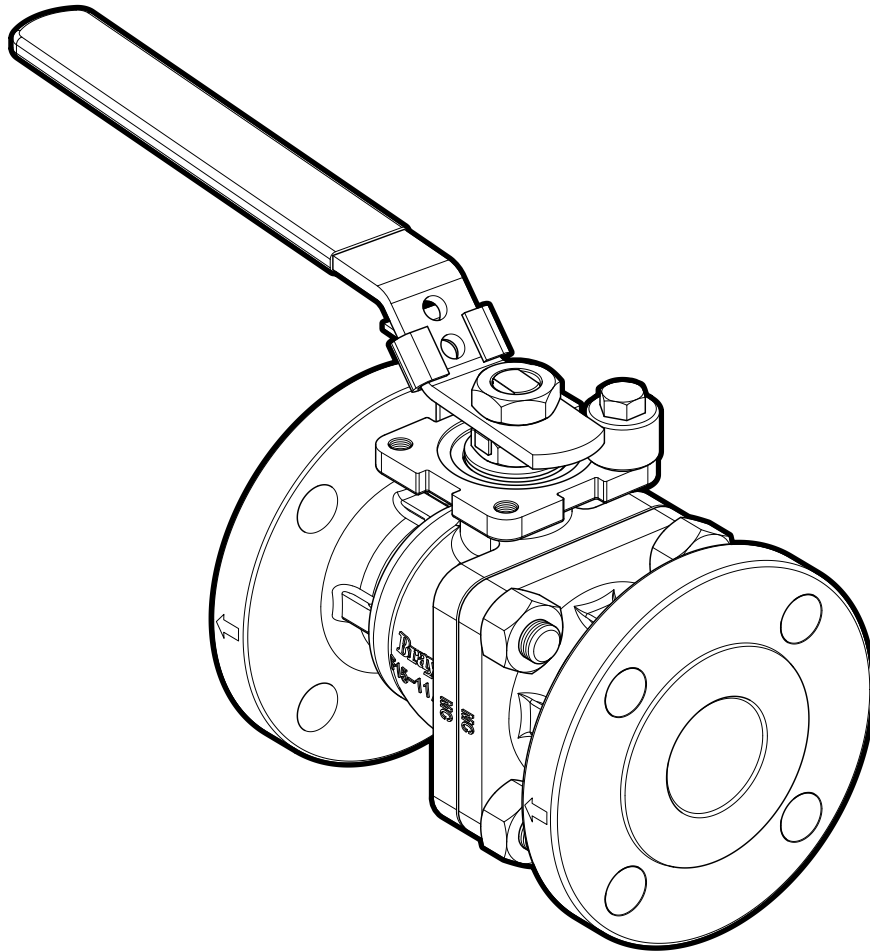


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**SERIES F15/F30 METAL SEATED**

# **2-PIECE FLANGED FULL PORT BALL VALVES**

Installation, Operation, and Maintenance Manual



# SERIES F15/F30 METAL SEATED 2-PIECE FLANGED FULL PORT BALL VALVES

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.

The design features of this valve include a split body, two piece metal seated construction, allowing ease of maintenance without special tools. These valves feature a “free floating” ball. The ball is not fixed but is free to move with the line pressure.

Valve constructions are uni-directional. A flow arrow will indicate the flow direction. Care should be taken when installing the valve.

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 the 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.

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## 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 pressure equipment and systems in accordance with established safety practices.
2. Is trained in the operation and maintenance of electrical equipment and systems in accordance with established safety practices.
3. Is trained or authorized to energize, de-energize, ground, tag, and lock electrical circuits and equipment in accordance with established safety practices.
4. Is trained in the proper use and care of personal protective equipment (PPE) in accordance with established safety practices.
5. 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.

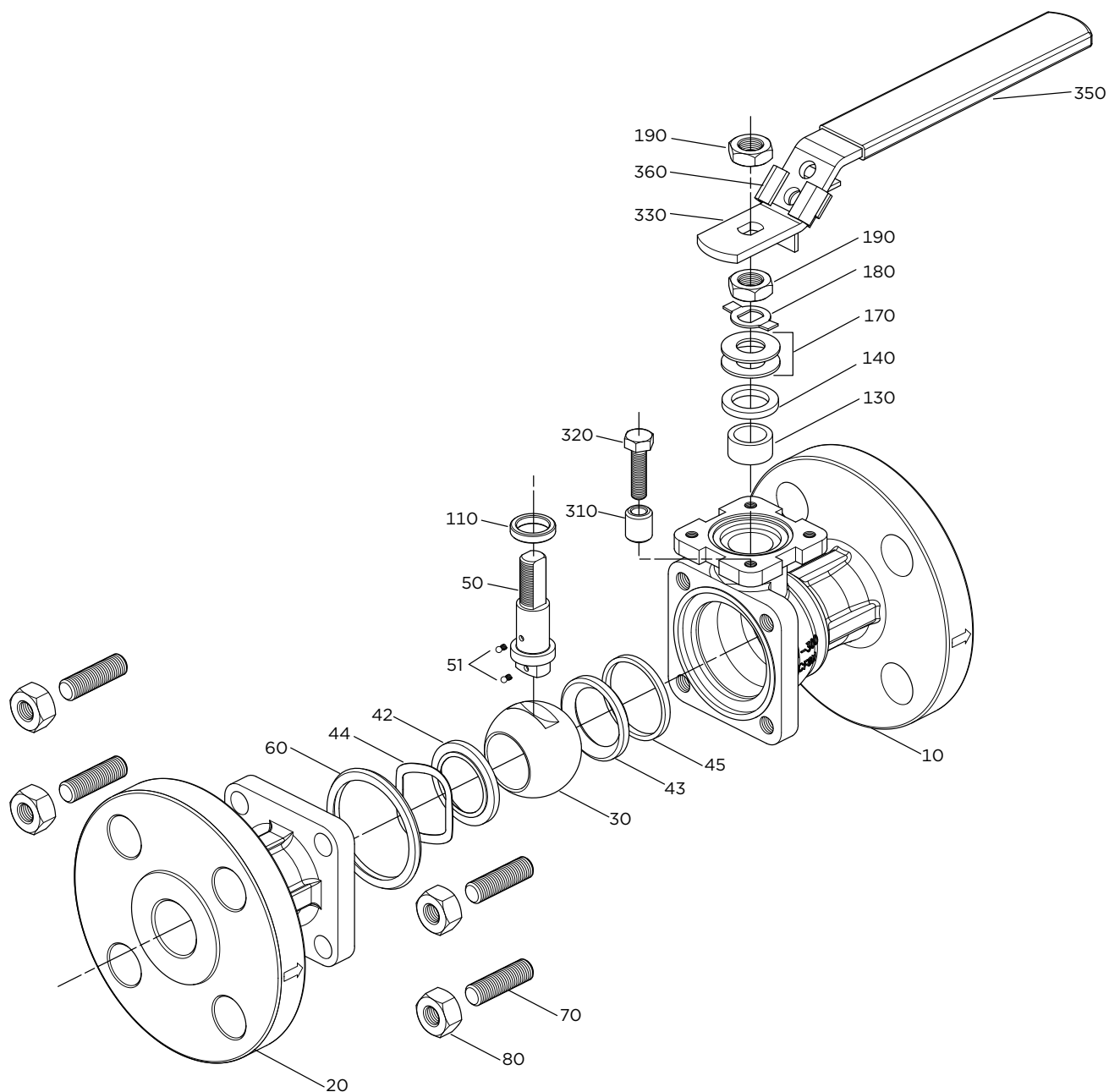
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## 4.0 PARTS IDENTIFICATION

### 4.1 Parts Callout - NPS ½ to 2 | DN 15 to 50



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## 4.2 Parts List - NPS ½ to 2 | DN 15 to 50

ITEM	DESCRIPTION	RECOMMENDED SPARE PARTS <sup>1</sup>
10	Body	
20	End Cap	
30	Ball	■
42	Upstream Seat	■
43	Downstream Seat	■
44	Wave Spring	■
45	Seat Seal	■
50	Stem	
51	Anti-static Device	
60	Body Seal	■
70	Body Stud	
80	Body Nut	
110	Thrust Washer	■
130	Stem Packing	■
140	Packing Gland	
170	Belleville Washer	
180	Tab Lock Washer	
190	Lock Nut	
310	Travel Stop Set Sleeve	
320	Travel Stop Bolt	
330	Handle	
350	Handle Sleeve	
360	Locking Device	

### NOTE

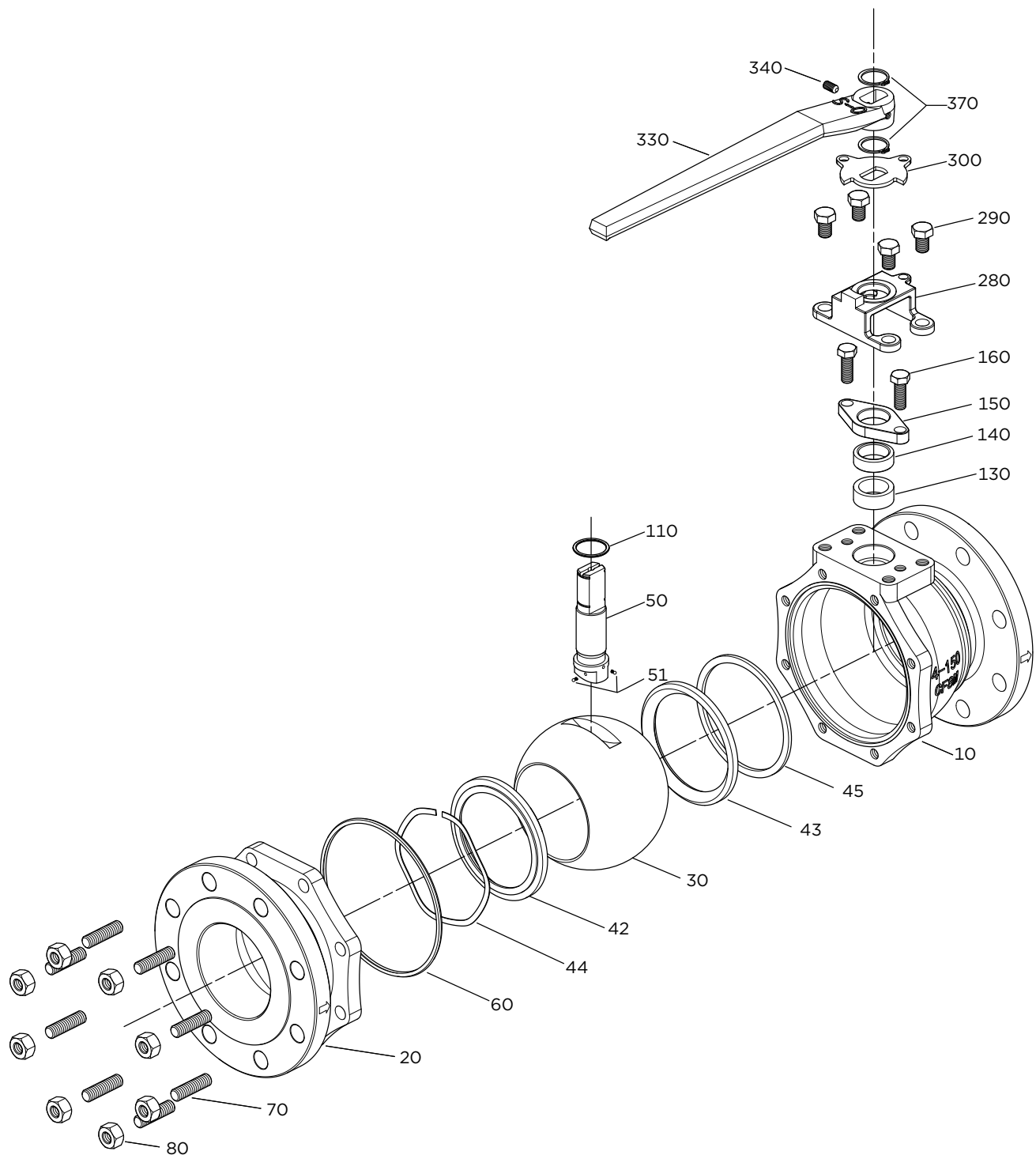
1. Items contained in repair kit

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**4.3 Parts Callout - NPS 2½ to 4 | DN 65 to 100**



SIZE NPS	SIZE DN	HANDLE STYLE
2½ - 4	65 - 100	Cast Handle

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## 4.4 Parts List - NPS 2½ to 4 | DN 65 to 190

ITEM	DESCRIPTION	RECOMMENDED SPARE PARTS <sup>1</sup>
10	Body	
20	End Cap	
30	Ball	■
42	Upstream Seat	■
43	Downstream Seat	■
44	Wave Spring	■
45	Seat Seal	■
50	Stem	
51	Anti-static Device	
60	Body Seal	■
70	Body Stud	
80	Body Nut	
110	Thrust Washer	■
130	Stem Packing	■
140	Packing Gland	
150	Packing Follower	
160	Gland Bolt	
280	Travel Stop Housing	
290	Housing Bolt	
300	Travel Stop Plate	
330	Handle	
340	Handle Bolt	
370	Snap Ring	

### NOTE

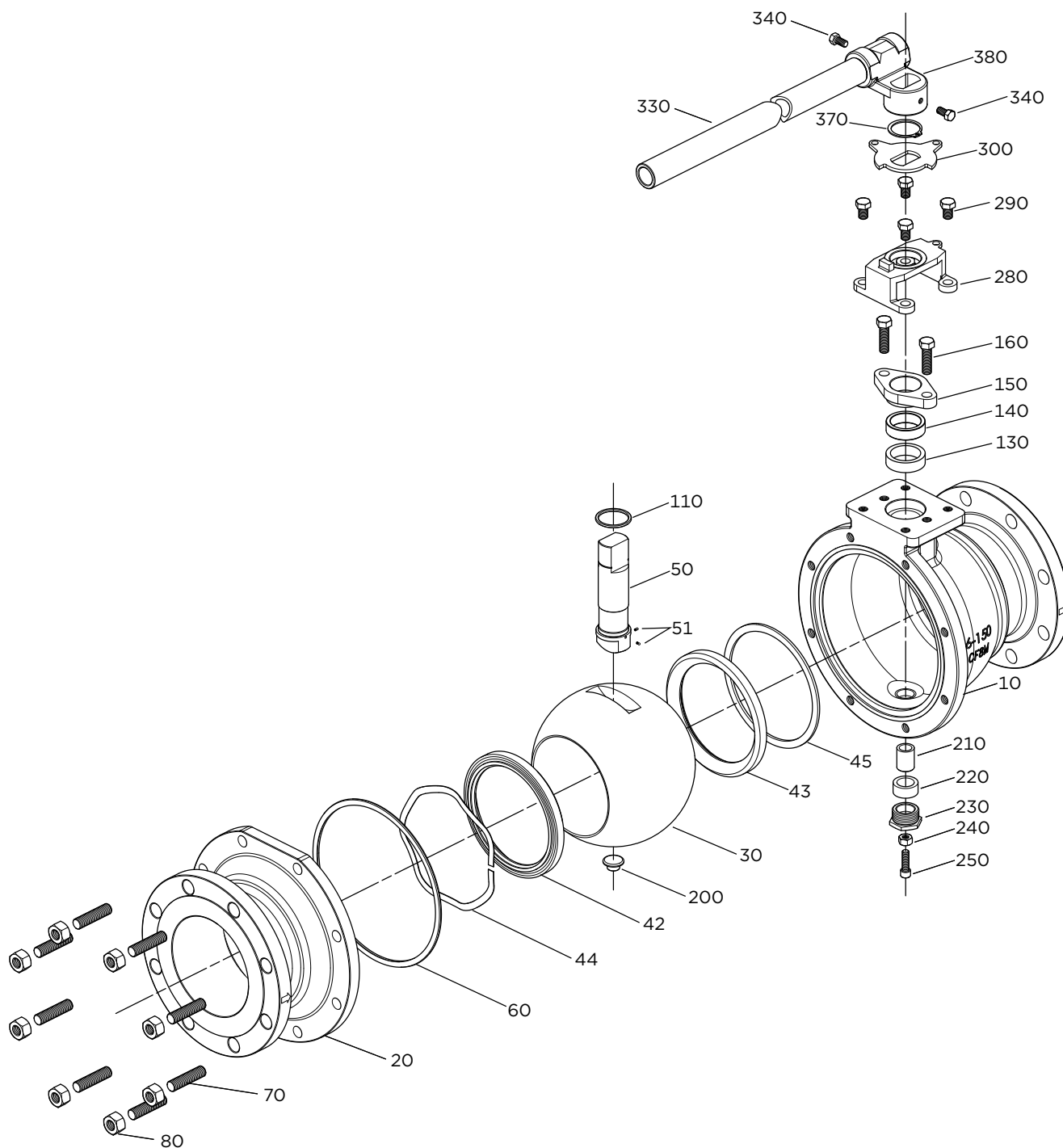
1. Items contained in repair kit

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## 4.5 Parts Callout - NPS 6 | DN 150



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## 4.6 Parts List - NPS 6 | DN 150

ITEM	DESCRIPTION	RECOMMENDED SPARE PARTS <sup>1</sup>
10	Body	
20	End Cap	
30	Ball	■
42	Upstream Seat	■
43	Downstream Seat	■
44	Wave Spring	■
45	Seat Seal	■
50	Stem	
51	Anti-static Device	
60	Body Seal	■
70	Body Stud	
80	Body Nut	
110	Thrust Washer	■
130	Stem Packing	■
140	Packing Gland	
150	Packing Follower	
160	Gland Bolt	
200	Pin Seat	■
210	Support Pin	
220	Pin Packing	■
230	Support Nut	
240	Set Nut	
250	Tuning Screw	
280	Travel Stop Housing	
290	Housing Bolt	
300	Travel Stop Plate	
330	Handle	
340	Handle Bolt	
370	Snap Ring	
380	Handle Junction	

### NOTE

1. Items contained in repair kit

## 4.7 Spare Parts

1. Use only Bray original spare parts.
2. Recommended spare parts are identified in the Parts Identification and list for each product model.
3. Bray cannot accept responsibility for any damages that occur from using spare parts or fastening materials from other manufacturers. If Bray products (especially soft good materials) have been stored for long periods of time, check them for corrosion or deterioration before putting them into use.



### 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.

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**5.0 VALVE IDENTIFICATION**

**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.

	SIZE:	BODY:	CWP:
	CLASS:	BALL:	SEAT:
	S/N:	STEM:	TEMP:
	API-607 YES NO		

Size	Valve Size
Class	Pressure Class
S/N	Valve Serial Number
Body	Body Material
Ball	Ball Material
Stem	Stem Material
API-607	Valve certified to API-607
CWP	Maximum Pressure at Ambient Temperature
Seat	Seat Material
Temp	Temperature



### 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 palleted 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.

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## 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

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.
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 stem 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 uni-directional. A flow arrow will indicate the flow direction. Care should be taken when installing the valve.

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 (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.

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.

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 the valve/ actuator to ensure valve, actuator and accessories operate properly.

### 8.3 Actuator Mounting



#### NOTICE

Remove components related to handle prior to installing actuator mounting set.

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.
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. Attach 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.

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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 After installation

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

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## 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.

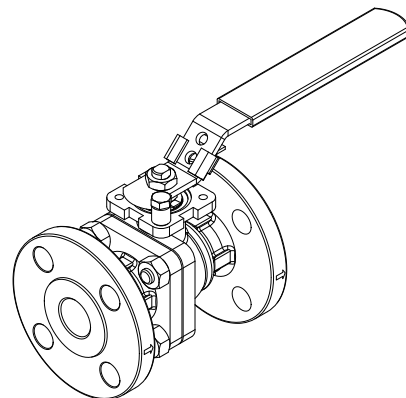
**Valve In Closed Position** - The handle is perpendicular to the pipeline.



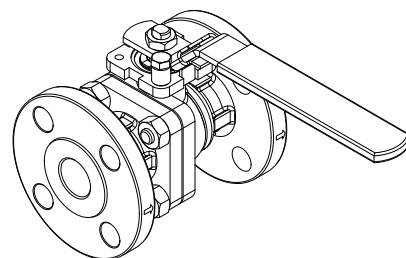
### CAUTION

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.

### OPEN POSITION



### CLOSED POSITION





## 10.0 MAINTENANCE AND REPAIR



### NOTICE

The valve may be assembled and operated dry where no lubricants are allowed in the system; however, a light lubrication of mating parts will aid in assembly and reduce initial operating torque. Lubricant used must be compatible with the intended line fluid.



### NOTICE

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.

If the service media builds scale or risks cold bonding, more frequent maintenance strokes should be performed.

Metal Seated Ball valves are inherently “mated” or “married” and balls/seats may not be interchanged between units.

## 10.1 Stem Packing Adjustment



### WARNING

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

Stem packing leakage may be corrected without disassembly by tightening the stem lower lock nut or gland bolts until such leakage stops. If the leakage continues or valve operating torque becomes excessive, the seals are worn and replacement will be necessary.

For NPS ½ to 2 (DN 15 to 50), if slight leakage is noted at stem, straighten lock washer tab, tighten the stem lower lock nut to flatten Belleville washers, back the stem lower lock nut off 1/4 turn, secure lock washer tab by bending the flat against the nut.

For sizes larger than NPS 2 (DN 50), if slight leakage is noted at stem, simply tighten gland bolts evenly in 1/4 turn increments until leak stops. Do not over tighten.

Be careful to not over tighten the packing as this can result in excess operating torque and accelerated wear of the stem packing. See **Table 1** for recommended stem gland nut and gland bolt torque for a new valve assembly. When making stem packing adjustments while the valve is in service, torque values may vary due to cycle frequency, temperature, and other operating conditions.

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**TABLE 1 - Stem Packing Fastener Tightening Torques**

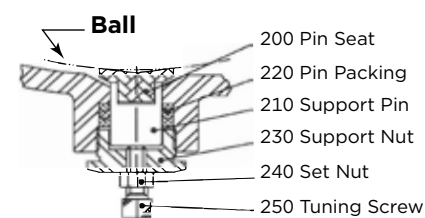
Valve Size		Standard Torque		FE			
				Combination		Graphite/Non Graphite	
NPS	DN	lbs-in	N m	lbs-in	N m	lbs-in	N m
½	15	53	6	53	6	53	6
¾	20	53	6	53	6	53	6
1	25	53	6	80	9	80	9
1¼	32	53	6	80	9	80	9
1½	40	132	14.9	160	18.1	160	18.1
2	50	132	14.9	160	18.1	160	18.1
2½	65	89	10.1	220	24.9	175	19.8
3	80	89	10.1	220	24.9	175	19.8
4	100	89	10.1	220	24.9	175	19.8
6	150	106	12	360	40.7	360	40.7

## 10.2 Ball Support Packing Adjustment

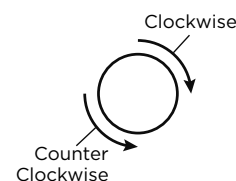
Ball support packing adjustment may be required in the rare event that the pin packing develops a leak. The below instructions should be followed in the event of a leak to adjust the packing. Note that the position of the ball support comes pre-set from the factory. Adjustment of the pin seat position may only be required if the ball support components have been replaced.

1. Loosen the set nut on the tuning screw by turning the nut counter-clockwise while holding the tuning screw stationary with an open end wrench.
2. With the set nut loose, turn the support nut clockwise to compress pin packing as necessary to stop leakage of line media around support nut threads.
3. Using finger pressure only, rotate the tuning screw in the clockwise direction until resistance is felt from the support pin seat contacting the ball surface. Then, rotate the tuning screw 1/4 turn in the counter-clockwise direction.
4. Lock the tuning screw in position with the set nut by holding the tuning screw head stationary with an open end wrench while firmly tightening the set nut in the clockwise direction.

**Figure 1 - Ball Support**



**Ball Support**



## 10.3 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.

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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.

## 10.4 Valve Removal from System and Cleaning Procedure



### CAUTION

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



### 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.



### NOTICE

Certain valve constructions are unidirectional. A flow arrow will indicate the flow direction. Care should be taken when rebuilding the valve to ensure these special constructions are considered.

It is recommended that the following steps be taken for safe removal and assembly.

## 10.5 Valve Disassembly



### NOTICE

When removing soft goods care should be taken to not damage sealing surfaces. Damage to sealing surfaces will affect the performance of the valve.

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1. Support valve and actuator assembly before removing from pipeline.
2. Open valve.
3. Remove valve from pipeline by removing the flange bolts and nuts.
4. Lift valve from line for servicing. Proper lifting and handling techniques shall be followed to remove the valve and actuator from pipeline. They should be adequately supported before removal from the line is begun.
5. For valves with actuation and accessories mounted, remove valve actuation, accessories and valve to actuator mounting parts. Store actuation, accessories and valve to actuator mounting parts per their installation, operating and maintenance instructions.



## NOTICE

Care should be taken to avoid scratching or damaging serrated flange face. The valve should be adequately supported before beginning.

6. Once valve has been removed from the pipeline, hold the body in a vise securely or attach to a work surface firmly enough to prevent movement but do not crush or damage the body.
7. For valves smaller than 2" (DN50) remove the upper lock nut, handle, lower lock nut, tab lock washer, Belleville washers, and packing gland. For larger valves, remove handle bolt, handle, snap ring, travel stop plate, travel stop housing and travel stop bolts, gland bolts, packing gland and packing follower.
8. Remove body bolts. Make witness marks on body end cap flanges for future reassembly, to ensure proper alignment. Lift off end cap. One seat should come out with end cap. Proper lifting and handling techniques should be followed.
9. Remove seat from end cap.
10. To remove the ball, rotate the stem so ball is in full closed position. Lift the ball from body, using a strap and lift device if necessary.



## NOTICE

Extreme caution should be taken to avoid damage to the ball.

11. Carefully remove body seal watching to not damage sealing surfaces. Damage to sealing surfaces will affect the performance of the valve.
12. Remove body seat.
13. The stem must be removed from inside the body - a tap with a rubber mallet, block of wood or hard plastic rod on the top of the stem should loosen it. The thrust washer should come out with the stem. Then remove the stem packing.

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## NOTICE

When removing soft goods care should be taken to not damage sealing surfaces. Damage to sealing surfaces will affect the performance of the valve.

14. Discard all soft seals.

## 10.6 Visual Inspection

Clean and inspect metal parts. It is not necessary to replace the ball and stem unless the seating surfaces have been damaged by scratches, abrasion or corrosion. Verify threads and threaded holes are clean and free from thread locker, paint, media, and foreign material.

Check all sealing areas on metal parts for damage. Replacement of all soft parts is strongly recommended whenever the valve is disassembled for reconditioning. This is the surest protection against subsequent leakage after valve assembly. The replacement parts can be ordered in kit form.

## 10.7 Valve Assembly Procedure: NPS ½ - 2 | DN 15 - 50



## NOTICE

Valve constructions are uni-directional. A flow arrow will indicate the flow direction. Care should be taken when installing the valve

1. Hold the body in a vise securely or attach to a work surface firmly enough to prevent movement but do not crush or damage the body. It is recommended to rebuild the valve with stem horizontal and valve body resting on the pipeline flange on a clean, smooth surface.
2. Carefully install the seat seal inside the body.
3. Install the downstream seat identifiable with 3 ring teeth on the back of the seat into the body on top of the seat seal, make sure the spherical curvature side of the seat will face the ball.
4. Place the thrust washer on the stem and slide the stem into the stem hole in the valve body. Be careful not to damage the stem or body.
5. Holding stem up inside valve body, install the stem packing onto the stem until it is rested against the bottom of the packing bore. See **Figure 2** for proper orientation.
6. Install the packing protector and then the packing gland onto the stem, and top of the stem packing.
7. Apply a light film of break in lubricant (for example light machine oil) to the surface of the ball. Lubricant shall be compatible with service media.

**Figure 2 - Stem Seal Packing Orientation**



V-ring Packing



Graphite Packing



Combo Packing

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8. Rotate the stem to the closed position and install the ball inside the valve body. The stem flats will fit into the slot on top of the ball. Lifting aid may be required to install the ball. Be careful not to damage sealing surfaces of ball or body. Turn the stem until the stem flat is parallel to the port centerline (so that the ball can fit onto the stem).
  - > For V-Control valves, insert V-ball with V opening being on right side of the stem, so when valve fully open, V will face downstream seat following flow arrow marked on the body.
  - > For Resolute Ball™ Valves, a “D” is stamped into the ball slot indicating the side of the ball that must be facing downstream in the open position once assembled.

9. Install the body seal into the body.

10. Install the wave spring onto the back of the upstream seat and install into the end cap, make sure the spherical curvature side of the seat will face the ball.



## NOTICE

Be careful not to damage body seal when assembling end cap into body.

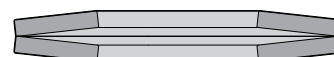
11. Lubricate threads of the body studs and the nut faces in contact with the end caps with anti-seize thread lubricant compatible with the media.
12. Thread body studs into body.
13. Install the end cap onto the body paying attention to proper end flange bolt hole alignment. Bolt holes on flange should always straddle the centerline. Witness marks on body-end cap flanges made during disassembly should match. Do not allow upstream seat to fall out, by holding it in place reaching through the end cap bore.
14. Thread the body nuts onto the body studs and hand tighten to ensure the two halves stay together while the remaining assembly is completed.
15. Install the Belleville washer together in series (bottom Belleville washer curve facing up, the top Belleville washer curve facing down see **Figure 3**, and then place them onto the stem, on top of the packing gland.
16. Install the tab lock washer over the stem and on top of the Belleville washers.
17. Thread the lock nut and tighten the nut to the torques in **Table 1**.

**TABLE 2 - Body Nut Tightening Torque**

Valve Size	Torque lb-in	
NPS	F15	F30
½	140	140
¾	140	140
1	210	210
1½	550	550
2	550	550
2½	550	550
3	550	1000
4	550	1000
6	1000	1000

Valve Size	Torque N m	
DN	F15	F30
15	16	16
20	16	16
25	24	24
40	62	62
50	62	62
65	62	62
80	62	113
100	62	113
150	113	113

**Figure 3 - Belleville Washer Orientation**



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## NOTICE

The use of a bore alignment tool, about 0.04 inches (1.0mm) less than the internal diameter of the end cap and ball, inserted through the end cap and ball will prevent the ball from turning as the lock nut is tightened on the stem.

Material for the bore alignment tool should be made from a material softer than 300 Series SS so that it will not inadvertently scratch the valve end cap or ball. Suggested materials: aluminum T6061, acetal or other suitable hard polymer/plastic material.

18. Secure the tab lock washer with one ear bending up against the flat of the nut.



## NOTICE

Body bolts/body nuts must be tightened in a cross or star pattern, to prevent uneven loading of the body seal.



## WARNING

Extreme care must be exercised during adjustment of body nuts to make sure that body studs are fully engaged. There should be at least one stud thread exposed beyond the flange on the body side and beyond the nut on the cap side.

19. Tighten the body nuts in a cross pattern per **Figure 4** based on number of fasteners per body joint. Fastener torque should be applied at 30%, 60% and 100% and once more at 100% increments per **Table 2**.
20. If equipped with a handle, place the handle onto the stem, on top of the lock nut.
21. Thread the lock nut on the stem and tighten the nut to secure the handle.
22. Cycle the valve slowly several times. By cycling slowly, the seats will conform to the ball. A fast turning motion initially may damage the seats before they have a chance to form the proper seal.
23. Mount actuation per installation section instructions.

## 10.8 Valve Assembly Procedure: NPS 2½ - 4 | DN 65 - 100



### NOTICE

Valve constructions are unidirectional. A flow arrow will indicate the flow direction. Care should be taken when installing the valve.

1. Hold the body in a vise securely or attach to a work surface firmly enough to prevent movement but do not crush or damage the body. It is recommended to rebuild the valve with stem horizontal and valve body resting on the pipeline flange on a clean, smooth surface.
2. Carefully install the seat seal inside the body.
3. Install the downstream seat identifiable with 3 ring teeth on the back of the seat into the body on top of the seat seal, make sure the spherical curvature side of the seat will face the ball.
4. Place the thrust washer on the stem and slide the stem into the stem hole in the valve body. Be careful not to damage the stem or body.
5. Holding stem up inside valve body, install the stem packing onto the stem until it is rested against the bottom of the packing bore. See **Figure 2** for proper orientation.
6. Install the packing protector and then the packing gland onto the stem, and top of the stem packing.
7. Install packing follower on top of the packing gland.
8. Install the gland bolts through the packing follower and thread into the body. Fasteners should be hand tight. Lubricate threads and bolt faces in contact with the packing follower with anti-seize thread lubricant compatible with the media.



### NOTICE

If valve will be actuated, Steps 9-12 are not required.

9. Install the travel stop housing over stem. Openings on side of travel stop housing shall be perpendicular to the pipeline.
10. Install the housing bolts through the stop housing and thread into the body. Lubricate threads and the bolt faces in contact with the travel stop housing with anti-seize thread lubricant compatible with the media. Tighten bolts.
11. Install travel stop plate over the stem making sure the lockout holes in the stop housing and travel stop housing are aligned in the open and closed positions.
12. Install snap ring over stem in groove closest to the travel stop housing.
13. Apply a light film of break in lubricant (for example light machine oil) to the surface of the ball. Lubricant shall be compatible with service media.



14. Rotate the stem to the closed position and install the ball inside the valve body. The stem flats will fit into the slot on top of the ball. Lifting aid may be required to install the ball. Be careful not to damage sealing surfaces of ball or body. Turn the stem until the stem flat is parallel to the port centerline (so that the ball can fit onto the stem).
  - > For V-Control valves, insert V opening being on right side of the stem, so when valve fully open, V will face downstream seat following flow arrow marked on the body.
  - > For Resolute Ball™ Valves, a “D” is stamped into the ball slot indicating the side of the ball that must be facing downstream in the open position once assembled.
15. Install the body seal into the body.
16. Install the wave spring onto the back of the upstream seat and install into the end cap, make sure the spherical curvature side of the seat will face the ball.



### NOTICE

Be careful not to damage body seal when assembling end cap into body.

17. Lubricate threads of the body studs and the nut faces in contact with the end caps with anti-seize thread lubricant compatible with the media.
18. Thread body studs into body.
19. Install the end cap onto the body paying attention to proper end flange bolt hole alignment. Bolt holes on flange should always straddle the centerline. Witness marks on body-end cap flanges made during disassembly should match. Do not allow upstream seat to fall out, by holding it in place reaching through the end cap bore.
20. Thread the body nuts onto the body studs and hand tighten to ensure the two halves stay together while the remaining assembly is completed.
21. Evenly tighten the gland bolts to the torques in **Table 1**.



### NOTICE

Body bolts/body nuts must be tightened in a cross or star pattern, to prevent uneven loading of the body seal.



### WARNING

Extreme care must be exercised during adjustment of body nuts to make sure that body studs are fully engaged. There should be at least one stud thread exposed beyond the flange on the body side and beyond the nut on the cap side.

22. Tighten the body nuts in a cross pattern per **Figure 4** based on number of fasteners per body joint. Fastener torque should be applied at 30%, 60% and 100% and once more at 100% increments per **Table 2**.
23. If equipped with a handle, install handle onto the valve stem and secure the handle with handle bolt. Install snap ring over stem in groove.
24. Cycle the valve slowly several times. By cycling slowly, the seats will conform to the ball. A fast-turning motion initially may damage the seats before they have a chance to form the proper seal.
25. Mount actuation per installation section instructions.

### 10.9 Valve Assembly Procedure: NPS 6 | DN 150



#### NOTICE

Valve constructions are uni-directional. A flow arrow will indicate the flow direction. Care should be taken when installing the valve.

1. Hold the body in a vise securely or attach to a work surface firmly enough to prevent movement but do not crush or damage the body. It is recommended to rebuild the valve with stem horizontal and valve body resting on the pipeline flange on a clean, smooth surface.
2. Carefully install the seat seal inside the body.
3. Install the downstream seat identifiable with 3 ring teeth on the back of the seat into the body on top of the seat seal, make sure the spherical curvature side of the seat will face the ball.
4. Place the thrust washer on the stem and slide the stem into the stem hole in the valve body. Be careful not to damage the stem or body.
5. Holding stem up inside valve body, install the stem packing onto the stem until it is rested against the bottom of the packing bore. See **Figure 2** for proper orientation.
6. Install the packing protector and then the packing gland onto the stem, and top of the stem packing.
7. Install packing follower on top of the packing gland.
8. Install the gland bolts through the packing follower and thread into the body. Fasteners should be hand tight. Lubricate threads and bolt faces in contact with the packing follower with anti-seize thread lubricant compatible with the media.



#### NOTICE

If valve will be actuated, Steps 9-12 are not required.

9. Install the travel stop housing over stem. Openings on side of travel stop housing shall be perpendicular to the pipeline.

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10. Install the housing bolts through the stop housing and thread into the body. Lubricate threads and the bolt faces in contact with the travel stop housing with anti-seize thread lubricant compatible with the media. Tighten bolts.
11. Install travel stop plate over the stem making sure the lockout holes in the stop housing and travel stop housing are aligned in the open and closed positions.
12. Install snap ring over stem in groove closest to the travel stop housing.
13. Install ball support assembly. Install the pin seat between the ball and the ball support body connection in the body. Install support pin and pin packing from the outside of the valve body, with the pin seat supported by the support pin. V-ring packing shall be installed with the “V” facing the internal valve pressure. See **Figure 1**. Thread support nut into body to compress the pin packing. Install the set nut and tuning screw. Hand tighten the tuning screw until resistance is felt from the pin seat contacts the ball. Then rotate the tuning screw 1/4 turn counterclockwise. Lock the tuning screw in position with the set nut by holding the tuning screw stationary and tighten the set nut.
14. Apply a light film of break in lubricant (for example light machine oil) to the surface of the ball. Lubricant shall be compatible with service media.
15. Rotate the stem to the closed position and install the ball inside the valve body. The stem flats will fit into the slot on top of the ball. Lifting aid may be required to install the ball. Be careful not to damage sealing surfaces of ball or body. Turn the stem until the stem flat is parallel to the port centerline (so that the ball can fit onto the stem).
  - > For V-Control valves, insert V-ball with V opening being on right side of the stem, so when valve fully open, V will face downstream seat following flow arrow marked on the body.
  - > For Resolute Ball™ Valves, a “D” is stamped into the ball slot indicating the side of the ball that must be facing downstream in the open position once assembled.
16. Install the body seal into the body.
17. Install the wave spring onto the back of the upstream seat and install into the end cap, make sure the spherical curvature side of the seat will face the ball.



### NOTICE

Be careful not to damage body seal when assembling end cap into body.

18. Lubricate threads of the body studs and the nut faces in contact with the end caps with anti-seize thread lubricant compatible with the media.

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19. Thread body studs into body.
20. Install the end cap onto the body paying attention to proper end flange bolt hole alignment. Bolt holes on flange should always straddle the centerline. Witness marks on body-end cap flanges made during disassembly should match. Do not allow upstream seat to fall out, by holding it in place reaching through the end cap bore.
21. Thread the body nuts onto the body studs and hand tighten to ensure the two halves stay together while the remaining assembly is completed.
22. Evenly tighten the gland bolts to the torques in **Table 1**.



## NOTICE

Body bolts/body nuts must be tightened in a cross or star pattern, to prevent uneven loading of the body seal.



## WARNING

Extreme care must be exercised during adjustment of body nuts to make sure that body studs are fully engaged. There should be at least one stud thread exposed beyond the flange on the body side and beyond the nut on the cap side.

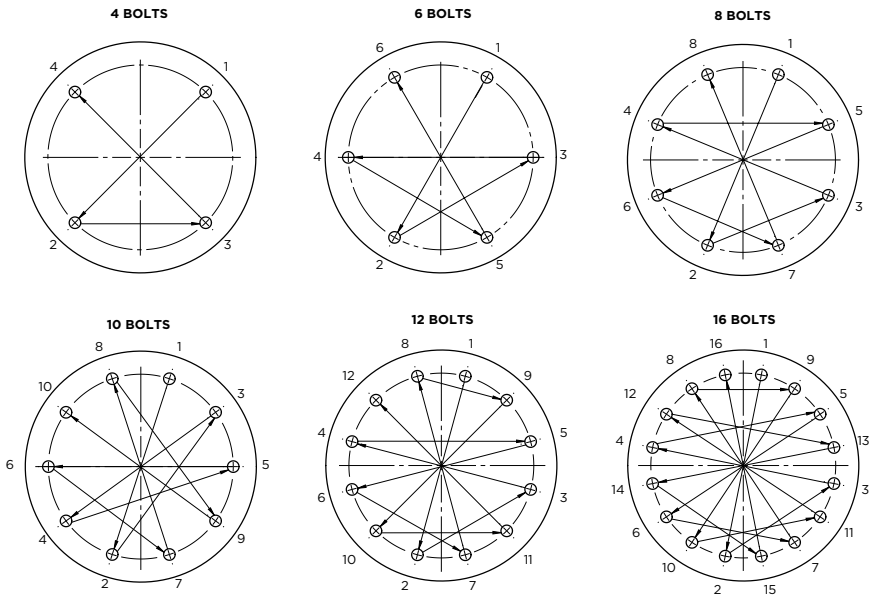
23. Tighten the body nuts in a cross pattern per **Figure 4** based on number of fasteners per body joint. Fastener torque should be applied at 30%, 60% and 100% and once more at 100% increments per **Table 2**.
24. If equipped with a handle, install handle junction onto the valve stem and secure with handle bolt. Install handle into handle junction and secure with handle bolt.
25. Cycle the valve slowly several times. By cycling slowly, the seats will conform to the ball. A fast-turning motion initially may damage the seats before they have a chance to form the proper seal.
26. Mount actuation per installation section instructions.

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**Figure 4 - Body Joint Bolting Guide**



F15 Body Bolting		
Valve Size NPS	Valve Size DN	No of Bolts
1/2	15	4
3/4	20	4
1	25	4
1 1/2	40	4
2	50	4
2 1/2	65	4
3	80	6
4	100	8
6	150	8

F30 Body Bolting		
Valve Size NPS	Valve Size DN	No of Bolts
1/2	15	4
3/4	20	4
1	25	4
1 1/2	40	4
2	50	4
2 1/2	65	6
3	80	10
4	100	12
6	150	16

## **11.0 REPAIR KITS**

Only Bray repair parts shall be used to service Bray products.  
Contact Bray for ordering proper repair kit and any valve replacement parts not provided in the repair kit.

When ordering repair kit and replacement parts, include

1. Valve identification information
2. Valve serial number if provided
3. Replacement part item number, part description and quantity.

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## 12.0 TROUBLESHOOTING

TROUBLE	POSSIBLE CAUSE	SOLUTION
Packing Leakage	Packing Consolidation Packing Wear Improper Repair	Tighten gland bolting or lock nut to eliminate leak. If leak continuous follow proper maintenance and repair.
Seat Leakage	Seat Wear Media Damage Improper Repair Improper Installation Direction	Follow proper installation, maintenance and repair.
Body Seal leakage	Improper Repair	Tighten body bolts per <b>Table 2</b> following tightening technique outline in valve assembly section. If leak continues, follow proper maintenance and repair

### 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.

### 13.0 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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