



## Globe / Needle Valve (DN10 (3/8") – DN50 (2"))

### Installation, Operation and Maintenance Manual

|                   |         |       |                |        |   |
|-------------------|---------|-------|----------------|--------|---|
| Reference Number: | IOM 002 | Date: | 19 August 2021 | Issue: | C |
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### **WARNING!**

**BEFORE ANY INSTALLATION AND MAINTENANCE WORK CAN COMMENCE ENSURE THE VALVE AND SURROUNDING SYSTEM IS DRAINED OF PRESSURE AND ISOLATED.**

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### Disclaimer

#### PLEASE NOTE:

If the valves produced by Bestobell Valves/LNG are refurbished by a third party organisation that is not approved by Bestobell Valves/LNG, then the safety and performance will not be guaranteed and the warranty may be invalid.

If unsure about the installation and operation procedures for this valve, please contact Bestobell Valves/LNG.

Bestobell Valves has produced this manual in order to provide engineering personnel with sufficient general information to enable the operation, installation and effective maintenance of the valve manufactured by Bestobell Valves.

In the interest of product development, the designs and specifications for our products are constantly under review and we therefore reserve the right to make changes and improvements without notice.

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### Introduction

#### Outline

This manual is broken down into separate sections:

- **Introduction**

This section provides information about important safety requirements as well as highlighting the precautions taken at Bestobell Valves to ensure the cleanliness of our products. Details regarding servicing are also introduced.

- **Installation**

This details the method of installing the valve on site, and includes information on storage, unpacking and inspection. Preparation of the valve and site is also discussed to allow ease of installation and operation.

- **Hardware Description**

Introduces the product as well as providing a more detailed description including operating conditions and suitable media. Any further requirements for the effective operation of the valve are also discussed.

- **Maintenance**

Provides information relating to the on-site maintenance of the supplied valve, as well as discussing common problems and solutions.

### Safety

**Read and understand these instructions before installing the valve. Improper installation, operation or maintenance by the owner or operator of this valve can result in personal injury.**

Only use genuine Bestobell Valves spares to ensure safe and optimum performance.

Prior to the installation of the valve into the system and any maintenance work, ensure the system is de-pressurised and isolated for the duration of the installation and during any subsequent maintenance.

The valve must be installed within a system that has adequate draining and venting provisions.

In cryogenic applications the area of pipe-work to receive the valve must be allowed to reach ambient temperature.

It is essential that the installers and operators are conversant with all of the safety issues relating to the medium within the system, and are fully trained to an adequate standard.

Wear safety glasses and gloves during any installation or operation of the valve.



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Valves must only be used in a circuit protected by suitable equipment.

The valve should be inspected for wear as part of a regular system maintenance programme.

Cryogenic burns can occur if the valve is handled during or after the valve has operated.

Minor leaks from the outlet side of the valve, if allowed to build up in a confined area, can be hazardous. This can be avoided by dissipating into the atmosphere or a well ventilated area.

If valve is to be installed in hazardous climatic conditions or seismic areas, please inform Bestobell Valves Ltd.

Identify the intended flow direction and match the valve orientation with its flow direction arrow.

Ensure that all end connections to the valve are in line and that the pipe work is supported to reduce unwanted stresses, loading and vibration on the valve and system pipe work.

Ensure that all joining materials / components used during the installation of the valve are compatible, and will not cause any deterioration to the valve structure.

When using on CO<sub>2</sub>, the internal atmosphere must be dry and moisture free as any bronze components could be affected by carbonic acid.

**DO NOT** check leaks with hands.

### ***Cleanliness***

Immediately after assembly in a controlled clean room, the valve is sealed in an airtight plastic bag to maintain cleanliness. As such, it is essential to maintain this cleanliness throughout all stages of installation. Particular care should be taken not to contaminate the internals of the valve with grease, moisture, grinding dust, weld/brazing spatter etc.

Clean practices will save time later with reduced 'flushing' and maintenance.



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### **Service Intervals**

Bestobell Valves recommends that a major service is carried out on its valves in line with the procedures contained in this manual every 2 years.

In addition to this, a regular inspection should take place to ensure correct operational condition.

Regular inspections are suggested on a monthly basis and maintenance work should be carried out in line with this service manual.

It is recommended that the Service Record Sheet enclosed be fully completed at every service interval.

### **Installation**

Personnel carrying out Assembly / Joining / Welding / Inspection must be adequately trained and hold the necessary approvals.

Valves should be installed in a vertical position.

Ensure that environmental conditions (atmospheric pollution) are compatible with the valve materials.

(NOTE: Ensure there is enough space around the valves installed position to allow the removal and refit of the headwork / valve)

### **Installation Overview**

The quality of performance in service is a function of the care taken to ensure good installation. A careful study of these instructions is therefore recommended, as properly installed equipment will normally operate for long periods without problems.

The most critical point in the lifetime of a valve is the time of installation, therefore, proper care at this stage and during any maintenance will increase the probability of trouble free valve service.

It is important to maintain cleanliness throughout all stages of the installation, with particular care being taken not to contaminate the internals of the valve with grease, moisture, grinding dust, weld / brazing spatter or other foreign matter.

Clean practices will save time later with reduced 'flushing' and maintenance.



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### STORAGE:

The equipment packing cases are **NOT** waterproof and should be stored in a weatherproof location before use.

### UNPACKING:

It is recommended that before any item is unpacked, it should be moved as close as possible to its installed position. This will minimise the possibility of damage during handling.

Before unpacking, items should be checked to ensure their part number is in line with requirements and/or the purchase order.

The valve should be inspected for damage upon receipt - any problems are to be immediately reported to Bestobell. This should be done within 48 hours of receipt of goods otherwise a warranty claim may be rejected.

It is further recommended that each item should only be unpacked immediately before it is required.

Before installation the engineer should check for:

- Damaged Packaging
- Bent or Distorted Items
- Scratches, Dents or Damage

Particular attention should be paid to the sealing faces on the end connection flanges.

### TOOLS REQUIRED:

No special tooling is required for the installation of this valve.



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### Preparation

#### **WARNING!**

**BEFORE ANY INSTALLATION AND MAINTENANCE WORK CAN COMMENCE ENSURE THE VALVE AND SURROUNDING SYSTEM IS DRAINED OF PRESSURE AND ISOLATED.**

Remove the headwork before installation and cover the top of the body to protect the internals of the valve from particulate contamination.

Also ensure that enough room is left above / around the valve for the headwork once this is replaced after installation.

Identify the intended flow direction and match the valve orientation with its flow direction arrow.

Ensure that all end connections to the valve are in line and that the pipe work is supported to reduce unwanted stresses, loading and vibration on the valve and system pipe work.

Ensure that all joining materials / components used during the installation of the valve are compatible, and will not cause any deterioration to the valve structure.

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### Hardware Description

All materials used are selected for their suitability to function at cryogenic temperatures. All valves are degreased for oxygen duty, assembled in clean room conditions, and sealed in robust polythene bags prior to despatch.

Maximum Working Pressure: #####

Temperature Range: +65°C to –196°C (-253°C for stainless steel versions) or + 150°F to -320°F

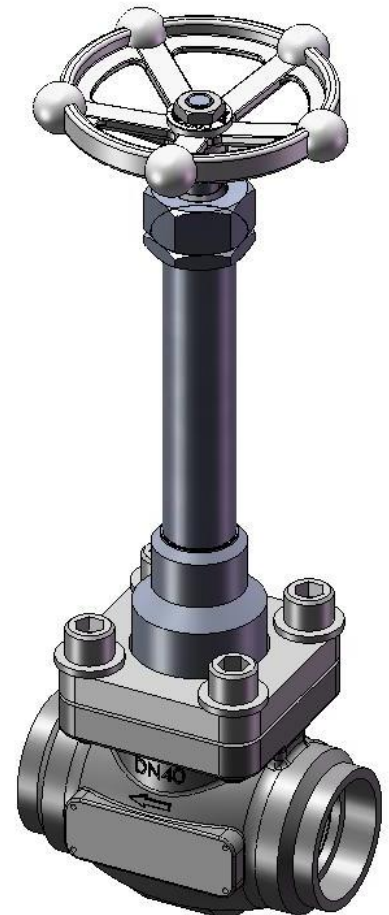
Only suitable for operation with media: - O<sub>2</sub>, N<sub>2</sub>, Ar, CO<sub>2</sub>, CH<sub>4</sub>, He, CHF, Kr, Ne, He, H<sub>2</sub>, C<sub>2</sub>H<sub>4</sub>, N<sub>2</sub>O, SF<sub>6</sub>, LPG, LNG

When using on CO<sub>2</sub>, the internal atmosphere must be dry and moisture free as bronze could be affected by carbonic acid.

These Globe Valves are supplied with stainless steel bodies (bolted bonnet only) and bronze bodies (bolted bonnet and union bonnet) extended and non-extended stems, with integral seat and renewable PTFE disc, complete with bronze internals.

Available with socket weld and butt weld ends, sockets for copper pipes and screwed female ends. The valve is of the cone seat design for drop tight shut off. The bolted bonnet version allows easy maintenance, even in confined spaces with lower bolting torques required than for an equivalent size union bonnet valve.

The valve is operated by a hand wheel. The hand wheel is turned clockwise to close the valve and anti-clockwise to open.

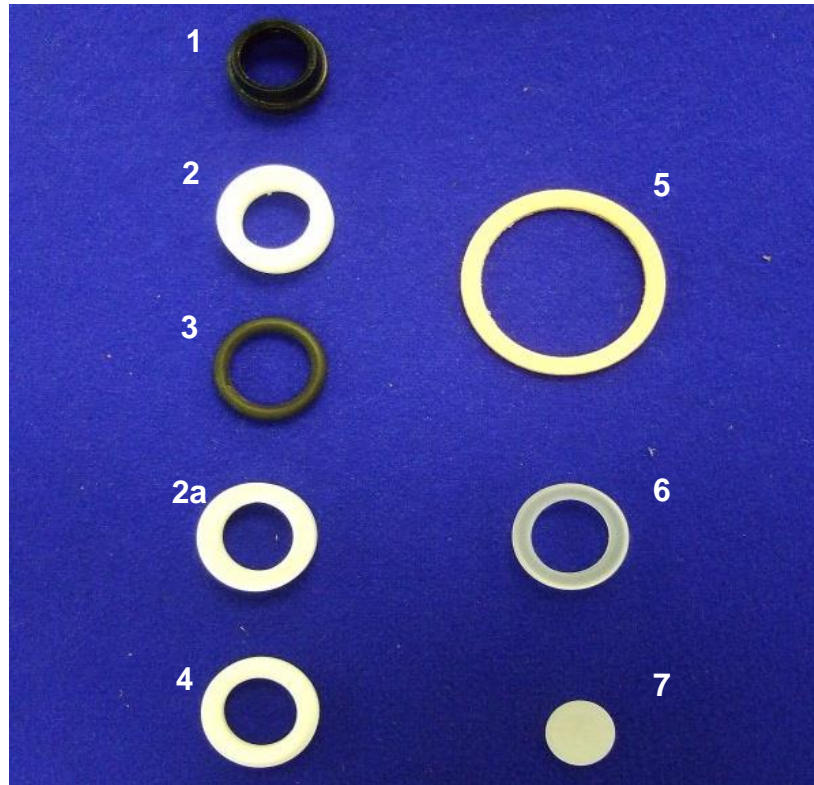


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### Installation and Maintenance

#### Spares Kit



| Reference | Description        | Spares Kit                                     |
|-----------|--------------------|--|
| 1         | Wiper Seal         | Contact<br>Bestobell Valves<br>Technical Sales |
| 2         | Chevron Top        |  |
| 3         | 'O' Seal           |  |
| 2a        | Chevron Top        |  |
| 4         | Chevron Bottom     |  |
| 5         | Gasket             |  |
| 6         | Valve Seal Flat    |  |
| 7         | Anti-Friction Disc |  |

Handwheel, separate gasket and full headwork are also available upon request.

***Please contact Bestobell Valves for specific part numbers***

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### ***Torque Table***

| Valve Size    | Disc Retaining Nut |                    | Gland Nut        | Bolted Bonnet |                   | Union Nut          |
|---------------|--------------------|--------------------|------------------|---------------|-------------------|--------------------|
| DN6 (1/4")    | M5                 | 2.5 NM (1.8 lb.ft) | 16 NM (12 lb.ft) | M8            | 16 NM (12lb.ft)   | 48 NM (35 lb.ft)   |
| DN10 (3/8")   |                    |                    |                  |               |                   |                    |
| DN15 (1/2")   |                    |                    |                  |               |                   |                    |
| DN20 (3/4")   | M6                 | 5 NM (3.7 lb.ft)   | 32 NM (24 lb.ft) | M10           | 32 NM (24 lb.ft)  | 54 NM (40 lb.ft)   |
| DN25 (1")     | M8                 | 12 NM (8.8 lb.ft)  |                  | M12           | 57 NM (42 lb.ft)  | 68 NM (50 lb.ft)   |
| DN40 (1 1/2") | M10                | 20 NM (14.7 lb.ft) | 32 NM (24 lb.ft) | M12           | 57 NM (42 lb.ft)  | 150 NM (111 lb.ft) |
| DN50 (2")     | M12                | 37 NM (27 lb.ft)   |                  | M16           | 120 NM (90 lb.ft) | 305 NM (225 lb.ft) |

- Apply torques across corners with a final tightening to avoid collar being set incorrectly in socket.
- Only use PTFE based lubricants.
- Torque specified is for lubricated Stainless Steel fasteners.
- On Cryogenic applications, ONLY use specified Stainless Steel fasteners.
- Torques specified for valves with PTFE body / bonnet gaskets.

### ***Installation Method***

\* **PLEASE NOTE:** The preferred orientation of the valve is vertical. If the valve has to be installed at an angle, it should not be less than 30° from the horizontal.

Progressively slacken the bonnet bolts in sequence to preserve conditions of internal gasket.

Remove the headwork before installation and cover the top of the body to protect the internals of the valve from particulate contamination. Fully open the valve before removing the headwork and remember to keep clean i.e. place in original bag and protect the exposed PTFE face.

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Identify the intended flow direction and note the valves flow direction, indicated by the flow direction arrow on the valve body.

Ensure all end connections to the valve are in line and that pipe work is supported to reduce unwanted stresses / loading and vibration on the valve and system pipe work.

Ensure that all joining materials / components used during the installation of the valve are compatible and will not cause any deterioration to the valve structure.

### Taper threaded end connections:

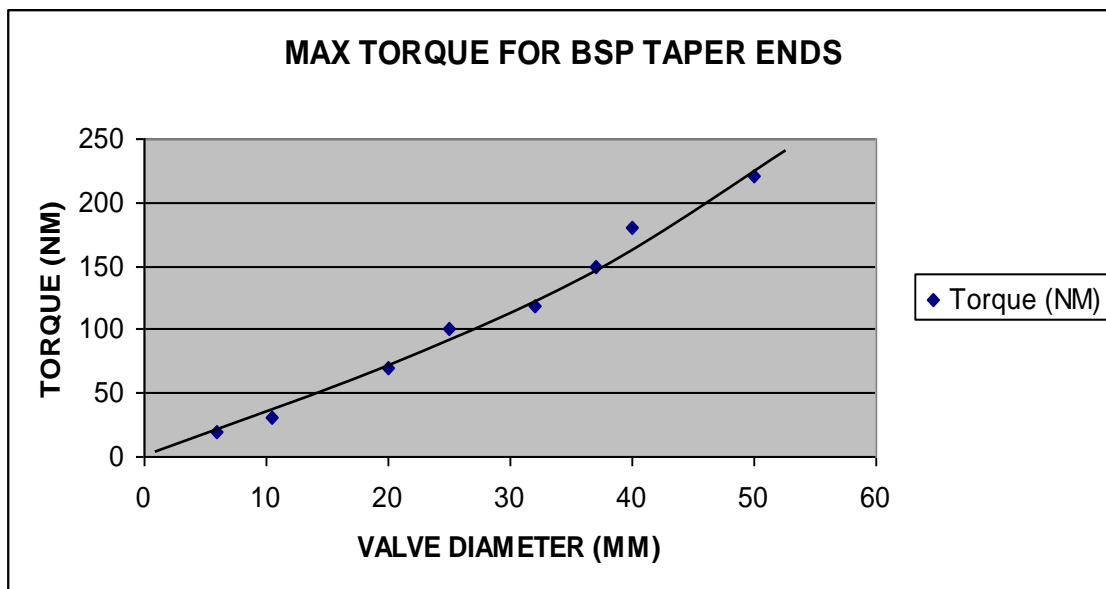
For valves with taper threaded end connections a good quality PTFE thread tape may be used.

Firstly tighten end connections by hand to reduce risk of cross threads before finally tightening with a suitable torque wrench. (See torque graph for Female taper threads).

For bolted bonnet type valve i.e. 4 retaining cap screws:  
Progressively slacken screws in sequence to preserve conditions of internal gasket.

For union bonnet type valve:  
Slacken locking grub screw before removing union nut.

Remember to keep headwork clean i.e. place in original bag.



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### **Step 1 Flanged end connections:**

Tighten flange fasteners progressively and in sequence, at the same time as checking alignment of mating flanges.

### **Step 2 Welded / Brazed End Connections:**

After completing and checking the welded / brazed end connections, ensure the internal seat surfaces are clean and system pipe work is thoroughly flushed in preparation for re-fitting the headwork.

### **Step 3 Refitting the Headwork:**

#### **Bolted Bonnet**

Refit the headwork (ensuring the disc is in the open position and replace any damaged gaskets) and secure in place using the capscrews removed earlier. Tighten to the torques on page 12.

#### **Union Bonnet**

Refit the headwork (ensuring the disc is in the open position and replace any damaged gaskets) and secure in place using the union nut removed earlier. Tighten to the torques on page 12. When torqued in position, re-tighten the locking grubscrew in the side of the union nut.

### **Step 4 Testing:**

Before introducing pressure to the valve, carry out a thorough inspection of all connections: welded and/or threaded. Once pressure is introduced to the valve, a method appropriate to the medium being carried by the system should be employed to test for leaks.

**Never use hands to test for leaks!**

### **Step 5 (Operation):**

Check that the valve fully opens (anti-clockwise) and closes (clockwise) smoothly by hand. If difficulty is experienced, refer to the troubleshooting section of this manual.

**Note: If unsure about the installation and operation of this valve please contact Bestobell Valves before you continue.**

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### Refit / Refurbishment Method

**PLEASE NOTE:**

Depending upon the size of valve and the materials it is constructed from, the bonnet can be either a bolted or union joint. The seat design also varies and could be either a cone or flat seat; therefore the refurbishment method will vary.

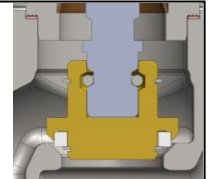
Union Nut



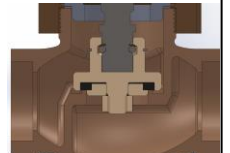
Bolted Bonnet



Cone Seat



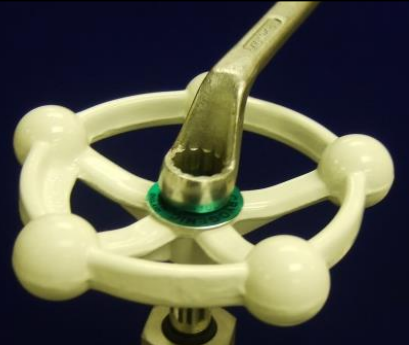
Flat Seat



**STEP 1:**

Whilst the valve is still in the service line, isolate it and drain off pressure.

Unscrew the hand wheel retaining nut, lift off the label and save both parts in a safe place.



**STEP 2:**

Lift off the hand wheel taking care not to damage the end of the stem.

Store the hand wheel in a safe place.



**STEP 3:**

Using the appropriately sized spanner; unscrew the gland locknut.



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### STEP 4:

Unscrew the gland nut.

Remove any debris from the stem.



### STEP 5:

Remove the gland nut and store this in a safe place.



### STEP 6:

Remove the wiper seal and discard.

Remove the gland follower and store in a safe place.

For Stainless Steel valves: **GO TO STEP 7**

For Bronze Valves: **GO TO STEP 8**



### STEP 7:

Remove the four securing screws and washers from the bonnet.

**GO TO STEP 9**



### WARNING

Before any installation & maintenance work can commence; ensure the valve and surrounding system is drained of pressure and isolated.



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### STEP 8:

Remove the grub screw from the union nut.

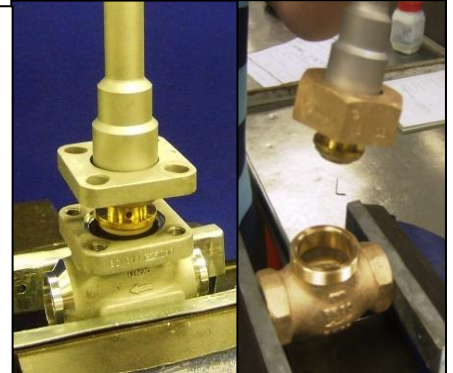
Loosen and remove the union bonnet.

**GO TO STEP 9**



### STEP 9:

Remove the headwork from the body.



### STEP 10:

Remove the stem from the cover.

**NOTE:** Depending on the style of the seat, the method for replacing the disc seal will vary.

For cone seats: **GO TO STEP 11**

For flat seats: **GO TO STEP 12**



### STEP 11:

Carefully remove the circlip from the end of the disc holder, taking care not to damage the seal groove and store in a safe place.

Then remove the disc seal and discard.

Note - old seal (ptfe) is black and the replacement seal (pctfe) is white on sizes 1 1/2".

**GO TO STEP 13**



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**STEP 12:**

Remove the lock nut(s) from the disc holder. Remove the seal retainer and store in a safe place.

Remove the disc seal and discard.

**GO TO STEP 13**



**STEP 13:**

Replace the disc seal with the new one from the spares kit.

For cone seats: **GO TO STEP 13**

For flat seats: **GO TO STEP 14**



**STEP 14:**

Replace the seal retaining circlip and ensure that it is seated correctly in the groove.

**GO TO STEP 16**



**STEP 15:**

Replace the seal retainer and secure in place with the lock nut(s) removed earlier. Tighten to the torques shown on page 12.



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### STEP 16:

Remove the gland packing, washers and spring from the inside of the gland area. Take care not to scratch the inside of the gland area.



### STEP 17:

Clean the washers and spring.

Discard the original gland packing and replace with the new packing from the spares kit.

Arrange as shown and re-insert into the gland.

**NOTE:** Ensure the 'O' seal is fitted into the top chevron.



### STEP 18:

Re-insert the stem into the cover.

Clean the gland follower and replace the lip seal using the new one from the spares kit. Slide these down the stem into the gland after the gland packing.



### STEP 19:

Screw on the gland nut after the gland follower.

Tighten to the torque shown on page 12 using a calibrated torque wrench.



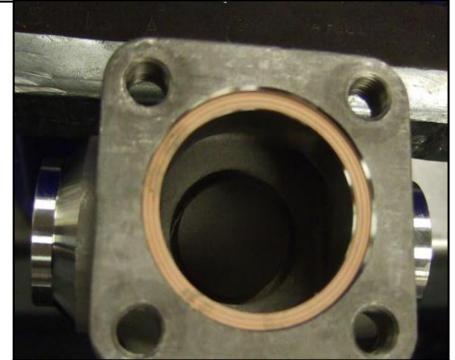
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### STEP 20:

Replace the gasket in the body with the new one from the spares kit.

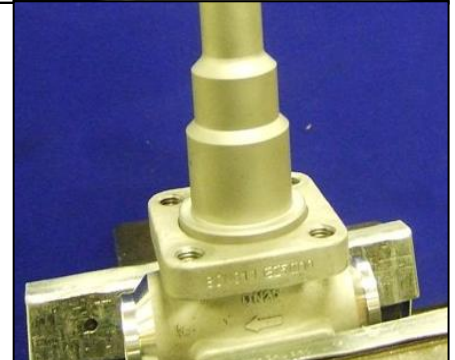
Remove and discard the old gasket.



### STEP 21:

Before replacing the headwork, ensure the disc is in the open position by rotating the hand-wheel anti-clockwise.

Replace the headwork on the body with the disc in the open position so as not to damage the inside of the body and disc/seal.



### STEP 22:

#### **Bolted Bonnet**

Slide the loose bonnet flange over the top of the cover and secure by hand by screwing in the four securing screws and washers.

Tighten to the torques shown on page 12 using a calibrated torque wrench. Gradually tighten each screw, frequently switching to opposite corners to ensure equal gasket loading.



### STEP 22A:

#### **Union Bonnet**

Slide the union nut over the top of the cover and secure by hand, then torque into position using the torque figures on page 12, using a calibrated torque wrench.

Then tighten the locking grub screw in the side of the union nut.



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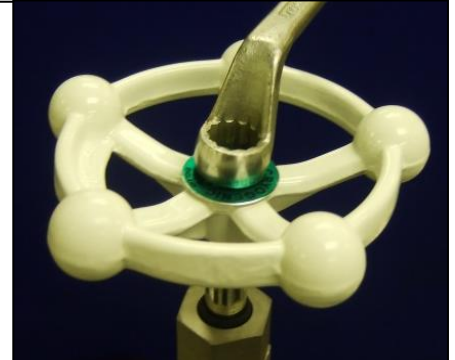
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### STEP 23:

Replace the hand wheel over the end of the stem.

Replace the label and retaining nut – tighten using a socket spanner.

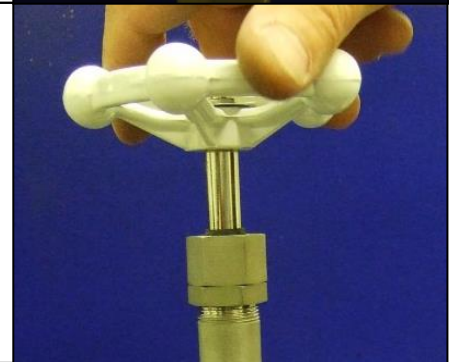


### STEP 24:

Wearing the appropriate personal protective equipment (PPE) operate the valve to determine if the action is smooth.

Re-introduce the flow and operate again to check for any signs of leakage.

If any problems are encountered, refer to the troubleshooting section of this manual.





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### Troubleshooting

| SYMPTOM:                                 | FAULT:   | SOLUTION:  |
|--|--|--|
| LEAKING BONNET                           | MISSING GASKET   | FIT NEW GASKET   |
|  | DAMAGED GASKET   | FIT NEW GASKET   |
|  | INCORRECT TORQUE SETTINGS TO HEADWORK FASTENERS OR UNION NUT | RESET TORQUE VALUES  |
|  | DIRT ON SEAL FACE  | CLEAN SEAL FACES AND REPLACE GASKET                              |
| LEAKING THREADED END CONNECTION          | LOOSE END CONNECTION   | TIGHTEN CONNECTION   |
|  | PTFE TAPE NOT USED   | APPLY PTFE TAPE  |
|  | DIRT ON THREADS  | CLEAN THREADS AND USE NEW PTFE TAPE                              |
|  | CROSSED THREADS  | CHECK THREADS FOR DAMAGE, RENEW ANY DAMAGED THREADED PARTS       |
| LEAKING FLANGED END CONNECTION           | LOOSE END FLANGE FASTENERS                                   | TIGHTEN TO CORRECT TORQUE  |
|  | MISALIGNED FLANGES   | ALIGN FLANGES (DO NOT STRESS MISALIGNED PIPE WORK WITH VALVE)    |
|  | MISSING OR DAMAGED FLANGE GASKET                             | RENEW FLANGE GASKET  |
|  | DIRT ON SEAL FACES   | CLEAN FACE AND REPLACE GASKET                                    |
| EXCESSIVELY TIGHT VALVE OPERATION        | HEADWORK STEM AND/OR STEM TUBE BENT OR DAMAGED               | REPLACE COMPLETE HEADWORK ASSEMBLY                               |
| LEAKING GLAND                            | WORN GLAND PACKING   | TIGHTEN GLAND NUT TO SPECIFIED TORQUE                            |
| GLAND CONTINUES TO LEAK AFTER TIGHTENING | GLAND PACKING EXCESSIVELY WORN                               | RENEW GLAND PACKING AND RE-TIGHTEN GLAND NUT TO SPECIFIED TORQUE |
| TIGHT OPERATION                          | GLAND PACKING NUT TOO TIGHT                                  | CHECK TORQUE   |

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## Globe / Needle Valve (DN10 (3/8") – DN50 (2"))

|                   |         |       |             |        |   |
|-------------------|---------|-------|-------------|--------|---|
| Reference Number: | IOM 002 | Date: | 20 May 2014 | Issue: | B |
|-------------------|---------|-------|-------------|--------|---|

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### Service Record

|                          |              |              |              |              |
|--------------------------|--------------|--------------|--------------|--------------|
| <b>Valve Tag Number:</b> | <b>Date:</b> | <b>Date:</b> | <b>Date:</b> | <b>Date:</b> |
|--------------------------|--------------|--------------|--------------|--------------|

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