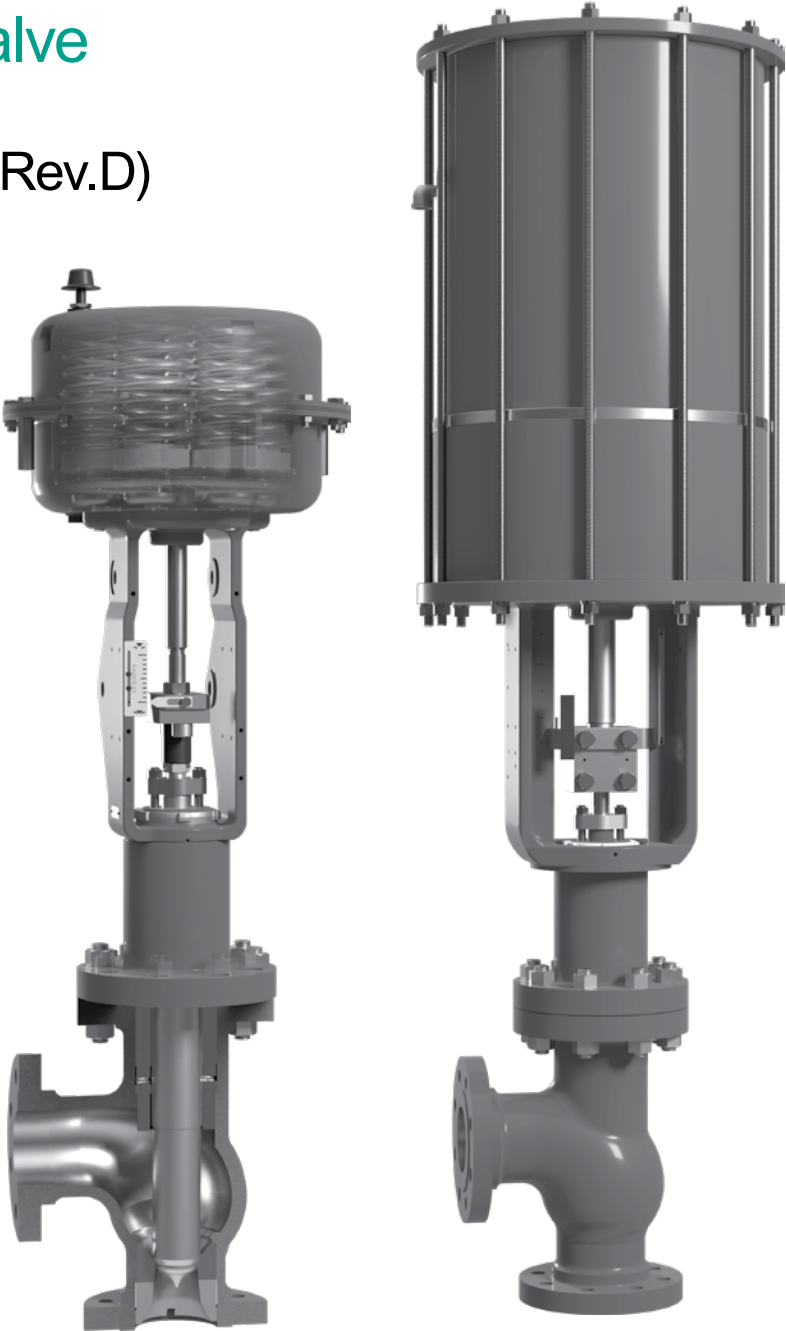


# 71000 Series

Heavy Duty, Streamlined  
Angle Control Valve

Instruction Manual (Rev.D)



**THESE INSTRUCTIONS PROVIDE THE CUSTOMER/OPERATOR WITH IMPORTANT PROJECT-SPECIFIC REFERENCE INFORMATION IN ADDITION TO THE CUSTOMER/OPERATOR'S NORMAL OPERATION AND MAINTENANCE PROCEDURES. SINCE OPERATION AND MAINTENANCE PHILOSOPHIES VARY, BAKER HUGHES COMPANY (AND ITS SUBSIDIARIES AND AFFILIATES) DOES NOT ATTEMPT TO DICTATE SPECIFIC PROCEDURES, BUT TO PROVIDE BASIC LIMITATIONS AND REQUIREMENTS CREATED BY THE TYPE OF EQUIPMENT PROVIDED.**

**THESE INSTRUCTIONS ASSUME THAT OPERATORS ALREADY HAVE A GENERAL UNDERSTANDING OF THE REQUIREMENTS FOR SAFE OPERATION OF MECHANICAL AND ELECTRICAL EQUIPMENT IN POTENTIALLY HAZARDOUS ENVIRONMENTS. THEREFORE, THESE INSTRUCTIONS SHOULD BE INTERPRETED AND APPLIED IN CONJUNCTION WITH THE SAFETY RULES AND REGULATIONS APPLICABLE AT THE SITE AND THE PARTICULAR REQUIREMENTS FOR OPERATION OF OTHER EQUIPMENT AT THE SITE.**

**THESE INSTRUCTIONS DO NOT PURPORT TO COVER ALL DETAILS OR VARIATIONS IN EQUIPMENT NOR TO PROVIDE FOR EVERY POSSIBLE CONTINGENCY TO BE MET IN CONNECTION WITH INSTALLATION, OPERATION OR MAINTENANCE. SHOULD FURTHER INFORMATION BE DESIRED OR SHOULD PARTICULAR PROBLEMS ARISE WHICH ARE NOT COVERED SUFFICIENTLY FOR THE CUSTOMER/OPERATOR'S PURPOSES THE MATTER SHOULD BE REFERRED TO BAKER HUGHES.**

**THE RIGHTS, OBLIGATIONS AND LIABILITIES OF BAKER HUGHES AND THE CUSTOMER/OPERATOR ARE STRICTLY LIMITED TO THOSE EXPRESSLY PROVIDED IN THE CONTRACT RELATING TO THE SUPPLY OF THE EQUIPMENT. NO ADDITIONAL REPRESENTATIONS OR WARRANTIES BY BAKER HUGHES REGARDING THE EQUIPMENT OR ITS USE ARE GIVEN OR IMPLIED BY THE ISSUE OF THESE INSTRUCTIONS.**

**THESE INSTRUCTIONS ARE FURNISHED TO THE CUSTOMER/OPERATOR SOLELY TO ASSIST IN THE INSTALLATION, TESTING, OPERATION, AND/OR MAINTENANCE OF THE EQUIPMENT DESCRIBED. THIS DOCUMENT SHALL NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN APPROVAL OF BAKER HUGHES.**

# Table of Contents

<b>Safety Information</b> .....	<b>1</b>
<b>Numbering System</b> .....	<b>2</b>
<b>1. Introduction</b> .....	<b>3</b>
1.1 Field of Application .....	3
1.2 Serial Plate .....	3
1.3 Actuator and Other Accessories .....	3
<b>2. Unpacking</b> .....	<b>3</b>
<b>3. Installation</b> .....	<b>3</b>
3.1 Piping Cleanliness .....	3
3.2 Isolation Bypass Valve.....	3
3.3 Flow Direction.....	3
<b>4. Maintenance</b> .....	<b>4</b>
4.1 Disassembly .....	4
<b>5. Maintenance &amp; Repair</b> .....	<b>4</b>
5.1 Threaded Seat Ring Removal .....	4
5.2 Plug Guide Removal.....	4
5.3 Lapping Seats.....	5
5.3.1 Threaded Trim .....	5
5.4 Plug Stem Pinning .....	5
5.4.1 Replacing Plug and Stem .....	5
5.4.2 Replacing Existing Stem Only .....	6
5.5 Packing Box.....	7
5.5.1 Braided PTFE with Carbon or Aramid Core (Standard) .....	7
5.5.2 Flexible Graphite Rings .....	7
5.5.3 LE Packing.....	7
5.5.3.1 Preparation .....	7
5.5.3.1.1 Stem .....	7
5.5.3.1.2 Packing Box .....	8
5.5.3.1.3 Packing.....	8
5.5.3.1.4 Spring Loaded Follower .....	8
5.5.3.2 Packing Installation .....	8
5.5.4 Packing Box Efficiency .....	9
6.0 Reassembly .....	10
<b>Tightening Torque</b> .....	<b>11</b>
<b>Parts Reference Diagram</b> .....	<b>12</b>
<b>Parts List</b> .....	<b>12</b>

# Safety Information

## Important - Please read before installation

These instructions contain **DANGER**, **WARNING**, and **CAUTION** labels, where necessary, to alert you to safety related or other important information. Read the instructions carefully before installing and maintaining your control valve. **DANGER** and **WARNING** hazards are related to personal injury. **CAUTION** hazards involve equipment or property damage. Operation of damaged equipment can, under certain operational conditions, result in degraded process system performance that can lead to injury or death. Total compliance with all **DANGER**, **WARNING**, and **CAUTION** notices is required for safe operation.



This is the safety alert symbol. It alerts you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



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



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



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



When used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, could result in property damage.

**Note: Indicates important facts and conditions.**

## About this Manual

- The information in this manual is subject to change without prior notice.
- The information contained in this manual, in whole or part, shall not be transcribed or copied without Baker Hughes's written permission.
- Please report any errors or questions about the information in this manual to your local supplier.
- These instructions are written specifically for the **Masoneilan™** 71000 Series Streamlined Angle Valves, and do not apply for other valves outside of this product line.

## Useful Life Period

The current estimated useful life period for the 71000 Series control valve is 25+ years with proper maintenance performed by a certified technician. To maximize the useful life of the product, it is essential to conduct annual inspections, routine maintenance and ensure proper installation to avoid any unintended stresses on the product. The specific operating conditions will also impact the useful life of the product. Consult the factory for guidance on specific applications if required prior to installation.

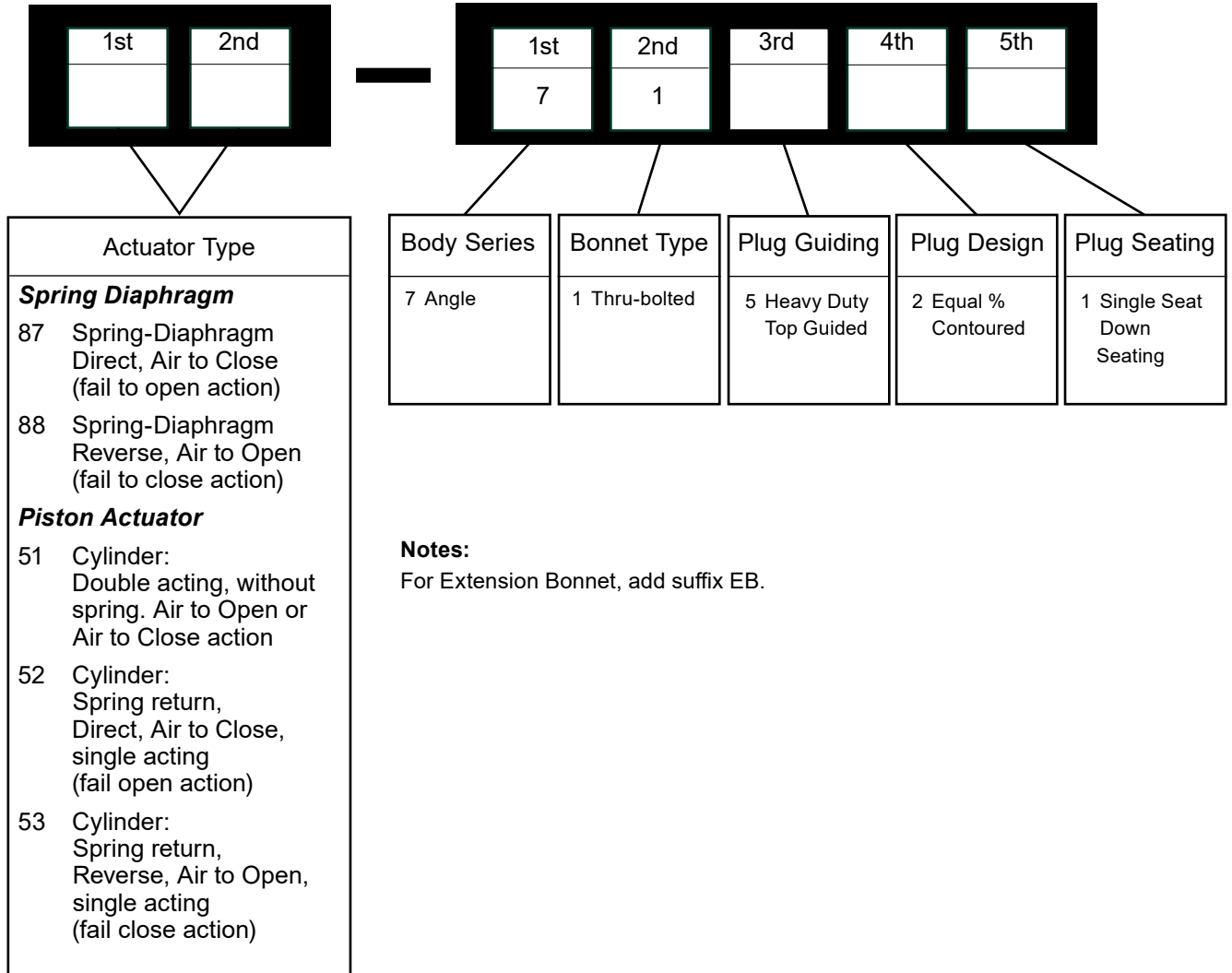
## Warranty

Items sold by Baker Hughes are warranted to be free from defects in materials and workmanship for a period of one year from the date of shipment provided said items are used according to Baker Hughes recommended usages. Baker Hughes reserves the right to discontinue manufacture of any product or change product materials, design or specifications without notice.

### **Note: Prior to installation**

- The valve must be installed, put into service and maintained by qualified and competent professionals who have undergone suitable training.
- All surrounding pipe lines must be thoroughly flushed to ensure all entrained debris has been removed from the system.
- Under certain operating conditions, the use of damaged equipment could cause a degradation of the performance of the system which may lead to personal injury or death.
- Changes to specifications, structure, and components used may not lead to the revision of this manual unless such changes affect the function and performance of the product.

# Numbering System



# 1. Introduction

## 1.1 Field of Application

The following instructions are designed to guide the user during the installation and maintenance of 71000 Series Streamlined Angle Valves.

The following instructions should be thoroughly reviewed and understood prior to installing, operating or performing maintenance on this equipment. Throughout the text, safety and/or caution notes will appear and must be strictly adhered to, otherwise, serious injury or equipment malfunction could result.

Baker Hughes has a highly skilled After Sales Department available for start-up, maintenance and repair of our valves and component parts.

Arrangements for this service can be made through your local Baker Hughes's representative or sales department. When performing maintenance use only Masoneilan replacement parts. Parts are obtainable through your local representative or spare parts department. When ordering parts, always include Model and Serial Number of the unit being repaired.

## 1.2 Serial Plate

This plate is usually fixed on the side of the actuator yoke. It indicates the valve type, model number, serial number, pressure class, pressure shell material, actuator pressure supply, and other necessary information.

## 1.3 Actuator and Other Accessories

The valve is normally equipped with an actuator. There is a particular instruction manual for each actuator, as well as for all other accessories installed on the valve assembly. Consult this actuator instruction manual for electrical and air connections. The 71000 Series most commonly uses the 51/52/53 Series piston cylinder actuators, or the 87/88 spring diaphragm actuators.

**Note:** *This manual describes all standard options of the 71000 Series valves. In order to meet the particular requirements of your application, Baker Hughes may have developed a special option covered by an Appendix to the present manual. If this is the case, the instructions of this Appendix always prevail over the general manual instructions.*

### **WARNING**

To prevent any equipment damage or troubles, follow the instructions below.

- A) The valve must not be used when exceeding the applied regulations, standards and criterion.
- B) The valves must not be used in any conditions other than the agreed specifications.

# 2. Unpacking

Care must be exercised when unpacking the valve to prevent damage to the accessories and component parts. Contact the local Baker Hughes Sales office or Service Center with any issues or problems. Be sure to note the valve model number and serial number in all correspondence.

# 3. Installation

## 3.1 Piping Cleanliness

Before installing the valve in the line, clean piping and valve of all foreign material such as welding chips, scale, oil, grease or dirt. Gasket surfaces should be thoroughly cleaned to ensure leak-proof joints.

## 3.2 Isolation Bypass Valve

To allow for in-line inspection, maintenance or removal of the valve without service interruption, provide a manually operated stop valve on each side of the 71000 Series valve with a manually operated throttling valve mounted in the by-pass line (as shown in Figure 1).

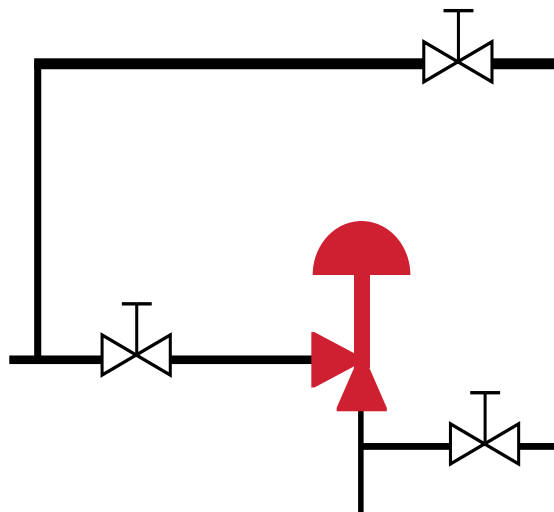


Figure 1 - Typical Installation with isolation valves to allow for in-line inspection.

## 3.3 Flow Direction

The valve must be installed so the process fluid will flow through the valve in the direction indicated by the flow arrow located on the valve body. The 71000 Series most commonly flows in from the side inlet and out through the bottom outlet opposite the installed actuator, unless otherwise noted.

## 4. Maintenance

If it is necessary to disassemble the valve for cleaning, maintenance or replacement of a damaged part, proceed as follows:

### **DANGER**

**Prior to performing maintenance on the valve, isolate the valve and vent the process pressure. Shutoff the supply air line and the pneumatic or electric signal.**

### 4.1 Disassembly

- Shut off all air supplies. Disconnect the tubing for the air supply, positioner signal pressure, and from the volume tank if applicable.
- To disassemble the valve, it must be removed from the piping. It is recommended to bring a block chain over the valve to remove it from the piping for disassembly and for installation.
- Run a lifting strap or chain that is suitably rated to handle the weight of the total assembly through the actuator yoke, and remove the piping flange connection bolts from the inlet and outlet while slightly pulling upward to relieve the weight on the bolts.
- Access to the internal components within the valve body should be accomplished with the actuator removed from the valve assembly. To remove the actuator, refer to the instruction manual for the specific actuator model.
- If the valve is installed in a horizontal position, also run a lifting strap or chain that is suitable rated to support the total valve weight around the body to avoid excessive force applied against the piping system, while disconnecting and removing the valve.
- Unscrew the packing stud nuts (B028) in order to reduce the packing adhesion to the plug stem.
- Disconnect the plug stem (B008) from the actuator stem.
- Remove the yoke nut (B013) and separate the actuator with its yoke from the bonnet (B034).
- Unscrew the bonnet stud nuts (B032) and remove them, lift up the bonnet (B034) until it gets free from the end of the plug stem (B008).

### **CAUTION**

**Care must be given to avoid damage to the plug and plug guiding surfaces**

- Where applicable, remove the guide gasket(s) (B010), possible 1 or 2 depending on size, and remove the plug stem (B008). If this operation becomes difficult because of residues of solidified hydrocarbons present on the parts,

replace the bonnet supported only with four bolts with nuts situated one pair opposite the other, then leaning on a flat bar iron and a cylindrical distance piece set on the top of the bonnet, turn a nut which has been screwed previously on the plug stem in order to “unstick” the plug and the guide (B006), then lift them off slowly either together or separately.

- Remove the bonnet. Pull out the plug with its stem as well as the plug guide (B006) and separate them if necessary. Remove the gasket (B009); pull out the packing (B011).
- Unscrew the seat ring retainer (B001) and remove the seat ring (B002). Thoroughly clean all of the parts before reassembling.

## 5. Maintenance & Repair

**Note: Spiral wound gaskets (B009 and B010) should not be reused, and it is imperative that new gaskets be installed each time the valve is disassembled.**

The purpose of this section is to provide recommended maintenance and repair procedures. These procedures assume the availability of standard shop tools and equipment.

### 5.1 Threaded Seat Ring Removal

Threaded seat ring retainers (B001) are installed tightly by the manufacturer, and after years of service they may be difficult to remove.

To facilitate removal, seat ring wrenches can be fabricated to engage the seat ring lugs and adapted to a standard wrench. If the seat ring is exceptionally resistant to removal, the application of heat or penetrating oil should be helpful.

### **CAUTION**

**When using heating devices, ensure that proper safety practices are observed. Flammability and toxicity of the process fluid must be considered and proper precautions taken.**

### 5.2 Plug Guide Removal

The plug guide (B006) is a slide fit over the valve plug (B005). It can be removed with the valve plug, but can remain within the valve if stuck due to coke, or foreign material, build up. When machining the plug guide, care must be taken to maintain proper dimensions and tolerance. These can be furnished to the local Masoneilan repair shop upon request.

## 5.3 Lapping Seats

Lapping is the process of working the valve plug against the seat ring with an abrasive to produce a close fit. If valve leakage is excessive, lapping becomes necessary. The plug and seat ring seating surfaces should be free of large scratches or other defects, and the contact surfaces of the seats should be as narrow as possible. This may require dressing both parts in a lathe. The seating surface angle of the plug is 30 degrees and the seat ring is 40 degrees (relative to the centerline axis). A good grade of fine grinding compound is required for the lapping operation.

The compound should be mixed with a small quantity of lubricant such as graphite. This will slow the cutting rate and prevent tearing of the seating surfaces. The amount of lapping required depends on the materials, condition of seating surfaces, and accuracy of machining. If a short period of lapping does not visibly improve seating, there is usually no advantage in continuing as excessive lapping may result in rough seats. The only remedy is replacement or re-machining of one or both parts. When lapping new plugs and seat rings, begin with a medium fine (240 grit) and finish with a finer grade (600 grit).

**Note: Lapping should produce a line contact area, not the entire surface, due to the difference in seat angles.**

### CAUTION

Before lapping, the plug and stem sub-assembly must be concentric. (See pinning operation, section 5.4).

#### 5.3.1 Threaded Trim

1. Clean body gasket surface areas.
2. When seat has been removed, ensure that the sealing surface in the body bridge and the threads are thoroughly cleaned.

**Note: A sealant compatible with the process should be applied sparingly to the seat ring threads and sealing shoulder.**

3. Install seat ring (B002), followed by seat ring retainer (B001) and tighten seat ring retainer using fabricated wrench used for removal. If the seat ring is exceptionally resistant to removal, the application of heat or penetrating oil can be helpful.

### CAUTION

Ensure proper safety practices are observed when using heating devices. Flammability and toxicity of the process fluid must be considered, and proper precautions must be taken.

Do not over-tighten. Do not strike seat ring lugs directly. This could distort the seat ring resulting in seat leakage.

4. Apply lapping compound on the plug at several spots equally spaced around the seating area.
5. Insert the stem and plug sub-assembly carefully into the body until it is seated.
6. Place bonnet (B034) on the body and fasten the bonnet to the body using the body stud nuts (B032) spaced equally apart. Apply slight pressure and tighten evenly.

### CAUTION

Do not tighten nuts to final torque specifications at this time. The bonnet is used temporarily for guiding purposes only.

7. Insert two or three pieces of packing rings (B011) into the packing box to assist in guiding the stem and plug during lapping.
8. Screw a drilled and tapped rod with a T-handle onto the plug stem and secure with a locknut.

**Note: As an alternative, drill a hole through a flat steel plate and fasten to the plug stem using two locknuts.**

9. Apply slight pressure on the stem, and rotate the stem in short oscillating strokes (around 8 to 10 times). Repeat this step as necessary.

**Note: The plug should be lifted and turned 90° each time before repeating Step (9). This intermittent lifting is required to keep the plug and seat ring concentric during lapping.**

### CAUTION

Avoid over-lapping as this can cause damage to the seating surface rather than improve leakage performance.

10. After completion of the lapping operation, remove bonnet and plug. The seating area of the seat ring and the plug must be cleaned of all lapping compound in preparation for reassembly. **Do not remove seat ring.**

### CAUTION

Maintenance of the plug should be limited to cleaning of the ports and the procedures defined under Sections 5.3 (Lapping) and 5.4 (Pinning) as required.

## 5.4 Plug Stem Pinning

Plug stem pinning in the field may be required for the following:

- Replacing existing plug and stem, or
- Replacing existing stem only

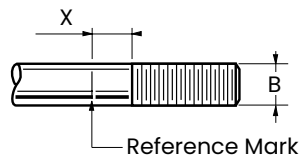
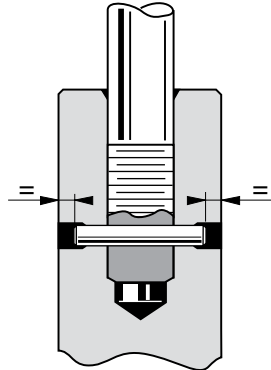
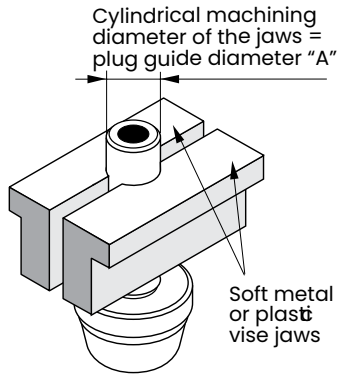
**Note: If it is necessary to replace the plug, then the plug stem must be replaced at the same time. The original pin hole in an existing stem will not provide the necessary fit, and might seriously impair the strength of the assembly.**

#### 5.4.1 Replacing Plug and Stem

### CAUTION

Use care to avoid damage to the guiding surfaces of the valve plug during disassembly, assembly, and pinning operations.





Trim Size	Pressure Class	Capacity	Plug diameter A Inches	Stem Diameter B Inches	Pin hole Diameter C Inches	D Inches	X Inches
1	Up to 2500	Reduced	0.98	0.38	0.100	0.94	0.37
		Full					
1.5	Up to 2500	Reduced	0.98	0.50	0.138	1.25	0.50
		Full	1.38				
2	Up to 2500	Reduced	1.61	0.75	0.197	1.88	0.75
		Full	1.97				
3	Up to 1500 2500	Reduced	1.97	0.75	0.197	1.88	0.75
				1.00		2.00	0.98
	Up to 1500 2500	Full	2.72	0.75	0.197	1.88	0.75
				1.00		2.00	0.98
4	Up to 1500 2500	Reduced	2.72	1.00	0.197	2.00	0.98
				1.25	0.315	3.13	1.25
	Up to 1500 2500	Full	3.58	1.00	0.197	2.00	0.98
				1.25	0.315	3.13	1.25
6	Up to 1500 2500	Reduced	3.98	1.00	0.197	2.00	0.98
				1.25	0.315	3.13	1.25
	Up to 1500 2500	Full	5.47	1.00	0.197	2.00	0.98
				1.25	0.315	3.13	1.25
8	Up to 1500 2500	Reduced	5.47	1.00	0.197	2.00	0.98
				1.25	0.315	3.13	1.25
	Up to 1500 2500	Full	6.30	1.00	0.197	2.00	0.98
				1.25	0.315	3.13	1.25
10	Up to 1500 2500	Reduced	6.30	1.00	0.197	2.00	0.98
				1.25	0.315	3.13	1.25
	Up to 1500 2500	Full	4.37	1.25	0.315	3.13	1.25
				1.50	0.394	3.50	1.50
12	Up to 1500	Full	4.37	1.25	0.315	3.13	1.25

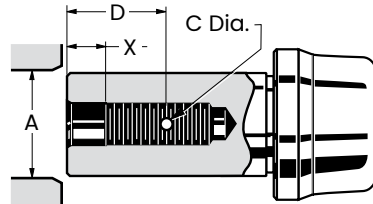


Figure 2 - Plug Stem Pinning

### A. Reference Marking on the Plug Stem

Measure the depth of the pilot recess in the plug (B005) (Dimension X as shown in Figure 2), and make a reference mark on the plug stem (B008) at the same distance from the thread.

## CAUTION

While pinning is being performed, care must be taken not to damage the seating surface or plug guide. Always use a soft metal or plastic vice jaws with cylindrical features to hold the plug guide area (see Figure 2).

### B. Screwing Stem to Plug

- Hold the plug (B005) in a vise using soft jaws to prevent surface damage.
- Lock two nuts against each other on the end of the new plug stem (B008), and screw the stem **solidly** into the plug (B005) using a wrench on the upper nut.

When properly assembled, the reference mark (see Section A above) should be flush with the end of the plug guide.

### C. Drilling the New Parts

- If the plug (B005) is already fully drilled, then drill the stem (B008) to the same diameter (see Figure 2) as the plug (B005) shank hole.

- If the plug guide area has a center mark,

Place the plug (B005) on a V-block and use a suitable drill size to either:

- Match the hole size in the plug, or
- Match Diameter C (see Figure 2)

Drill through the plug-stem assembly.

If the plug (B005) area does not have any hole or any center mark,

- Measure Dimension D based on the plug (B005) diameter and plug stem (B008) diameter (see Figure 2).
- Place the plug (B005) on a V-block, and make a center mark on the plug (B005) area using a center punch.
- Drill through the plug stem (B008) assembly using a suitable size drill bit.

**In all cases after drilling:** Remove any burrs from the plug guide hole by making a slight chamfer.

## D. Pinning the Plug-Stem Assembly

1. Select the correct size plug stem pin (B007) based on the plug (B005) diameter and plug stem (B008) diameter (see Figure 2). Apply a small amount of grease on the pin and hand assemble it into the hole in the plug.
2. Press fit the plug stem pin (B007) into the hole using a hammer while the plug is held in a vise. (see Figure 2).
3. After the plug (B005) has been pinned, it should be placed in a lathe to ensure it is concentric with the stem.

If the assembly is not running true, then the plug stem (B008) should be placed in a collet with the plug (B005) against it and the plug should be adjusted. Alignment of plug stem can be performed by means of a soft faced mallet.

### 5.4.2 Replacing Existing Stem Only

#### A. Removing Existing Pin and Stem

1. Place the plug (B005) on a V-block and use a drift punch to drive out the old plug stem pin (B007).

**Note: If it is necessary to drill out the pin, use a drill bit slightly smaller than the pin diameter.**

2. Hold the plug (B005) in a vise (Follow previous CAUTION alerts to protect parts).
3. Lock one nut against another at the end of the plug stem (B008). Using a wrench on the lower nut, unscrew the stem from the plug (B005). The stem is removed by turning it counter-clockwise.

#### B. Screwing Stem to Plug

Refer to step B of the previous section on “REPLACING PLUG AND STEM”.

#### C. Drilling the New Stem

Place the plug (B005) on a V-block and use a suitable size drill bit to drill the plug stem (B008) (use the hole in the plug as a guide).

#### D. Pinning

Select the correct size pin based on the plug guide diameter and pin hole diameter. Proceed as described in part D of the previous section, taking care not to damage the plug guide area.

## 5.5 Packing Box

Packing box maintenance is one of the principle action items of routine servicing. Tightness of the packing is maintained by packing compression. Compression is achieved by evenly tightening the packing flange nuts (B028) against the packing flange (B014). Care must be taken not to over tighten as this could prevent smooth operation of the valve. If all compression is used up and the valve leaks, then new packing is required.

# CAUTION

**Valve must be isolated and the pressure vented before performing packing box maintenance.**

Proceed as follows :

### 5.5.1 Braided PTFE with Carbon or Aramid Core (Standard)

**Note: The Braided PTFE/Carbon or Aramid packing rings have a skive cut allowing packing replacement without**

**disconnecting the plug stem from the actuator connector or actuator stem.**

- A. Loosen and remove packing flange nuts (B028).
- B. Lift the packing flange (B014) and packing follower (B030) up the valve stem.

**Note: They may be taped in place to keep them out of the way before proceeding.**

- C. By means of a hooked instrument, remove packing rings (B011) ensuring not to damage the sealing surfaces of the packing box or plug stem.

**Note: On valves equipped with an optional lubricator connection, the lantern ring must also be removed to gain access to lower packing rings.**

- D. Replace packing rings (B011).

**Note: Assemble and compress rings one at a time into packing box. The skive cut of each packing ring must be placed about 120 degrees apart.**

**Note: On valves equipped with an optional lubricator connection, see Figure 4 for correct amount of rings to place under the lantern ring .**

- E. Replace packing follower (B030) and packing flange (B014).
- F. Replace and tighten packing stud nuts (B028).

# CAUTION

**Do not over tighten.**

- G. Place valve back in service and only tighten packing as necessary to stop external leakage.

**Note: In an emergency, string packing may be used as a temporary repair only. It must be replaced with the correct packing as soon as possible.**

### 5.5.2 Flexible Graphite Rings

**Note: Flexible graphite packing rings replacement may require disconnecting the plug stem from the actuator stem and removal of the actuator if rings are not skive cut.**

- A. Loosen and remove packing flange nuts (B028).
- B. Remove packing flange (B014) and packing follower (B030) from the plug stem.
- C. By means of a hooked instrument, remove packing (B011) ensuring not to damage the sealing surfaces of the packing box or plug stem.

**Note: On valves equipped with an optional lubricator connection, the lantern ring must also be removed to gain access to lower packing rings.**

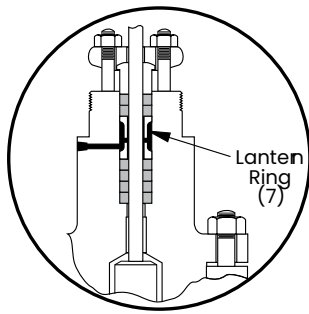
- D. Replace new packing set (B011); first assemble a back-up ring (*Graphite Filament Yarn braided ring*), then the flexible graphite rings (*smooth rings*), and finally another braided back-up ring.

**Note: Assemble and compress rings one at a time into packing box.**

**Note: On valves equipped with an optional lubricator connection, see Figure 4 for correct arrangement according to valve size.**

- E. Assemble packing follower (B030) and packing flange (B014).
- F. Assemble and tighten packing stud nuts (B028).

Packing box with Kevlar/PTFE packing rings



Valve Size		Quantity of Packing Rings (6)					
		Kevlar/PTFE			Expanded Graphite w/ backup Rings		
in.	mm	Above Lantern Ring (7)	Below Lantern Ring (7)	Total	Above Lantern Ring (7)	Below Lantern Ring (7)	Total
3/4 to 4	20 to 100			6			6
6 to 8	150 to 200			7			7

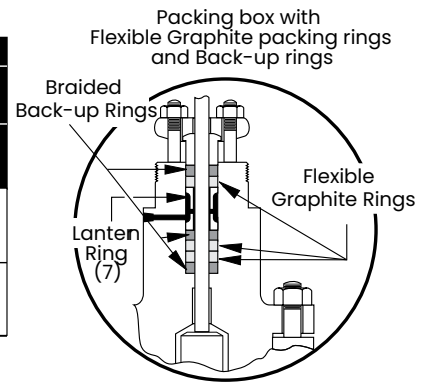


Figure 3 - Packing Ring Arrangements with Optional Lubricator Connection

## CAUTION

Do not over-tighten.

- G. Proceed to appropriate instructions for actuator and valve assembly adjustment.
- H. Place valve back in service and only tighten packing as necessary to stop external leakage.

### 5.5.3 LE Packing

The Masoneilan Low-E (Low Emissions) Packing from Baker Hughes is a high performance packing system capable of containing fugitive emissions well below the specifications of the most severe recommendations. It is also available as fire proof configuration if required.

The packing is provided as a set of rings consisting of middle rings and bound by end rings also referred to as anti-extrusion rings. All of our Low-E solutions come with Live Loading which is imperative to maintain a constant load on the packing and is necessary for thermal cycling applications.

Applied properly, this packing exhibits below current regulations. Consequently, it can effectively prevent fugitive emissions leaks from a control valve. The Low-E packing system can directly replace conventional packing, requiring no modification to the control valve or actuator.

The packing material could vary depending on the specifications and timing when the valve was ordered. It is important to understand the specific packing material that is being replaced.

Installation should be performed by a qualified technician. The following paragraphs will provide guidance while Packing Manual Ref. 34620 is also available.

#### 5.5.3.1 Preparation

##### 5.5.3.1.1 Stem

Inspect stem for any nicks or scratches on the surface finish. Reject the stem for any of these reasons as they may damage packing.

**Note: A properly etched part number on the stem in the packing area will have no adverse effect on the performance of the packing.**

Stem finish should be 3-7 AARH (Ra 0,1/0,2).

##### 5.5.3.1.2 Packing Box

**Note: Bonnets that have a lube hole or leak detection port are unacceptable for use with the packing arrangement.**

## CAUTION

Packing box should be clean and free of burrs, rust, and any foreign matter. Parts can be cleaned with denatured alcohol.

**Note: Packing box finish should be 125 AARH (Ra 3,2) or better.**

The packing box may be bored or honed oversize by up to 0.015" (0.38 mm) above the nominal diameter to improve the finish. For instance, a nominal 0.875" (22.22 mm) packing box may be bored or honed up to 0.890" (22.60 mm) and the LE Packing will still seal properly.

**Packing box must be finished to the bottom of the bore.**

#### 5.5.3.1.3 Packing

Inspect packing rings. DO NOT use packing if any nicks or scratches on packing are observed. Check packing instructions to ensure that it is in proper arrangement (different packing materials contain arrangements specific to the design).

#### 5.5.3.2 Packing Installation

- a. Refer to the packing instructions that were provided with the packing for proper installation.
- b. Packing Manual Ref 34620 is also available as an additional aid while completing the packing installation.
- c. The packing should be checked for leakage.

**Note: All exposed surfaces of the packing set must be covered with the lubricant.**

- d. Packing load should be checked after the valve has cycled approximately 500 times. Adjust if necessary. Plant maintenance / operation personnel should periodically inspect valves to spot leakage. Adjust if necessary and per OEM recommendations. If leak is not resolved, packing and any non-confirming hardware part must be replaced.

## 5.5.4 Packing Box Efficiency

The constant supervision of the packing box is one of the main routing operations of the maintenance service. In order to provide a correct functioning of the valve, the packing should not be tightened over the compression value sufficient to provide the tightness. The packing box efficiency is obtained by the compression of the packing, or by combining it with use of the lubricant. As it wears, gradually re-tighten the packing up to the limits of the possible compression. In order to add packing, it is necessary only to remove the packing follower and flange and introduce one or two split rings.

***Note: In case of urgency, the braided packing of suitable section can be inserted without removal of the worn rings. Before this operation, the valve must be put out of service. If the packing is made up of non-split rings, it may be necessary to disassemble the valve and remove the worn packing. To repack the stuffing box, see paragraph "Reassembling".***

## 6.0 Reassembly

Replace all parts with significant dimensional defects caused by the corrosion, erosion or wear. It is also necessary to replace the gasket (B009), the guide gasket(s), if applicable, (B010) and the packing (B011) with new parts after each disassembly.

- Clean all gasket mating surfaces
- Replace the seat ring (B002) in the valve body. Apply a small amount of sealant to the seat ring retainer (B001) threads and sealing shoulder, and screw and lock the seat ring retainer (B001) with the torque values indicated in the table below for each valve size.

**Note: A sealant compatible with the process should be applied sparingly on the retainer thread.**

### CAUTION

**Do not over-tighten or strike seat ring (B002) or seat ring retainer (B001) directly. This could distort the seating area resulting in unwarranted seat leakage.**

- Insert the plug guide (B006) in the valve body following with the plug (B005) fitted with its stem (B008). Place the gasket (B009) on the body.

### CAUTION

**Care must be taken during assembly to ensure proper alignment of the trim, and that the plug and plug guiding surfaces do not get damaged.**

### CAUTION

**For bonnet with purge or injection connection: NPT or flange. Before achieving metal to metal contact with the body, rotate the bonnet to orient this connection in front of the existing piping.**

Center the guide gasket (B010) on the top of the guide (B006), and then place the bonnet down over the plug stem until it is centered on the upper part of the guide.

- Assemble the bonnet with the body by means of bonnet studs (B033) and bonnet stud nuts (B032). Tighten the nuts to obtain metal-to-metal contact between the bonnet and valve body (size 8", 10" and 12" only) and/or tighten them with torque value indicated in the table below for each valve size.
- Insert the packing as follows: first, one braided ring, then the die-formed rings and finally another braided ring. It is important to tamp down the rings in the packing box one by one. If packing rings have a radial cut, stagger the cut of adjacent rings by 180°.
- Slip the packing follower and flange over the plug stem. Tighten the nuts (B028) manually. Verify if the plug accomplishes its normal stroke in the valve body. Tighten the nuts (B028) to another full turn with the wrench.
- Replace the actuator and fasten it by means of the yoke nut (B013).

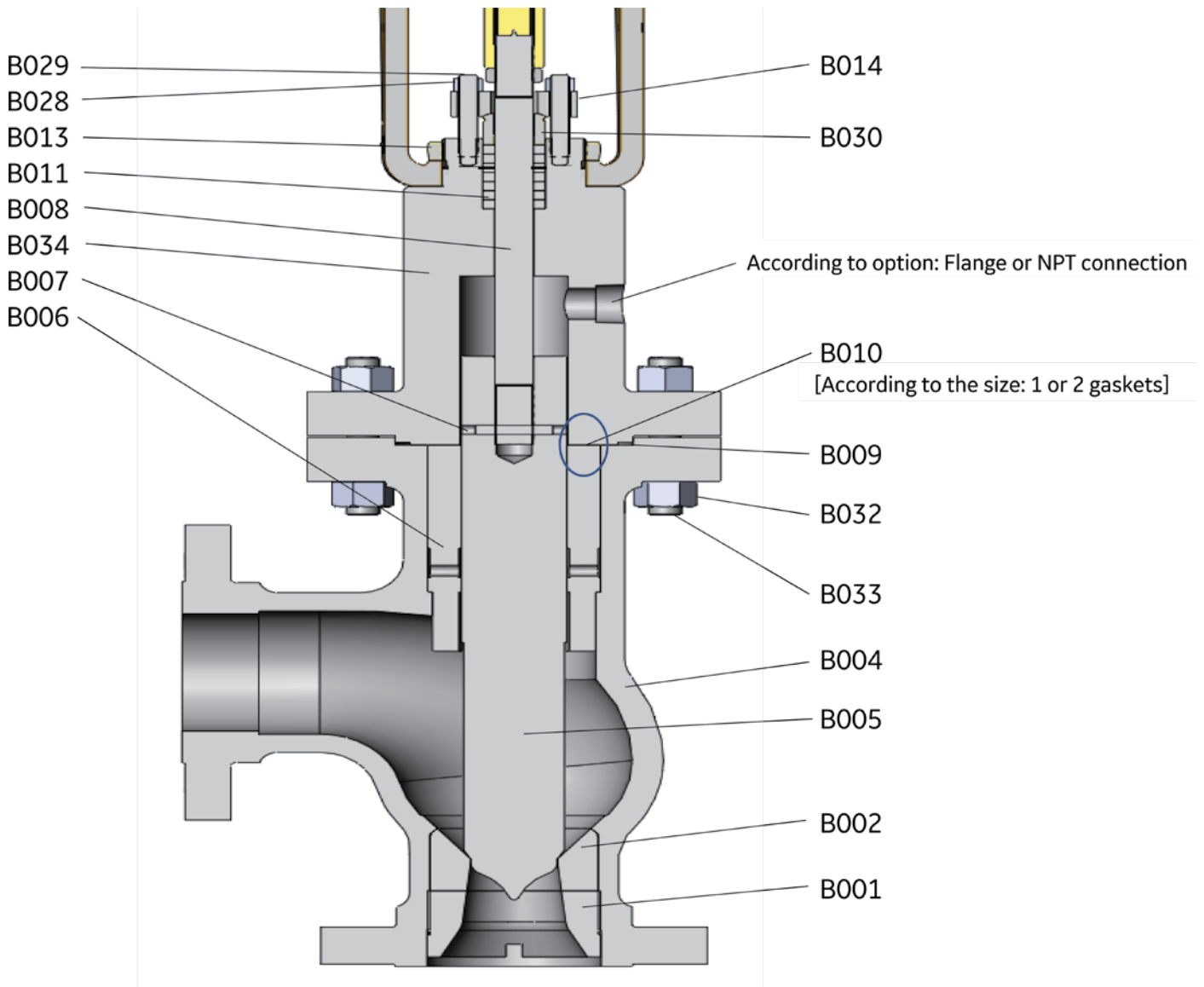
- Be sure that the plug sits normally on the seat ring and connect the actuator to airline or to electrical circuit.
- Connect the actuator stem to the valve stem in accordance with the appropriate actuator instruction manual. The 71000 Series most commonly uses the 51/52/53 Series piston cylinder actuators, or the 87/88 spring diaphragm actuators.
- Replace the valve on the piping, carry out the connections and start it up again.

## Tightening Torque

Valve Size		ANSI Class Max.	Body Studs		Required Torque			
					Carbon Steel Body Studs		Retainer Seat Ring	
mm	in.		Size	Qty	Ft. Lbs	daN.m	Ft. Lbs	daN.m
25	1	600	1/2 - 13 UNC	4	52	7	148	20
40	1 1/2	600	3/4 - 10 UNC	4	118	16	148	20
50	2	600	5/8 - 11 UNC	8	96	13	221	30
80	3	600	3/4 - 10 UNC	8	170	23	1475	200
100	4	600	7/8 - 9 UNC	8	295	40	3690	500
150	6	600	1 - 8 UN	12	288	39	4425	600
200	8	600	1 3/8 - 8 UN	12	605	82	4425	600
250	10	600	1 1/4 - 8 UN	16	443	60	11065	1500
300	12	600	1 1/4 - 8 UN	16	443	60	11065	1500

The 71000 Series is also available in non-standard configurations that are Engineered-to-Order. These ETO configurations can be alternate pressure class rated constructions requiring special bolt torquing requirements. For these configurations, see the order-specific Bill of Materials drawings that specify bolt torque.

## Parts Reference Diagram

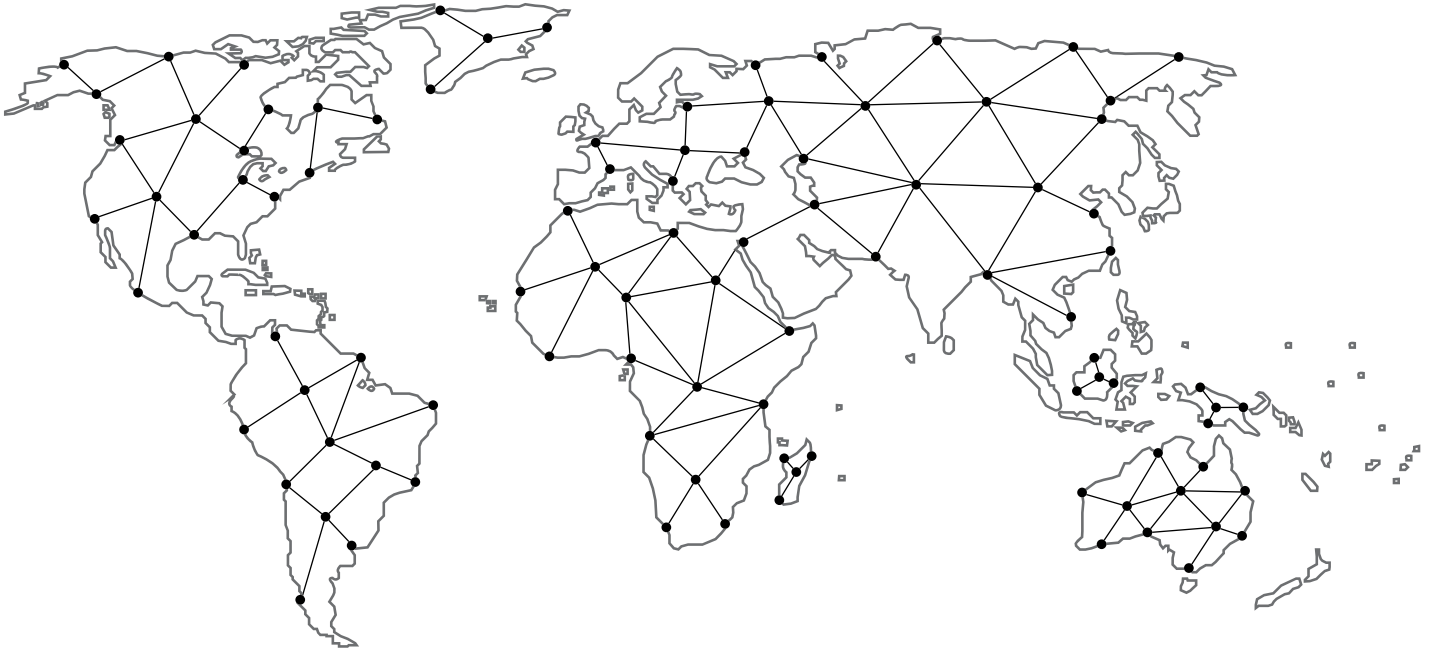


## Parts List

Item	Designation	Item	Designation
B001	Seat ring retainer	B011	Packing rings
B002	Seat ring	B013	Yoke nut
B004	Valve body	B014	Packing flange
B005	Valve plug	B028	Packing stud nut
B006	Plug guide	B029	Packing stud
B007	Plug stem pin	B030	Packing follower
B008	Plug stem	B032	Bonnet stud nut
B009	Valve body gasket	B033	Bonnet stud
B010	Guide gasket (8, 10 and 12 sizes only)	B034	Bonnet

# Find the nearest local Channel Partner in your area:

[valves.bakerhughes.com/contact-us](https://valves.bakerhughes.com/contact-us)



## Tech Field Support & Warranty:

Phone: +1-866-827-5378

[valvesupport@bakerhughes.com](mailto:valvesupport@bakerhughes.com)

[valves.bakerhughes.com](https://valves.bakerhughes.com)

Copyright 2023 Baker Hughes Company. All rights reserved. Baker Hughes provides this information on an "as is" basis for general information purposes. Baker Hughes does not make any representation as to the accuracy or completeness of the information and makes no warranties of any kind, specific, implied or oral, to the fullest extent permissible by law, including those of merchantability and fitness for a particular purpose or use. Baker Hughes hereby disclaims any and all liability for any direct, indirect, consequential or special damages, claims for lost profits, or third party claims arising from the use of the information, whether a claim is asserted in contract, tort, or otherwise. Baker Hughes reserves the right to make changes in specifications and features shown herein, or discontinue the product described at any time without notice or obligation. Contact your Baker Hughes representative for the most current information. The Baker Hughes logo and Masoneilan are trademarks of Baker Hughes Company. Other company names and product names used in this document are the registered trademarks or trademarks of their respective owners.

**Baker Hughes** 