# Neles™
# PB2 series full bore flange PFA lined ball valve
## NPS 1/2″ – 6″

Installation, maintenance and operating instructions

# Table of contents



**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™ PB2 Series full bore, seat supported, flanged PFA lined 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 name plate attached to the valve body. The name plate markings identify the size, materials of construction, pressure rating, month and year of construction, and a unique manufacturing order number.

## 1.3 SAFETY PRECAUTIONS

**WARNING:**
**DO NOT EXCEED THE VALVE PERFORMANCE LIMITATIONS!**
EXCEEDING THE PRESSURE OR TEMPERATURE LIMITATIONS MARKED ON THE VALVE NAME 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 NAME 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:**

**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 / BRACKETS. 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 1**).

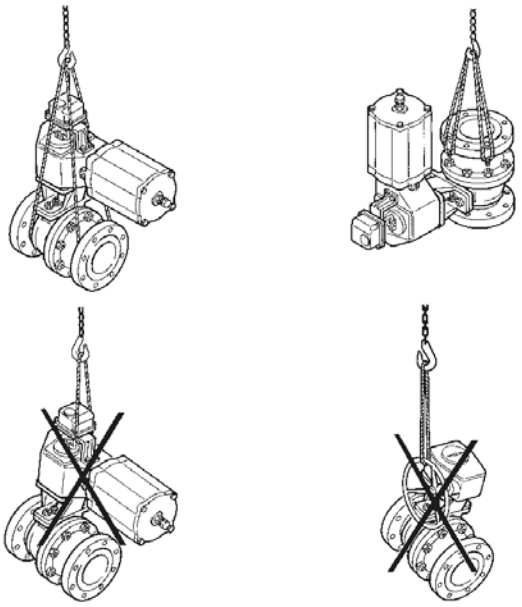


Figure 1. Lifting of the valve assembly

## 1.4 TECHNICAL SPECIFICATION

| | |
|---|---|
| Series: | PB2 |
| Bore: | Full bore |
| End connection: | Raised face, flanged |
| Service fluid: | Dangerous or non-dangerous gas or liquid |
| Service temperature & pressure: | ASTM A395 Ductile cast iron body: -10°C to 160°C, 17.2 bar to 7 bar<br>ASTM A351 CF8 body: -30°C to 160°C, 19 bar to 7 bar |
| Size: | NPS 1/2” to 6” |
| Rating: | ASME Class 150 |
| Face-to-face length: | ASME B16.10 |
| Leakage rate: | API 598 |

# 2. TRANSPORTATION AND STORAGE

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

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

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

Move the valve to its intended location just before installation.

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:**

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!

The valve may be installed in any position and offers tight shut-off in either flow direction. When in a horizontal line, it is not recommended to install a valve with the stem on the underneath side as debris in the pipeline may enter the body cavity and damage the gland packing.

Refer to Section 4, MAINTENANCE for gland packing adjustment. If there is seepage past the gland packing upon installation, it means the valve may have been subject to wide temperature variations in shipment. Leak-tight performance will be restored by a simple stem seal adjustment described in the MAINTENANCE section.

## 3.3 VALVE INSULATION

Neles™ 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 2.**

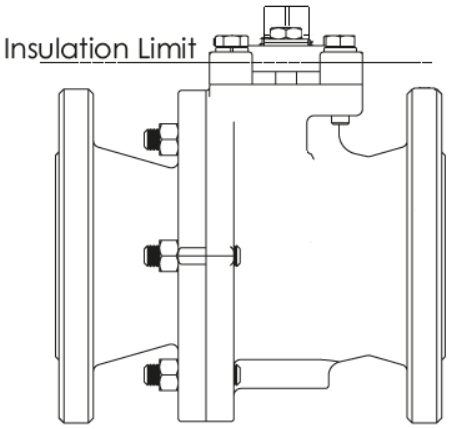



Figure 2. Insulation of the valve

## 3.4 ACTUATOR

**WARNING:**

WHEN INSTALLING THE ACTUATOR ON THE VALVE, MAKE SURE THAT THE VALVE ASSEMBLY FUNCTIONS PROPERLY. INFORMATION ON ACTUATOR INSTALLATION IS GIVEN IN SECTION 7 OR IN THE 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. MAINTENANCE

## 4.1 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 (item 16 in exploded view) 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. 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.

# 4.2 ACTUATED VALVE

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.

# 4.3 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

1. Follow the steps in all the **WARNING** sections above before performing any work on the valve.
2. Open and close the valve and leave in the closed position.
3. Remove the handle bolts (12), washers (10), handle (8).
4. Remove the C-ring (11), and then remove the stop plate (9).
5. Remove the gland bolts (14), washer (13), and then the gland (6).
6. Place the valve in the vertical position with the cap (2) end up.
7. Remove the body nuts (16) and remove the cap (2). Be careful not to scratch the ball.
8. Remove the seat (5) from the body cap.
9. Close ball (3) by rotating stem (4) and lift ball (3) from body.
10. Remove the lower seat (4) from the valve body. Be careful not to scratch the body sealing surface behind the seat.
11. Press the stem (4) from the top into valve body and carefully remove it.
12. Remove the gland packing (7).

# 4.4 CHECKING PARTS

1. Clean all disassembled parts.
2. Check the stem (4) and ball (3) for damage. Pay particular attention to the sealing areas.
3. Check all sealing and gasket surfaces on the body (1) and cap (2).
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 cracks, gouges or pits that will affect sealing.

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

a. Valve type code as per technical bulletin and model number from name plate,

b. If the valve is serialized - the serial number (stamped on the valve body or name plate) or applicable manufacturing order number,

# 4.5 VALVE ASSEMBLY

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

It is advisable to replace seats and seals if complete disassembly and reassembly become necessary.

1. Clean all valve components, if not previously done.
2. Inspect all components for damage before assembling the valve. Look for damage to the sealing areas on the ball, stem, and body.

3. With a brush, clean body blots (15) and gland bolts (14) of foreign material such as paint, thread locker, grime and commodity. Inspect the threads for damage or defect with appropriate ring or plug gage. Repair any out-of-tolerance threads or replace in-kind.
4. Re-inspect all components for damage to the sealing areas, stem (4), body (1), and cap (2). Replace any damaged parts.
5. Carefully clean and polish the ball (3) sealing surface: It should be free of all scratches and grooves.
6. If the ball is damaged, or scratches are present, replace the ball.
7. With the body cavity facing up, insert one valve seat (5) into the body (1) to below the stem bore. Tilt the seat into place and position so the proper surface will be in contact with the ball.
8. Insert the stem (4) into the body (1), and press it gently up into the stem.
9. Holding stem (4) in place from the bottom and insert the gland packing (7) over the stem. See **Figure 2** for proper V-ring orientation.

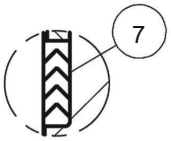



Figure 3. V-ring packing orientation

10. Install the gland (6), washers (13), and gland bolts (14).

11. Tighten the gland bolts (14) evenly until the gland packing (7) is compressed and then tighten an additional ¼ turn. Visually inspect to ensure the gland (6) is parallel with top of actuator mounting flange.

12. Rotate the stem (4) so the ball drive is in the closed position. Place the ball (3) into the body cavity by partially rotating and sliding the ball onto the stem (4) and against the seat (5). Make certain the stem is roughly in the middle of the ball slot.

13. Place the second seat (5) into the cap (2) in the correct orientation so the proper surface contacts the ball.

14. Carefully place the cap (2) on top of the body (1) and loosely install the body nuts (16). Lightly lubricate bolts and face of nut with anti-seize grease. Tighten the body nuts in an alternating sequence across the body, gradually increasing the tightening torque in multiple steps to applicable torque from **Table 1**.

| Table 1 | | |
|---|---|---|
| **Valve Size NPS** | **Spec of Bolt holes** | **Bolt torque Nm 0...+30%** |
| 1/2 | M12 x 4 | 15 |
| 3/4 | M12 x 4 | 15 |
| 1 | M12 x 4 | 15 |
| 1 1/2 | M16 x 4 | 44 |
| 2 | M16 x 4 | 49 |
| 2.5 | M16 x 4 | 53 |
| 3 | M16 x 8 | 53 |
| 4 | M16 x 8 | 104 |
| 6 | M20 x 8 | 137 |

10. After fully tightening the gland packing and body joint flange, operate valve to verify smooth operation during opening and closing.
11. If the actuator was removed, reinstall and set the actuator stops as described in the **ACTUATOR MOUNTING INSTRUCTIONS** Section.

## 4.6 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.

# 5. 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.

## 5.1 ACTUATOR MOUNTING INSTRUCTIONS

1. When a spring-return actuator is being mounted, the valve should be in the closed position for spring-to-close operation or in the open position for the spring-to-open operation. When an electric or double-acting pneumatic actuator is being mounted, the valve position should correspond to the indicated actuator position.
2. Assemble actuator onto the valve, ensuring full engagement between the stem and actuator drive, and the actuator fully contacts the mounting face on the valve.
3. Tighten actuator mounting screws to the torque listed in **Table 2**.

**CAUTION:**
Do not exceed the tightening torque. Applying excessive tightening torque can damage the aluminum threads in the actuator body.

| TABLE 2 | |
|---|---|
| **Torque to Aluminum Body Actuators** | |
| **Bolt Size** | **No Lubrication to Screws** |
| **mm** | **N.m** |
| M6 | 6.8 |
| M8 | 15 |
| M10 | 30 |
| M12 | 52 |
| M16 | 122 |
| M20 | 230 |

4. Cycle actuator and verify proper ball position in both open and closed positions. Adjust the actuator travel stops as necessary.

# 6. 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 warranty for reconditioning based on condition of each valve.

**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:

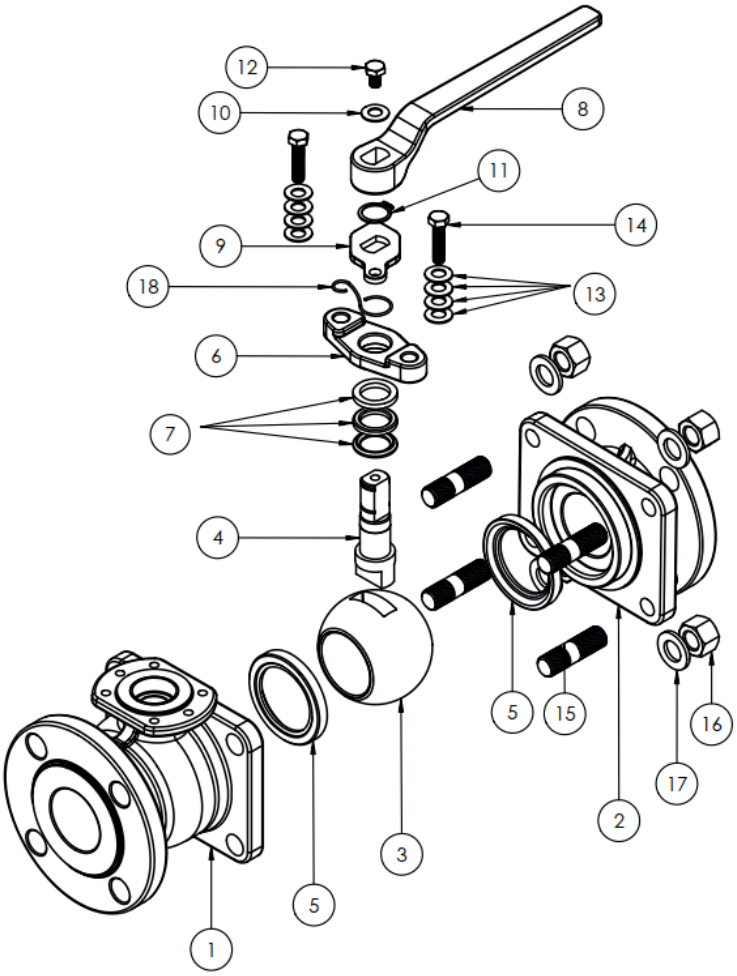
a. Valve ype code as per technical bulletin and model number from name plate,
b. the valve is serialized - the serial number (stamped on the valve body or name plate) or applicable manufacturing order number.

# 7. WELDING WARNING

**WARNING:**

WELDING AND/OR GRINDING OF STAINLESS STEEL AND OTHER ALLOY STEELS CONTAINING CHROMIUM METAL MAY CAUSE THE RELEASE HEXAVALENT CHROMIUM. HEXAVALENT CHROMIUM, CHROMIUM(VI) OR CR(VI), IS KNOWN TO CAUSE CANCER. BE SURE TO USE ALL APPROPRIATE PPE WHEN WELDING METALS CONTAINING CHROMIUM. IF YOU HAVE ANY QUESTIONS CONSULT YOUR SUPERVISOR.

# 8. EXPLODED VIEW




| Bill of Material and Parts List | | | |
|---|---|---|---|
| Part no. | Part name | Material | |
| | | Ductile Iron<br>D2 | Stainless Steel<br>S4 |
| 1 | Body | ASTM A395 Ductile Iron+PFA | ASTM A351 CF8+PFA |
| 2 | Cap | ASTM A395 Ductile Iron+PFA | ASTM A351 CF8+PFA |
| 3 | Ball | ASTM A351 CF8+PFA or ASTM A276 304+PFA | |
| 4 | Stem | ASTM A276 304+PFA | |
| 5 | Seat | TFM 1600 | |
| 6 | Gland | ASTM A351 CF8 | |
| 7 | Gland packing | PTFE | |
| 8 | Handle | ASTM A216 WCB | ASTM A351 CF8 |
| 9 | Stop plate | ASTM A276 304 | |
| 10 | Washer | ASTM A276 304 | |
| 11 | C-ring | ASTM A276 304 | |
| 12 | Bolt | ASTM A193 Gr. B8 | |
| 13 | Washer | ASTM A276 304 | |
| 14 | Gland bolt | ASTM A193 Gr. B8 | |
| 15 | Body bolt | ASTM A193 Gr. B8 | |
| 16 | Body nut | ASTM A194 Gr.8 | |
| 17 | Washer | ASTM A276 304 | |
| 18 | Anti-static spring | ASTM A313 302 | |

# 9. TYPE CODE

## ***NELES PB2*** FULL BORE FLANGE PFA LINED BALL VALVE

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| PB2 | C | A | 01 | D2 | Z | T | A | - |

| 1. sign | Valve series & Style |
|---|---|
| PB2 | PFA lined ball valve, full bore, Face-to-face: ASME B16.10 |

| 2. sign | Pressure rating |
|---|---|
| C | ASME Class 150 |

| 3. sign | Construction |
|---|---|
| A | Standard construction, PFA lining. |

| 4. sign | SIZE NPS |
|---|---|
| 0H | 1/2" |
| 3Q | 3/4" |
| 01 | 1" |
| 1H | 1 1/2" |
| 02 | 2" |
| 2H | 2 1/2" |
| 03 | 3" |
| 04 | 4" |
| 06 | 6" |

| 5. sign | Material of body & trim | | |
|---|---|---|---|
| | Body | Ball | Stem |
| S4 | CF8+PFA | 304+PFA | 304+PFA |
| D2 | DI+PFA | 304+PFA | 304+PFA |

| 6. sign | Material of seat |
|---|---|
| Z | TFM 1600 |

| 7. sign | Packing material |
|---|---|
| T | PTFE Live loaded packing |

| 8. sign | Version |
|---|---|
| A | Model A |

| 9. sign | Additional requirement |
|---|---|
| - | No |
| LD | Locking device |

**NOTE:**
As the use of the valve is application specific, a number of factors should be taken into account when selecting a valve for a given application. Therefore, some of the applications in which the valves are used are outside the scope of this document. If you have any questions concerning the use, application or compatibility of the valve with the intended service, contact nearest Valmet sales office for more information.

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