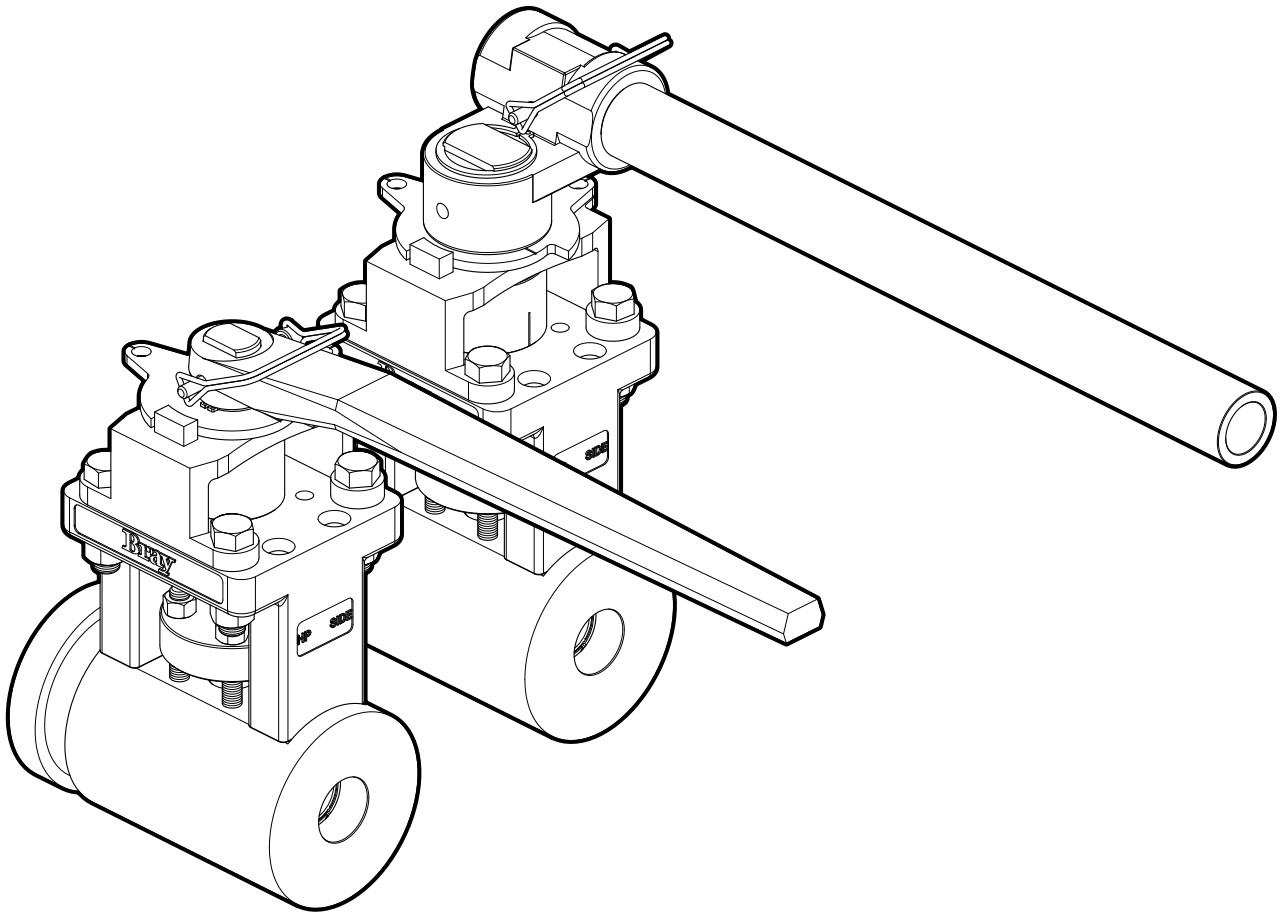


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**SERIES M4**

# **SEVERE SERVICE BALL VALVE**

Installation, Operation, and Maintenance Manual



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**READ AND FOLLOW THESE INSTRUCTIONS CAREFULLY.  
FOR THE LATEST IOM VERSION, VISIT BRAY.COM**

## 1.0 DEFINITION OF TERMS

All information within this manual is relevant to the safe operation and proper care of your Bray valve. Please understand the following examples of information used throughout this manual.

Specific instructions for non-standard materials of construction, temperature range, etc. should be referred to the factory.

### 1.1 Safety Statements

To prevent unwanted consequences, standard symbols and classifications are used as shown below:



#### **DANGER**

Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.



#### **WARNING**

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



#### **CAUTION**

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.



#### **NOTICE**

Used without the safety alert symbol, indicates a potential situation which, if not avoided, may result in an undesirable result or state, including property damage.

**NOTE:** Provides important information related to a procedure.

## 2.0 GENERAL INFORMATION

### 2.1 Introduction



#### NOTICE

Failure to follow these procedures and observe these notes, cautions and warnings including the use of non-OEM parts could lead to hazards and/or void product warranties, either expressed or implied.

Series M4 severe service ball valve is a floating ball valve with unidirectional sealing. It is important and critical to install the valve correctly in the pipeline to assure the valve will isolate the proper side of the piping system.

Series M4 are engineered using advanced technology, featuring a 1-piece uni-body construction, with heavy-duty drive train, 360° mate-lapped ball and seat with high velocity oxygen fuel (HVOF) and spray & fuse hard coating options and live-load packing with Belleville springs.

Series M4 severe service ball valves are ideal for service in conventional coal and combined cycle power generation, nuclear balance of plant applications, co-generation, for boiler drains, feed water drains, header drains, turbine drains, above and below seat drains, super heater vents and drains, steam drum vents, soot blower isolation, bypass line isolation and economizer header drain applications as well as specialized applications including, power operated pressure relief valves, and sky vents.

The valve should be maintained as part of a preventative maintenance program and in accordance with Bray's recommended pressure and temperature to ensure a long service life. During shipment, storage, and in operation, the valve should be fully open or fully closed ("open" is preferred for shipping and storage).

Additional product information (such as application data, engineering specifications, actuator selection, etc.) is available from your local Bray distributor or sales representative, or online at **BRAY.COM**

For complete details on the latest product certifications, visit **BRAY.COM/Certifications**.

### 2.2 Use

The following instructions are designed to assist in the unpacking, installation, and maintenance as required for Bray ball valves. Product users and maintenance personnel should thoroughly review this manual prior to installing, operating, or performing any maintenance. In most cases, Bray valves, actuators, and accessories are designed for specific applications (e.g. with regard to medium, pressure and temperature). For this reason, they should not be used in other applications without first contacting the manufacturer.



## **WARNING**

Before installing this equipment, confirm that it is suitable for the intended service. The identification tags describe the maximum allowable service conditions for this product. Be sure that the installation is protected by appropriate pressure control and safety devices to ensure that acceptable limits are not exceeded.

### **2.3 Applicability**

The following instructions are applicable to the maintenance and installation of Bray ball valves. These instructions cannot claim to cover all details of all possible product variations, nor can they provide information for every possible example of installation, operation, or maintenance. This means that the instructions normally include only the directions to be followed by qualified personnel using the product for its defined purpose. If there are any uncertainties in this respect, particularly in the event of missing product related information, clarification must be obtained via the appropriate Bray sales office.

## 3.0 SAFETY INFORMATION



### NOTICE

Failure to follow these procedures could affect product warranty.

Read completely and understand all instructions provided prior to beginning installation or maintenance.

Follow all instructions as described using the correct tools for the job.

Before installing this equipment, confirm that it is suitable for the intended service. The identification tags describe the maximum allowable service conditions for this product.

Be sure that the installation is protected by appropriate pressure control and safety devices to ensure that acceptable limits are not exceeded.



### WARNING

Prior to servicing, remove actuation media and power and confirm there is no stored energy in the actuation such as compressed springs or trapped air before beginning service. Stored energy devices can cause serious injury if the energy is released without warning.

Confirm that line pressure has been removed and that there is no pressure trapped within the valve prior to beginning service. Do not attempt to remove any packing components or other fittings before confirming that pressure has been completely removed!



### WARNING

Before working on valve being in service make sure that service media has been flushed and line is safe. Make sure that all applicable MSDS sheets are available. Follow all safety related procedures.

Do not begin service work without proper tools and protective safety measures.

The work area should be clear of obstructions and other safety hazards.



### NOTICE

Before disassembly valve shall be cycled several times to assure there is no pressure trapped in body cavity.



### WARNING

During the pressure test of reassembled valve follow all safety precautions to avoid possible injury. (Use of proper test equipment, correct parts assemblies, follow test procedures.)



### WARNING

While line is under pressure DO NOT remove packing gland or any other valve parts

### 3.1 Protective Clothing

Bray products are often used in critical applications (e.g. under extremely high pressures with dangerous, toxic, or corrosive mediums). When performing service, inspection, or repair operations, always ensure that the valve and the actuator are depressurized, the valve has been cleaned, and the valve is free of harmful substances. In such cases, pay particular attention to personal protection (e.g. protective clothing, gloves, glasses, etc.).

### 3.2 Service and Repair

To avoid possible injury to personnel or damage to products, safety terms must be strictly adhered to. Modifying this product, substituting non-factory parts, or using maintenance procedures other than those outlined in these Installation, Operation and Maintenance instructions could drastically affect performance, be hazardous to personnel and equipment, and may void existing warranties.

Apart from the operating instructions and the obligatory accident prevention directives valid in the country of use, all recognized regulations for safety and good engineering practices must be followed.

### 3.3 Hazard-Free Use



#### NOTICE

Failure to follow these procedures could affect product warranty.

This device left the factory in proper condition to be safely installed and operated in a hazard-free manner. The notes and warnings in this document must be observed by the user if this safe condition is to be maintained and hazard-free operation of the device assured.

Take all necessary precautions to prevent damage to the valve due to rough handling, impact, or improper storage. Do not use abrasive compounds to clean the valve, or scrape metal surfaces with any objects.

The control systems in which the valve is installed must have proper safeguards — to prevent injury to personnel, or damage to equipment — should failure of system components occur.

The upper limits of permitted pressure and temperature (depending on the housing and liner materials) must be observed. These limits are shown on the valve identification tag.

The valve must not be operated until the following documents have been observed:

- > Declaration on EU Directives (if applicable)
- > IOM Manual (supplied with the product).

## 3.4 Qualified Personnel



### NOTICE

Failure to follow these procedures could affect product warranty.

A **qualified person** (in terms of this document) is one who is familiar with the installation, commissioning, and operation of the device, and who has appropriate qualifications, such as:

1. Is trained in the operation and maintenance of electrical equipment and systems in accordance with established safety practices.
2. Is trained or authorized to energize, de-energize, ground, tag, and lock electrical circuits and equipment in accordance with established safety practices.
3. Is trained in the proper use and care of personal protective equipment (PPE) in accordance with established safety practices.
4. Is trained in the commissioning, operation, and maintenance of equipment in hazardous locations — in cases where the device is installed in a potentially explosive (hazardous) location.
5. For weld end valves it is recommend the welder have certifications to either ASME BPVC Section 9 or PED based on the applicable country of installation



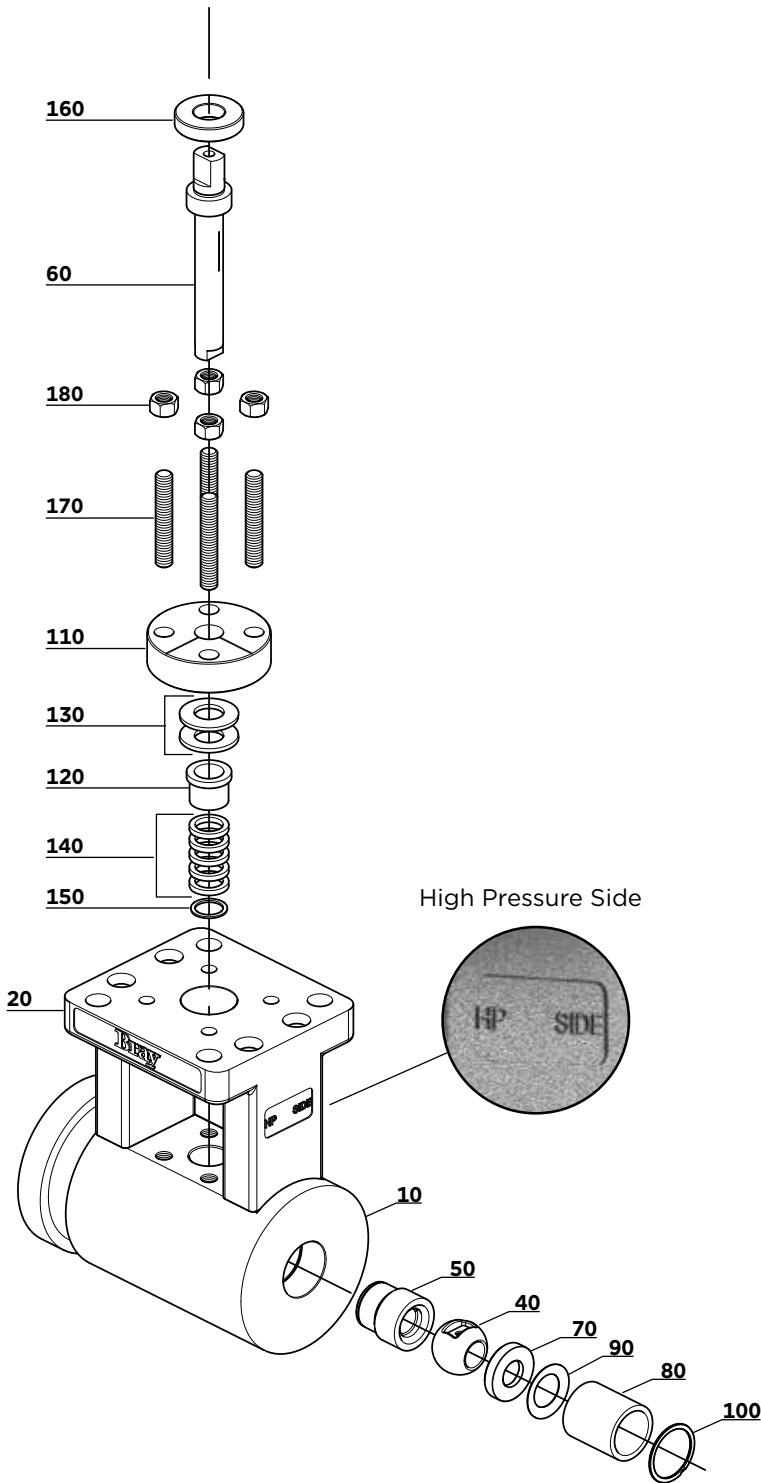
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## 4.0 PARTS IDENTIFICATION

### 4.1 Valve Parts Callout / Parts List - ASME CLASS 1700, 3100, 4500 | NPS ½ to 4 | DN 15 to 100



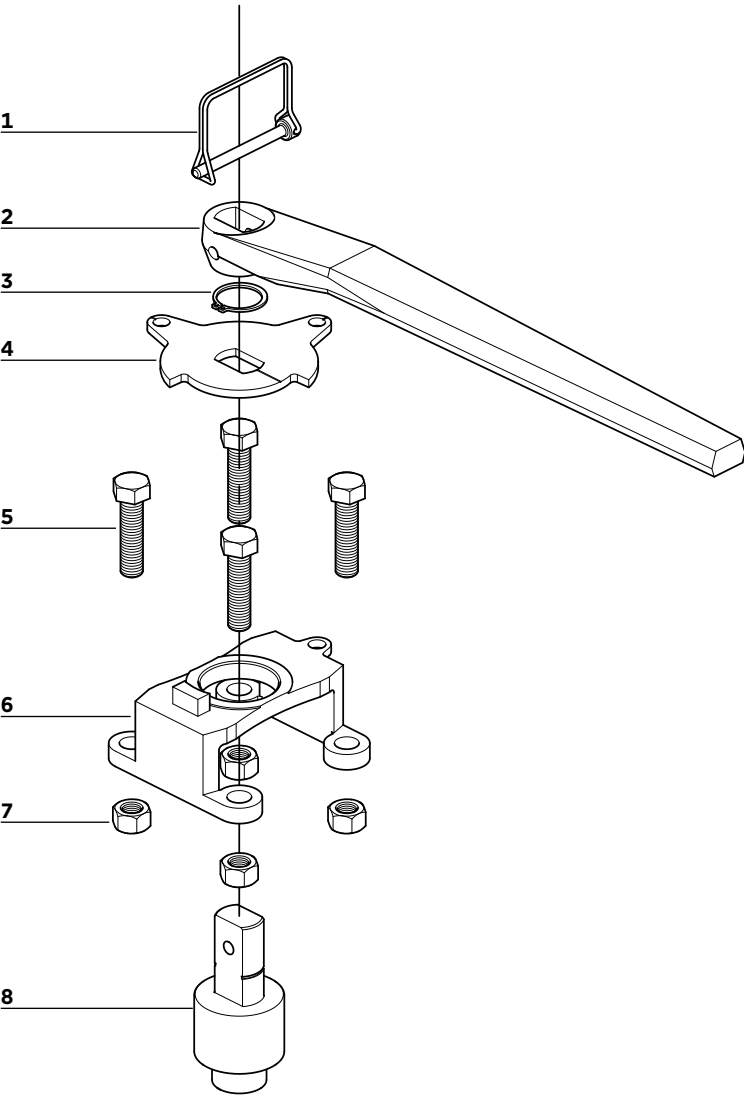
| ITEM | DESCRIPTION              |
|------|--------------------------|
| 10   | Body                     |
| 20   | Bracket                  |
| 40   | Ball                     |
| 50   | Primary Seat             |
| 60   | Stem                     |
| 70   | Pusher Seat              |
| 80   | Transition Sleeve        |
| 90   | Seat Spring              |
| 100  | Retaining Ring           |
| 110  | Gland Flange             |
| 120  | Gland Follower           |
| 130  | Live Loading             |
| 140  | Packing Set              |
| 150  | Anti-Extrusion Ring      |
| 160  | Stem Bearing             |
| 170  | Gland Stud               |
| 180  | Gland Nut                |
| 190  | Roller Pin (not shown)   |
| 200  | Bracket Bolt (not shown) |

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## 4.2 Cast Handle Parts Callout / Parts List



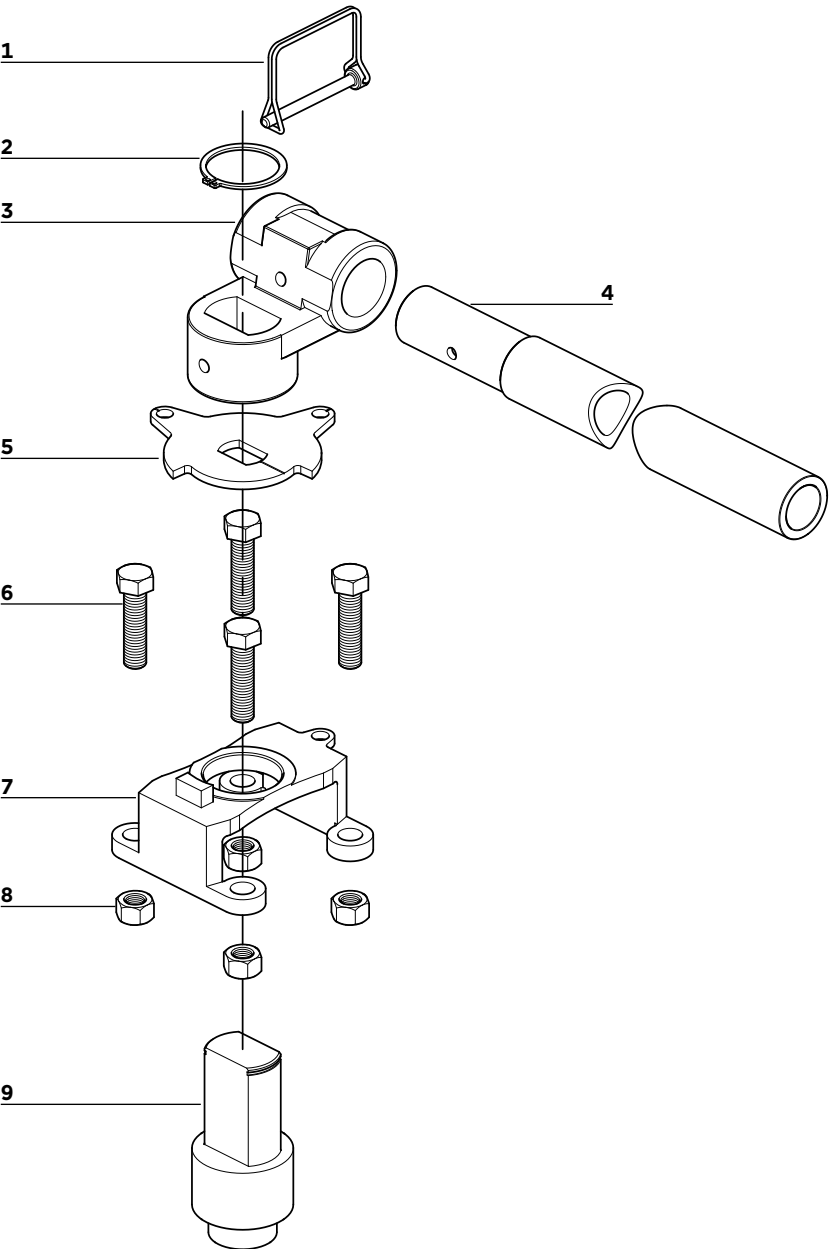
| ITEM | DESCRIPTION         |
|------|---------------------|
| 1    | Snap Pin            |
| 2    | Handle              |
| 3    | Snap Ring           |
| 4    | Travel Stop Plate   |
| 5    | Bolt                |
| 6    | Travel Stop Housing |
| 7    | Nut                 |
| 8    | Stem Adapter        |

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## 4.3 Pipe Handle Parts Callout / Parts List




| ITEM | DESCRIPTION         |
|------|---------------------|
| 1    | Snap Pin            |
| 2    | Snap Ring           |
| 3    | Junction Head       |
| 4    | Handle              |
| 5    | Travel Stop Plate   |
| 6    | Bolt                |
| 7    | Travel Stop Housing |
| 8    | Nut                 |
| 9    | Stem Adapter        |

## 5.0 VALVE IDENTIFICATION

### 5.1 Identification Tag

All valves, actuators, or control products are provided with a permanently affixed identification tag meeting the requirements of applicable standards and certifications for the product.

As each product is unique, data may vary.

|   |        |           |           |          |         |    |
|---|--------|-----------|-----------|----------|---------|----|
|  | MODEL: |           | SIZE:     |          | B16.34: |    |
|   | BODY:  |           | BALL:     |          | SEAT:   |    |
|   | STEM:  |           | B/S CTG.: |          | MAX T:  | °F |
|   | MAX P: | psi@100°F |           | bar@38°C |         |    |
| S / N:  |        |           | P / N:    |          |         |    |

|                |                          |
|----------------|--------------------------|
| <b>Model</b>   | Valve Series Model       |
| <b>Size</b>    | Nominal Pipe Size x Bore |
| <b>B16.34</b>  | Pressure Class           |
| <b>Body</b>    | Body Material            |
| <b>Ball</b>    | Ball Material            |
| <b>Seat</b>    | Seat Material            |
| <b>Stem</b>    | Stem Material            |
| <b>B/S Ctg</b> | Ball/Seat Coating Code   |
| <b>Max P</b>   | Maximum Pressure         |
| <b>Max T</b>   | Maximum Temperature      |
| <b>S/N</b>     | Valve Serial Number      |
| <b>P/N</b>     | Valve Part Number        |

### 5.2 Valve Body Markings

Bray

Valve Model

NPS x Bore (if bore is different than NPS)

Pressure Class Rating

End Connection Designation

Material Designation

Body Heat Number

Serial Number

High Pressure End for both flanged and non-flanged valves

Additional markings may be required on body, depending on the type of valve.

- > Ring Number (RXX) for RTJ flanges, stamped on the OD of each flange.
- > Butt Weld Schedule (SCH XX) for BW end valves.
- > Hub Type (GRXX) for hub connection

## 6.0 HANDLING REQUIREMENTS



### WARNING

A potential hazard exists with handling valves. Failure to handle valves properly may cause a valve to shift, slip or fall causing serious injury or death and/or equipment damage.

### 6.1 Packed Valves

**Crates:** Lifting and handling of the packed valves in crates will be carried out by a forklift truck, by means of the appropriate fork hitches.

**Cases:** The lifting of packed valves in cases will be carried out in the lifting points and in the center of gravity position which has been marked. The transportation of all packed material must be carried out safely and following the local safety regulations.

Moving crated, packed, or palletized products must be done in a safe manner, using appropriate lifting equipment (i.e., forklift, hand truck, pallet jack, etc.)



### NOTICE

When lifting the valve from shipping container, use straps through valve body. Take care to position lifting straps to avoid damage to the tubing and mounted accessories.

### 6.2 Unpacked Valves

Lifting and handling of valves should be carried out by using appropriate means and observing the carrying limits. Handling must be carried out on pallets, protecting all machined surfaces to avoid any damage.

With large bore valves, rigging the load must be carried out by using the appropriate tools to prevent the valve from falling or moving during the lifting and handling.



### CAUTION

Product is shipped in protected position and must be transported in such a way as to avoid damage during movement.

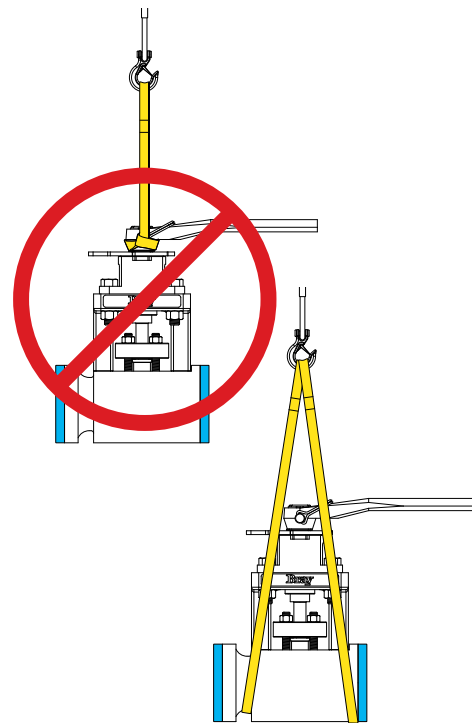
For handling and/or lifting, the lifting equipment (fasteners, hooks, etc.) must be sized and selected while considering the product weight indicated in our packing list and/or delivery note.

Lifting and handling must be performed only by qualified personnel.

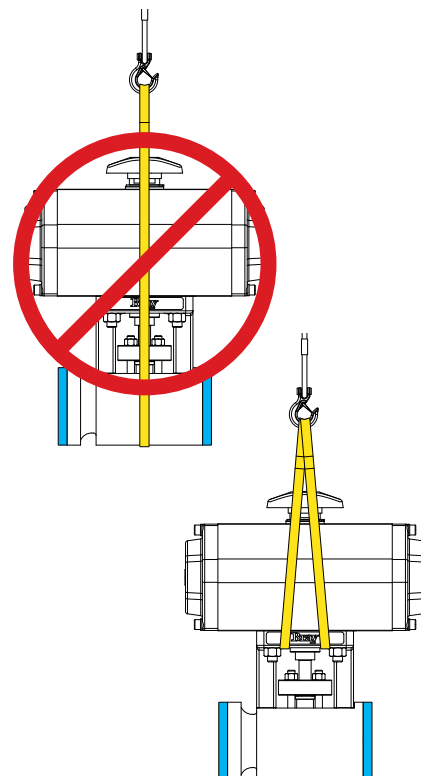
Fasteners must be protected by plastic covers in sharp corner areas.

Caution must be taken during handling to avoid this equipment passing over workers, or over any other place where a possible fall could cause injury or damage. In all cases, local safety regulations must be respected.

**Figure 1:** Correct lifting valve with handle



**Figure 2:** Correct lifting valve with actuator





## CAUTION

The end connection necks are suitable places to attach lifting slings/straps. Never use hand wheels or other protruding parts of the gearbox or actuator not designated for this purpose.



## NOTICE

During handling, protect the end connection faces and fittings against damage from the lifting devices. Failure to cover faces and fittings could cause damage to the valve.

While unpacking the valve, check the packing list against the materials received. Lists describing the valve and accessories are included in each shipping container and General Assembly drawing as applicable.



## WARNING

Never lift the valve or valve package by the actuator, positioner, limit switch or their piping. When lifting a valve, be aware that the center of gravity may be above the lifting point. Therefore, support must be given to prevent the valve from rotating. Failure to do so can cause serious injury to personnel and damage to the valve and nearby equipment.

Contact your shipper immediately if there is shipping damage. Should any problem arise, call your Bray representative.



## WARNING

A potential hazard exists with handling valves. Failure to handle valves properly may cause a valve to shift, slip or fall causing serious injury or death and/or equipment damage.

### 6.3 Moving Valves

Moving crated, packed, or palletized products must be done in a safe manner, using appropriate lifting equipment (i.e., forklift, hand truck, pallet jack, etc.)

Lifting of products should be done using lifting points, and in the center of gravity position as marked, in observance of existing carrying limits.



## CAUTION

Product is shipped in protected position and must be transported in such a way as to avoid damage during movement.

For handling and/or lifting, the lifting equipment (fasteners, hooks, etc.) must be sized and selected while considering the product weight indicated in our packing list and/or delivery note.

Lifting and handling must be performed only by qualified personnel.

Fasteners must be protected by plastic covers in sharp corner areas.

Caution must be taken during handling to avoid this equipment passing over workers, or over any other place where a possible fall could cause injury or damage. In all cases, local safety regulations must be respected.

### 7.0 TRANSPORT AND STORAGE



#### NOTICE

Failure to follow these procedures could affect product warranty.

The packaging is designed to protect the products only during shipping. If the product is not installed immediately after delivery, then it must be stored according to these requirements.

These are general guidelines for valve storage. Storage guidelines for accessories fitted on valves shall be as per respective Installation, Operation and Maintenance manual. Please consult the factory for information regarding specific requirements.

#### 7.1 Transport

Valves will be shipped in wooden crates that are plastic lined. Upon arrival at the site, valves general condition should be inspected right away for any potential shipping damage. Any damage should be reported to Bray,

#### 7.2 Short-Term Storage

Short-term storage is defined as storage of products and equipment to be used in the construction of a project for periods of one to three months. Short-term storage must be carried out in a controlled manner as follows:

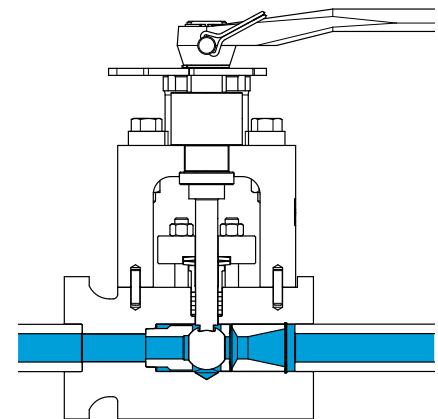
1. Valves must be stored in a closed, clean, and dry environment.
2. Ball valves should be stored in the fully open position to protect the ball and seats.
3. Ball valves should remain in the original shipping container and be placed on pallets of wood or other suitable materials. End protectors should remain on the valve ends to prevent the entrance of dirt and removed only at time of installation.

#### 7.3 Long-Term Storage

Long-term storage is defined as storage of products and/or equipment for periods longer than 3 months. Long-term storage must be carried out in a controlled manner as follows:

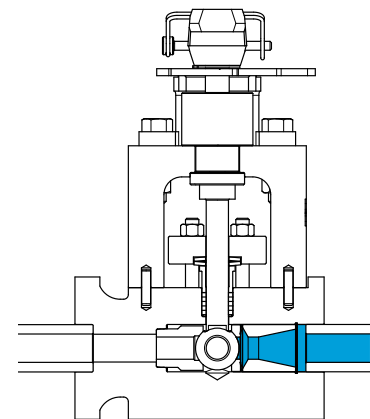
1. Valves must be stored in a closed, clean, and dry environment.
2. Ball valves should be stored in the fully open position to protect the ball and seats.
3. Ball valves should remain in the original shipping container and be placed on pallets of wood or other suitable materials. End protectors should remain on the valve ends to prevent the entrance of dirt and removed only at time of installation.

**Figure 3:** Valve fully open



**Fully Open**

**Figure 4:** Valve fully closed



**Fully Closed**

4. A visual inspection (with results recorded) shall be performed every three months to ensure the above conditions are maintained. Inspection, as a minimum, shall include reviewing the following:
  - > Packaging
  - > Flange covers
  - > Dryness
  - > Cleanliness

These are general guidelines for valve storage. Please consult the factory for information regarding specific requirements.



### CAUTION

Do not stack the products on top of each other.

## 7.4 General Storage Requirements

Manually actuated valves may be stored in the vertical or horizontal position. For air or hydraulically actuated valves, the preferred orientation is with the valve and cylinder in the vertical position. Access ports should be secured to prevent unauthorized entry and prevent contamination.

The preferred storage location is a closed, clean, and dry environment. Do not expose the product to temperature extremes.



### NOTICE

The preferred temperature range is 40°F (4°C) to 85°F (29°C). For long-term storage in temperatures lower or higher than the preferred range, please consult the factory for information regarding specific requirements.

End protectors shall remain on the valve ends to prevent the entrance of dirt, debris, or insects/wildlife.

Product shall remain in the original shipping container with the original packaging materials.

Valves and equipment containing elastomers, including O-rings, must be stored in a climate-controlled warehouse according to SAE-ARP5316D requiring:

1. The ambient relative humidity to be less than 75%.
2. No exposure from direct ultraviolet or sunlight.
3. Protection from ozone generating equipment or combustible gases and vapors.
4. Storage at temperatures below 100°F (38°C), away from direct sources of heat.
5. No exposure to ionizing radiation.



## 8.0 INSTALLATION

### 8.1 Considerations



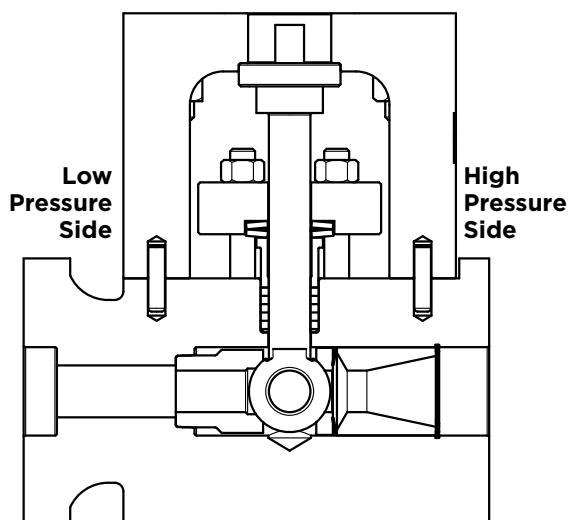
#### NOTICE

Valve constructions are unidirectional.

Identify the preferred sealing direction of the valve by positioning the valve in piping where the 'High Pressure End' is positioned toward the highest pressure against the valve when the valve is closed. Valve should be installed so that the primary sealing occurs at the low pressure end.

It is important and critical to install the valve correctly in the pipeline to assure the valve will isolate the proper side of the piping system.

**Figure 5:** Low and High Pressure



The valve may be fitted in any position on the pipeline.

Before installing the valves, the pipes must be flushed clean of dirt, burrs, and welding residues, or the seats and ball surface will be damaged. Check pipe end connections (threads, flanges, weld end connections, etc) to ensure they are not damaged.

If for any reason the valve is installed prior to flushing of the piping system, the valve must remain in the full open position until the piping system has been fully flushed clean of debris.

Ensure the adjoining pipe on each end of the valve is aligned to prevent external piping loads. Piping misalignment may cause excessive external loads on the valve resulting in body joint leaks.



#### NOTICE

Do not pressurize the line without an actuation device properly installed and working on the valve.

For hydrostatic testing of the piping system, the valves must be placed in the full or half open position prior to pressurizing the system.



### NOTICE

Hydrostatic system testing with the valve in the closed position may result in damage to the valve seats, affecting their ability to create a proper seal.

Failure to implement the installation and testing instructions as outlined, resulting in a valve failure, will void the warranty coverage of the product.



### WARNING

Before installing this equipment, confirm that it is suitable for the intended service. **Refer to the nameplate for maximum allowable service conditions for this product.**



When installing valves verify the orientation of handle, actuator and/or actuation accessories are not interfering with existing piping, equipment, or structure.

## 8.2 Actuator Installation

1. It is recommended to allow sufficient space for removal when actuator package is installed.
2. It is recommended to install the actuator package with the valve stem in the upright position. If stem is in other than vertical position, actuator package weight support is recommended to avoid any possibility of side load during operation.
3. It is recommended to avoid installing the actuator package where the actuator or accessories are in contact with the pipeline or pipeline structure.



### WARNING

Keep hands and other body parts clear of the valve flow port and other rotating machinery.

4. Prior to putting the valve into service, cycle valve/actuator to ensure valve, actuator and accessories operate properly.

## 8.3 Actuator Mounting

1. Inspect the valve actuator mounting surface, stem, mounting hardware, bracket, coupling/adaptor and actuator package for damage, wear or any other irregularity which could affect the operation and performance of the valve or actuator package.
2. Follow specific actuator installation, operating and maintenance instructions.
3. Select a desired orientation for the actuator mounting relative to the ball position as indicated by the scribe line on the stem.
4. Valve stem shall be in the upright position.
5. Ensure valve is properly supported when mounting the actuator.
6. Valve closure position per **Section 9**.
  - a. If the actuator is a spring return fail to close or double acting style actuator, the valve closure shall be set to closed position.
  - b. If the actuator is a spring return fail to open style actuator, the valve closure shall be set to open position.
7. Attached the mounting bracket to the valve with provided hardware hand tight. A lifting device may be required based on the size and weight of the bracket.
8. Install the coupling/adaptor on the valve stem. A lifting device may be required based on the size and weight of the coupling/adaptor.
9. Proper valve and actuator performance requires alignment between the valve stem and actuator drive. Misalignment can cause premature wear of the valve and actuator components.
10. Ensure actuator drive orientation is in the proper position.
11. Lift the actuator package from its storage location and lower the actuator so the actuator drive is in a direct line with the valve stem. Support actuator package once actuator is on the mounting bracket. Be careful not to force the valve stem into the valve as the actuator drive and stem are in contact.



### NOTICE

It may be necessary to loosen the mechanical stop to allow the mounting holes to align properly. Refer to actuator installation instructions.

12. Tighten the actuator provided mounting hardware hand tight. Maintain the actuator package support.
13. Cycle actuator 2 to 3 times to allow the assembly to center the valve stem, coupling/adaptor, and actuator drive.
14. Tighten the mounting hardware at the valve and actuator.

15. The actuator travel stops shall be adjusted to ensure proper valve closure position, open and closed. The actuator stops shall be set every time the actuator is removed from the valve.



## CAUTION

Valves can leak through bore if proper care is not exercised during the setting of Open and/or Closed stops.

### 8.4 Installation of Threaded Valves

Valve can be screwed on without the use of union.

The use of a thread sealant is recommended.



## CAUTION

Tightening by using the valve body, handle or the opposite endcap can seriously damage the valve; use a wrench on both the near thread and pipe to avoid applying torque to the body.

In some applications, screwed valves may be back-welded.

### 8.5 Installation of Weld-end Valves



## NOTICE

Ensure that appropriate weld procedures are implemented that are compatible with the materials used.

1. Clean the pipeline, connecting valve weld end, and the weld area on the pipe.
2. Remove the plastic protective caps from the valve ends (**Figure 6**). Do not remove the contraction rings.
3. Inspect the valve bore and remove any debris.
4. Ensure that the piping and valve end connections are properly aligned to avoid line bind.
5. Place the valve in open position, (the valve is in the open position when the handle is parallel to the axis of the valve and pipe).
6. Apply a welding ground strap adjacent to the valve end being welded to prevent current flow through the valve.
7. Follow the appropriate welding procedures per the applicable industry standards, that are compatible with the valve and piping materials being joined. While welding, monitor the valve body temperature near the seat pockets using a temperature indicator stick, Ensuring that the temperature does not exceed 593°C (1100°F).

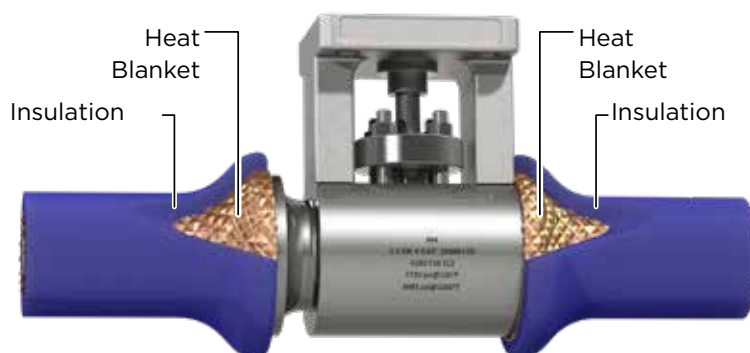
**Figure 6:** Plastic Shields



8. After welding, follow the appropriate post weld heat treatment (PWHT) procedures per the applicable standards. PWHT shall be performed localized. To avoid excessive body temperatures, perform PWHT to one end of the valve and then normalize to ambient temperature before proceeding to the second end of the valve. Ensure that the temperature does not exceed 593°C (1100°F).

**NOTE:** Figures used in this document show only socket weld end connections; however, butt weld connections are also available.

**Figure 7:** Insulation During PWHT Process



## WARNING

Do not allow valve body temperature to exceed 1100°F | 593°C during welding or post weld heat treating. To avoid body temperature exceeding 1100°F | 593°C, perform PWHT on one end then normalize to room temperature before proceeding to the second end. Valve body reaching to higher temperatures will lead to void of warranty.

9. After installation, with the valve still in the open position, flush the piping system and valve clean again to remove any dirt, burrs, and welding residue that may have accumulated during valve installation.
10. After installation and flushing of the piping system, verify smooth operation by cycling the valve several times.

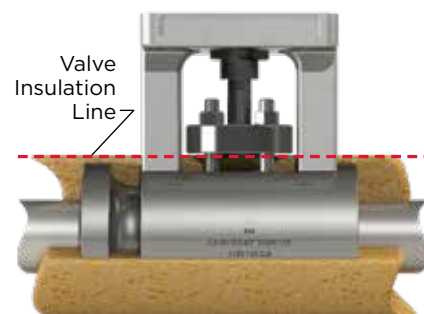
## 8.6 Valve Insulation

Valve insulation should not extend above the packing gland. Refer to the dotted line in **Figure 8**.

## 8.7 After Insulation

After valve has been installed in the pipeline and prior to any system testing or start up, tighten the gland nuts per **Table 1**.

**Figure 8:** Insulation Line



### 9.0 OPERATION

Operation of the valve is done by turning the handle a quarter-turn (90 degree turn). Clockwise to close, counterclockwise to open.

Valve In Open Position - The handle is parallel with the pipeline.

Valve In Closed Position - The handle is perpendicular to the pipeline.



#### CAUTION

Valves with actuators should be checked for actuator/valve alignment. Misalignment will result in high operational torque, and cause damage to valve stem and seals.

#### 9.1 Visual Indicator - Handle

##### Visual Indicator - Handle

If valve handle is in-line with pipeline, valve is in the open position; if handle is perpendicular to pipeline, then valve is in the closed position.

#### 9.2 Visual Indicator - Scribe Line

The scribe line can be used to set operator open/close stops if the operator cannot be removed from valve. Valve shown in closed position.



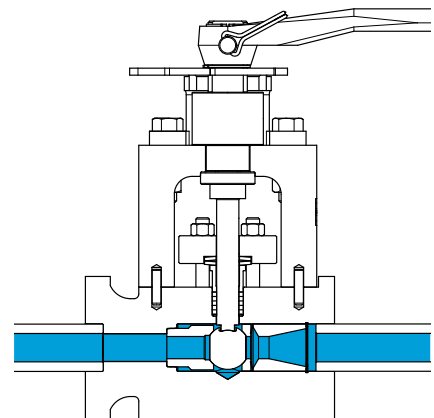
#### CAUTION

Valves with actuators should be checked for actuator/valve alignment. Misalignment will result in high operational torque, and cause damage to valve stem and seals.

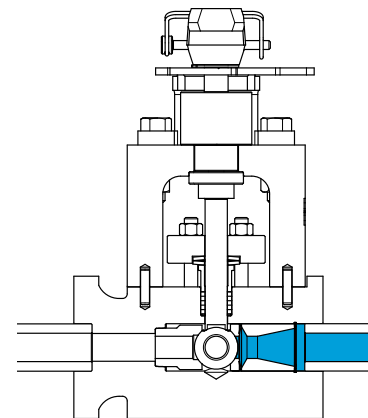
Avoid 180° rotation of the ball and/or stem as this could cause premature wear to the ball/seat lapping surface thus reducing effective sealing/isolation which may lead to void of warranty.

When cycling the valve open or close, make sure that the valve is fully opened and fully closed to wipe away any accumulation of debris on the ball and seat sealing surfaces. This ensures optimal performance and long valve life.

The actuator must not be re-oriented without removal from the valve. This prevents 180° rotation of the ball and assures the mate-lapped ball and seat surfaces to match. Seat leakage may occur when the ball and seat surfaces are not matched.



Fully Open



Fully Closed

# SERIES M4 SEVERE SERVICE BALL VALVE

Installation, Operation, and Maintenance Manual



## 10.0 MAINTENANCE



### WARNING

DO NOT attempt to remove packing components or any other valve parts while line is under pressure.



### WARNING

Depressurize the line before loosening any gland nuts.



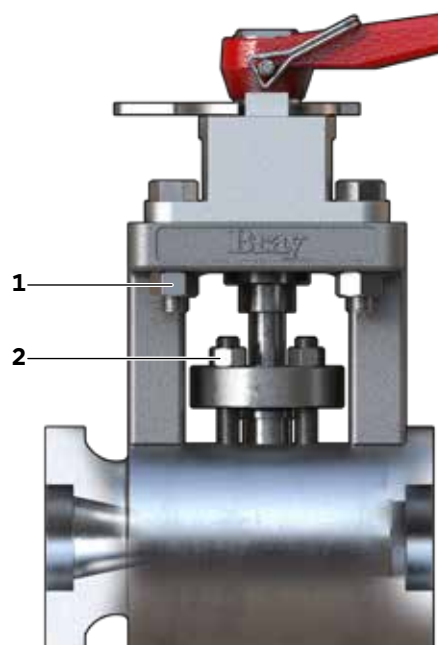
### NOTICE

Check gland nuts periodically, and re-torque if necessary.  
Open/Close the valve intermittently (at least once a year).  
Valves should always be fully opened or fully closed to wipe away any accumulation on the sealing surfaces.

After installation, verify bolting torque at the following locations:

1. Valve Operator Mounting (if present)
2. Gland Flange (or Stem Packing) per **Table 1**.

**Figure 9:** Operating Mounting and Gland Flange Bolting



**Table 1**

| Packing Torque (lbs in) |     |            |         |         |            |         |           |            |         |           |            |           |      |
|-------------------------|-----|------------|---------|---------|------------|---------|-----------|------------|---------|-----------|------------|-----------|------|
| Valve Size              |     | ASME Class |         |         |            |         |           |            |         |           |            |           |      |
|                         |     | Class 1700 |         |         | Class 2500 |         |           | Class 3100 |         |           | Class 4500 |           |      |
|                         |     | Valve Bore |         |         |            |         |           |            |         |           |            |           |      |
| NPS                     | DN  | 0.63       | 1.03    | 1.56    | 0.63       | 1.03    | 1.56      | 0.63       | 1.03    | 1.56      | 0.63       | 1.03      | 1.56 |
| ½                       | 15  | 35 - 39    | n/a     | n/a     | 52 - 57    | n/a     | n/a       | 65 - 71    | n/a     | n/a       | 94 - 103   | n/a       | n/a  |
| ¾                       | 20  | 35 - 39    | 48 - 53 | n/a     | 52 - 57    | 70 - 78 | n/a       | 65 - 71    | 87 - 96 | n/a       | 94 - 103   | 124 - 140 | n/a  |
| 1                       | 25  | 35 - 39    | 48 - 53 | n/a     | 52 - 57    | 70 - 78 | n/a       | 65 - 71    | 87 - 96 | n/a       | 94 - 103   | 124 - 140 | n/a  |
| 1½                      | 40  | 35 - 39    | 48 - 53 | 75 - 83 | 52 - 57    | 70 - 78 | 111 - 122 | 65 - 71    | 87 - 96 | 137 - 151 | 94 - 103   | 124 - 140 | n/a  |
| 2                       | 50  | 35 - 39    | 48 - 53 | 75 - 83 | 52 - 57    | 70 - 78 | 111 - 122 | 65 - 71    | 87 - 96 | 137 - 151 | 94 - 103   | 124 - 140 | n/a  |
| 2½                      | 65  | n/a        | 48 - 53 | 75 - 83 | n/a        | 70 - 78 | 111 - 122 | n/a        | 87 - 96 | 137 - 151 | n/a        | 124 - 140 | n/a  |
| 3                       | 80  | n/a        | n/a     | 75 - 83 | n/a        | n/a     | 111 - 122 | n/a        | n/a     | 137 - 151 | n/a        | n/a       | n/a  |
| 4                       | 100 | n/a        | n/a     | 75 - 83 | n/a        | n/a     | 111 - 122 | n/a        | n/a     | 137 - 151 | n/a        | n/a       | n/a  |

| Packing Torque (N m) |     |            |         |           |            |           |             |            |            |             |             |           |      |
|----------------------|-----|------------|---------|-----------|------------|-----------|-------------|------------|------------|-------------|-------------|-----------|------|
| Valve Size           |     | ASME Class |         |           |            |           |             |            |            |             |             |           |      |
|                      |     | Class 1700 |         |           | Class 2500 |           |             | Class 3100 |            |             | Class 4500  |           |      |
|                      |     | Valve Bore |         |           |            |           |             |            |            |             |             |           |      |
| NPS                  | DN  | 0.63       | 1.03    | 1.56      | 0.63       | 1.03      | 1.56        | 0.63       | 1.03       | 1.56        | 0.63        | 1.03      | 1.56 |
| ½                    | 15  | 4 - 4.4    | n/a     | n/a       | 5.9 - 6.4  | n/a       | n/a         | 7.3 - 8    | n/a        | n/a         | 10.6 - 11.6 | n/a       | n/a  |
| ¾                    | 20  | 4 - 4.4    | 5.4 - 6 | n/a       | 5.9 - 6.4  | 7.9 - 8.8 | n/a         | 7.3 - 8    | 9.8 - 10.8 | n/a         | 10.6 - 11.6 | 14 - 15.8 | n/a  |
| 1                    | 25  | 4 - 4.4    | 5.4 - 6 | n/a       | 5.9 - 6.4  | 7.9 - 8.8 | n/a         | 7.3 - 8    | 9.8 - 10.8 | n/a         | 10.6 - 11.6 | 14 - 15.8 | n/a  |
| 1½                   | 40  | 4 - 4.4    | 5.4 - 6 | 8.5 - 9.4 | 5.9 - 6.4  | 7.9 - 8.8 | 12.5 - 13.8 | 7.3 - 8    | 9.8 - 10.8 | 15.5 - 17.1 | 10.6 - 11.6 | 14 - 15.8 | n/a  |
| 2                    | 50  | 4 - 4.4    | 5.4 - 6 | 8.5 - 9.4 | 5.9 - 6.4  | 7.9 - 8.8 | 12.5 - 13.8 | 7.3 - 8    | 9.8 - 10.8 | 15.5 - 17.1 | 10.6 - 11.6 | 14 - 15.8 | n/a  |
| 2½                   | 65  | n/a        | 5.4 - 6 | 8.5 - 9.4 | n/a        | 7.9 - 8.8 | 12.5 - 13.8 | n/a        | 9.8 - 10.8 | 15.5 - 17.1 | n/a         | 14 - 15.8 | n/a  |
| 3                    | 80  | n/a        | n/a     | 8.5 - 9.4 | n/a        | n/a       | 12.5 - 13.8 | n/a        | n/a        | 15.5 - 17.1 | n/a         | n/a       | n/a  |
| 4                    | 100 | n/a        | n/a     | 8.5 - 9.4 | n/a        | n/a       | 12.5 - 13.8 | n/a        | n/a        | 15.5 - 17.1 | n/a         | n/a       | n/a  |



## 10.1 Removing Valve From Service

Before the valve is removed from service it should be placed in the open position to prevent internal damage to valve components.



### CAUTION

Line must be depressurized before valve removal from pipeline. Valve should be cycled to assure there is no pressure is trapped in valve cavity. Ball valves can trap pressurized media when closed. Flush line with valve 1/2 open to remove media. If the valve has been used to control hazardous media, it must be decontaminated.



### WARNING

DO NOT attempt to remove packing components or any other valve parts while line is under pressure.



### CAUTION

Properly support the valve before removing or loosening anybody bolts. The larger sizes are heavy and may cause injury if allowed to swing or fall freely.

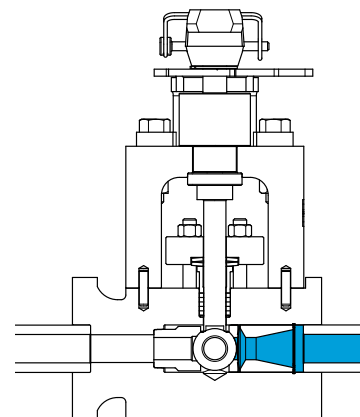


### WARNING

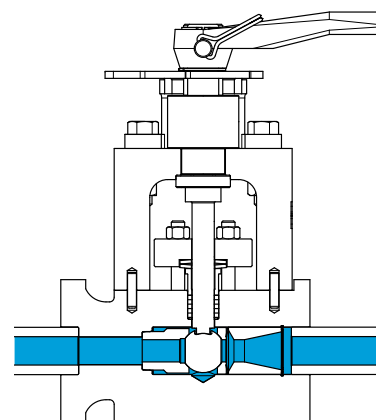
Remove actuation media and power connections and confirm that there is no stored energy in the actuation such as compressed springs or trapped air before beginning. Stored energy devices can cause serious injury if the energy is released without warning.

## 10.2 Actuator Removal

1. Follow specific actuator installation, operating and maintenance instructions.
2. Ensure valve is properly supported when removing the actuator.
3. If the valve is in the pipeline, the process shall be stopped.
4. Disconnect all energy sources (electrical, pneumatic, or hydraulic) prior to removing the actuator.
5. Properly support actuator assembly.
6. Remove and store mounting hardware.
7. Lift the actuator package in a direct line with the valve stem until the actuator, coupling/adaptor is clear of the valve.
8. The actuator package shall be placed in a place which will avoid damage and personal injury.
9. Remove and store mounting bracket and coupling/adaptor. A lifting device may be required based on the size and weight of the bracket and coupling/adaptor.



**Fully Closed**



**Fully Open**



## 11.0 TROUBLESHOOTING

| TROUBLE         | POSSIBLE CAUSE                  | SOLUTION                                      |
|-----------------|---------------------------------|---|
| Packing Leakage | Packing Consolidation           | Tighten gland nuts to value in <b>Table 1</b> |
|                 | Packing Wear                    | Follow proper installation                    |
| Seat Leakage    | Improper Installation Direction | Follow proper installation                    |

### NOTES:

- > Bray does not accept any responsibility for the product if wear parts not tested and approved by Bray are used.
- > Bray does not accept any responsibility for the product if maintenance instructions are not followed during maintenance.

## 12.0 RETURN MERCHANDISE AUTHORIZATION



### WARNING

Before products are returned to Bray for repair or service, Bray must be provided with a certificate that confirms that the product has been decontaminated and is clean.

All products that are returned require a Return Merchandise Authorization (RMA). Contact a Bray representative to obtain authorization and shipping instructions.

The following information must be provided when submitting RMA.

- > Serial number
- > Part number
- > Month and year of manufacture
- > Time of purchase (if known)
- > Actuator and actuator accessories/controls specifics
- > Application
- > Media
- > Operating temperature
- > Operating pressure
- > Total estimated cycles (since last installation or repair)

**NOTE:** Product information is provided on identification tag attached to device.



### NOTICE

Materials must be cleaned and sanitized prior to return. MSDS sheets and Declaration of Decontamination are required.

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