING

The following table lists the possible malfunctions that can occur after prolonged use:

Malfunction	Probable cause	Repair
Valve will not open or close	Iced up due to restricted flow or low temperature.	Inject antifreeze solution into valve body. Check to ensure compatibility of antifreeze solution used does not damage the valve seals. Drain valve periodically to eliminate water accumulation.
	Improper setting of gear or actuator stops.	Reset gear or actuator stops.
Difficult to operate the valve	Accumulation of material in the valve body.	Drain the valve.
	Infrequent operation, lack of lubrication.	Grease the valve.
	Gearbox hard to operate or stuck.	Check gear. Lubricate or replace.
	Operator not installed correctly.	Check operator.
Leak past the seat	Foreign material between seat and ball.	Grease the valve – operate several times to wipe clean.
	Valve not fully closed.	Check the stop plate or gear for fully closed position.
	Worn or damaged seat inserts.	Disassemble the valve and replace worn parts.
	Operator stops not set properly.	Adjust stops to proper setting.
	Worn or damage o-ring seals.	Disassemble the valve and replace seat o-ring. Check compatibility of o-ring material with the application media.
Leak around stem seal	Worn or damage stem o-ring.	Disassemble the valve and replace stem o-ring. Check compatibility of o-ring material with the application media.
Leak between body and adaptor	Worn or damage adaptor o-ring.	Disassemble the valve and replace adaptor o-ring. Check compatibility of o-ring material with the application media.
	Adaptor studs and nuts not tightened properly.	Tighten nuts to torque specified in table.
Grease fitting leaking	Debris in the fitting.	Inject a small amount of cleaner to dislodge debris.
	Damaged fitting.	Tighten the safety cap or replace the fitting.

WARNING:

NEVER REMOVE THE ENTIRE FITTING WITH THE VALVE UNDER PRESSURE.

9. SERVICE / SPARE PART

We recommend that valves be directed to Valmet service centers for maintenance. The service centers are equipped to provide rapid turn-around at a reasonable cost and offer new valve warranty with all reconditioned valves.

NOTE: When sending goods to the service center for repair, do not disassemble them. Clean the valve carefully and flush the valve internals. Include the material safety datasheet(s) (MSDS) for all media flowing through the valve. Valves sent to the service center without MSDS datasheet(s) will not be accepted.

For further information on spare parts and service or assistance visit our web-site at www.neles.com/valves.

NOTE: When ordering spare parts, always include the following information:

- Valve catalog code from label plate,
- If the valve is serialized – the serial number (from label plate)
- From exploded view, the ballooned part number, part name and quantity required

10. TYPE CODE

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
T40	01	01	FF	A	3	31	17	W3	51	S		

1.	Valve Model
T40	2-piece side entry, full bore
T45	2-piece side entry, reduced bore
T60	3-piece side entry, full bore
T65	3-piece side entry, reduced bore
E40	Top entry, full bore
E45	Top entry, reduced bore
W50	Fully welded, full bore
W55	Fully welded, reduced bore

2.	Pressure Class
01	Class 150
03	Class 300
04	Class 400
06	Class 600
09	Class 900
02	Class 1500
05	Class 2500

3.	End Connection
01	Raised face flange
02	Flat face flange
03	Ring type joint
07	Butt weld end

4.	Size, DN (NPS)
FF	DN 50 (2)
GG	DN 65 (2 ½)
HH	DN 80 (3)
JJ	DN 100 (4)
KK	DN 150 (6)
LL	DN 200 (8)
MM	DN 250 (10)
NN	DN 300 (12)
PP	DN 350 (14)
QQ	DN 400 (16)
RR	DN 450 (18)
SS	DN 500 (20)
TT	DN 600 (24)
UU	DN 750 (30)
VV	DN 900 (36)
WW	DN 1000 (40)
XX	DN 1050 (42)
YY	DN 1200 (48)
ZZ	DN 1400 (56)

5.	Operation
A	Lever
B	Bare stem
G	Gearbox
D	Actuator

6.	Ball Type
3	Solid ball
4	V port

7.	Body Material
31	WCB
32	CF8
33	CF8M
46	CF3
34	CF3M
35	A105
36	F304
37	F316
47	F304L
38	F316L
39	LCB
40	LF2
41	WCC
42	SS 904L
43	Alloy C
44	CD3MN
45	4A

8.	Ball Material
11	F304
12	F316
13	F316L
14	A105 + ENP
15	CF8M
16	CF8
17	WCB + ENP
18	SS 316L
22	SS 904L
24	Alloy C
25	SS 410
28	Inconel 825
32	CU5MCU
33	CF3
34	SS316 + ENP
37	CF3M + ENP

9.	Stem Material
22	F316
23	F316L
24	17-4 PH
25	SS 410
26	SS 304
27	SS 316
28	SS 316L
29	SS 904L
30	Alloy C
32	F51
33	F6A

10.	Seat Material
A1	A105 + Devlon
A2	A105 + PEEK
A3	A105 + RPTFE
F1	F316 + Devlon
F2	F316 + PEEK
F3	F316 + RPTFE
W1	WCB + Devlon
W2	WCB + PEEK
W3	WCB + RPTFE
C3	CF8M + RPTFE
ID	Inconel 825 + Devlon
D1	CD3MN + Devlon
A7	SS410 + Devlon
C6	CF3M + RPTFE

11.	Fasteners
51	B7 / 2H
52	B7M / 2HM
53	B8 / 8
54	B8M / 8M
55	L7 / 7
56	L7 / 4

12.	Manufacturing Type
S	Sand casting
I	Investment casting
F	Forging
B	Bar stock

13.	Certification
C	PED CE mark
I	IBR
A	API
F	Fire safe
N	Non Fire safe

General safety warnings

Lifting

1. Always use a lifting plan created by a qualified person to lift this equipment. Lifting guidance is provided in this IMO (Installation, Maintenance and Operation manual) to assist in lifting plan development. Think about the center of gravity (CG) of the equipment being lifted. Make sure the CG is always under the central lifting point.
2. Valves may be equipped with lifting threads on the body or on the flanges. These are intended to be used with the lifting plan.
3. Use only correct and approved lifting devices. Ensure that lifting devices and straps are securely attached to the equipment prior to lifting.
4. Check, that lifting devices are not damaged and in good condition with a valid check stamp prior to use.
5. Workers must be trained for lifting and handling valves.
6. Never lift an assembly by the instrumentation (solenoid, positioner, limit switch, etc.) or by the instrumentation piping. Straps and lifting devices should be fitted to prevent damage to instrumentation and instrumentation piping. Failure to follow the lifting guidance provided may result in damage and personal injury from falling objects.

Work activities on the valve

1. Wear your personal safety equipment. Personal safety equipment includes but is not limited to protective shoes, protective clothing, safety glasses, helmet, hearing protection and working gloves.
2. Always follow the local safety instructions in addition to the Valmet instructions. If Valmet instructions conflict with local safety instructions, stop work and contact Valmet for more information.
3. Before beginning service on the equipment, make sure that the actuator is disconnected from any kind of power source (pneumatic, hydraulic, and/or electric), and no stored energy is applied on the actuator (compressed spring, compressed air volumes, etc.). Do not attempt to remove a spring return actuator unless the stop screw is carrying the spring force.
4. Make sure that there is a LOTOTO (Lock Out / Tag Out / Try Out) procedure in place for the system in which the valve is installed and strictly follow it.
5. Always make sure that the pipeline is depressurized and in ambient temperature condition before maintenance work is started.
6. Keep hands and other body parts out of the flow port when the valve is being serviced and the actuator is connected to the valve. There is a high risk of serious injury to hands and/or fingers due to malfunction if the valve suddenly starts to operate.
7. Beware of Trim (Disc, Ball or Plug) movement even when the valve is disassembled. Trim may move simply due to the weight of the part or change in position of the valve. Keep hands or other body parts away from locations where they may be injured by movement of the trim. Do not leave objects near or in the valve port which may fall in and need to be retrieved.

General disclaimers

Receiving, handling and unpacking.

1. Respect the safety warnings above!
2. Valves are critical components for pipelines to control high pressure fluids and must therefore be handled with care.
3. Store valves and equipment in a dry and protected area until the equipment is installed.
4. Do not exceed the maximum storage temperatures given in the IMO (installation, maintenance, and operating instructions).
5. Keep the original packaging on the valve as long as possible to avoid environmental contamination by dust, water, dirt, etc.
6. Remove the valve endcaps just before mounting into the pipeline.
7. **FOR YOUR SAFETY IT IS IMPORTANT TO FOLLOW THESE PRECAUTIONS BEFORE REMOVAL OF THE VALVE FROM THE PIPELINE OR ANY DISASSEMBLY:**
 - Be sure you know what flow medium is in the pipeline. If there is any doubt, confirm with the proper supervisor.
 - Wear any personal protective equipment (PPE) required for working with the flow medium involved in addition to any other PPE normally required.
 - Depressurize the pipeline, bring to ambient temperature, and drain the pipeline flow medium.
 - Cycle the valve to relieve any residual pressure in the body cavity.
 - After removal but before disassembly, cycle the valve again until no evidence of trapped pressure remains.
 - The valves with offset shaft (Butterfly, eccentric rotary plug) have greater trim area on one side of the shaft. This will cause the valve to open when pressurized from the preferred direction without a locking handle or an actuator installed.
 - **WARNING: DO NOT PRESSURIZE THE ECCENTRIC VALVE WITHOUT A HANDLE OR AN ACTUATOR MOUNTED ON IT!**
 - **WARNING: DO NOT REMOVE A HANDLE OR AN ACTUATOR FROM AN ECCENTRIC VALVE WHILE PRESSURIZED!**
 - Before installing the eccentric valve in or remove it from the pipeline, cycle the valve closed. Eccentric valves must be in the closed position to bring the trim within the face to face of the valve. Failure to follow these instructions will cause damage to the valve and may result in personal injury.

Operating

8. The identification plate (ID-plate, type plate, nameplate, or engraved markings) on the valve gives the information of max. process conditions to the valve.
9. (For soft seats) The practical and safe use of this product is determined by both the temperature and pressure ratings of the seat and body. Read the identification plate and check both ratings. This product is available with a variety of seat materials. Some seat materials have pressure ratings that are lower than the body ratings. All body and seat ratings are dependent on the valve type, size and material of the body and seat. Never exceed the marked rating.

10. Temperatures and pressures must never exceed values marked on the valve. Exceeding these values may cause uncontrolled release of pressure and process medium. Damage or personal injury may result.
11. The operating torque of the valve may rise over time due to wear, particles or other damage of the seat. Never exceed the actuator torque preset values (air supply, position). Application of excessive torque may cause damage to the valve.
12. Valmet valves typically are designed to be used in atmospheric conditions. Do not use valves under external pressurized conditions unless specifically designed and explicitly marked for this service.
13. Avoid Pressure shocks or water hammer. Systems with high pressure valves should be equipped with a bypass to reduce the differential pressure before opening the valve to avoid pressure shock.
14. Avoid thermal shock. High temperature, Low temperature and cryogenic valves should be operated in a way that limits the rate of increase or decrease in temperature. The valve should be thermally stabilized before being pressurized.
15. Materials of the valve are carefully selected for the process conditions. Changes to the process media can have a major impact on function and safety of the valve. Always confirm the materials are suitable for the service prior to installation.
16. As the use of the valve is application specific, several factors should be considered when selecting a valve for a given application. Therefore, some situations in which the valves are used are outside the scope of this manual.
17. It is the end user's responsibility to confirm compatibility of the valve materials with the intended service, however if you have questions concerning the use, application, or compatibility of the valve for the intended service, contact Valmet for more information.
18. Never use a valve with enriched or pure oxygen if the valve is not explicitly designed and cleaned for oxygen. Selected materials and design have a major impact on the safety to operate the valve with oxygen.
19. Valves intended for use in or with explosive atmospheres must be equipped with a grounding device and marked according ATEX (or equivalent international standards).
20. Manual handles are available for specific butterfly valve sizes and maximum line pressures. Do not operate a valve with a handle or wrench outside the size and pressure limits stated in the IMO. High line pressure may create a large enough force to pull the handle from the operator's hands. Damage or personal injury may result.
25. Always check the position of the valve before starting maintenance work. Follow the Lock out /tag out (LOTO) rules at the site before starting any maintenance activity.
 - See IMO for the correct stem position.
 - Consider that the positioner may give the wrong signals.
26. Sealing materials (soft sealing parts) should be changed when the valve is in maintenance. Always use original equipment manufacturers (OEM) spare parts to ensure proper performance of the repaired valve.
27. All pressure containing parts must be inspected visually for damage or corrosion. Damaged parts must be replaced.
28. Valve pressure retaining parts and all internals must be inspected for corrosion or erosion which may result in reduced wall thickness on pressure retaining parts. Damaged pressure retaining parts must be replaced with original equipment manufacturer's (OEM) replacement parts or repaired to factory specifications by an authorized Valmet service partner in order to maintain the warranty.
29. Do not use sharp tools, grinding machines, or files to work on functional surfaces such as sealing, seating or bearing surfaces as this can damage these surfaces.
30. Check the condition of sealing surfaces on the seats, trim (disc, ball, plug, etc.), body and body cap. Replace parts if there are significant wear, scratches, or damage.
31. Check the wear of bearings and bearing contact surfaces on the shaft and replace damaged parts if necessary.
32. Do not weld on pressure retaining parts without an ASME and PED qualified procedure and personnel.
33. Pressure retaining parts of valves in high temperature applications must be carefully examined for the effects of material creep and fatigue.
34. Make sure that the valve is positioned in the correct flow direction into the pipeline.
35. If the valves are marked to be suitable for explosive atmospheres, the correct function of the discharging device must be tested before returning to service.
36. Always work in a clean environment. Avoid getting particles inside the valve due to machining, grinding, or welding nearby.
37. Never store a valve in maintenance without flow port protection.
38. When pressure testing valve seats, never exceed the maximum operating pressure of the system or the maximum shut- off pressure marked on the valve identification plate.
39. Actuator mounting and unmounting:
 - Before installing the actuator on to the valve, be sure the actuator is properly indicating the valve position. Failure to assemble these to indicate correct valve position may result in damage or personal injury.
 - When installing or removing a linkage kit, best practice is to remove the entire linkage assembly, including couplings which may fall off the valve during lifting or when position changes.
 - Mounting sets have been designed to support the weight of the Valmet actuator and recommended accessories either as is or with additional actuator support. Use of the linkage to support additional equipment or additional weight such as people, ladders, etc. may result in equipment damage or personal injury.

Maintenance

21. Respect the safety warnings above!
22. Plan service and maintenance actions, that spare parts, lifting devices and service personnel is available.
23. Maintain the valve within the recommended minimum maintenance intervals or within the recommended maximum operating cycles.
24. Always make sure that the valve and the pipeline is depressurized before starting any kind of maintenance work at a valve.

40. The valve should be installed between flanges using appropriate gaskets and fasteners that are compatible with the application, and in compliance with applicable piping codes and standards. Center the gaskets carefully when fitting the valve between the flanges. Do not attempt to correct pipeline misalignment by means of the flange bolting.
41. Repairs on valves for special service like Oxygen, Chlorine, and Peroxide, have special requirements.
- Parts must be cleaned appropriate to the service and protected from contamination prior to assembly.
 - Assembly areas and tools must be clean and dry to prevent contamination of the parts during assembly.
 - Test equipment must be clean and dry to prevent contamination during testing. This includes the test equipment internals that may allow particles or other contamination into the test medium during the test.
 - Lubrication shall be used only if specifically required in the instructions. Where lubrication is required, the lubricant must be approved for the service by the end user.

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