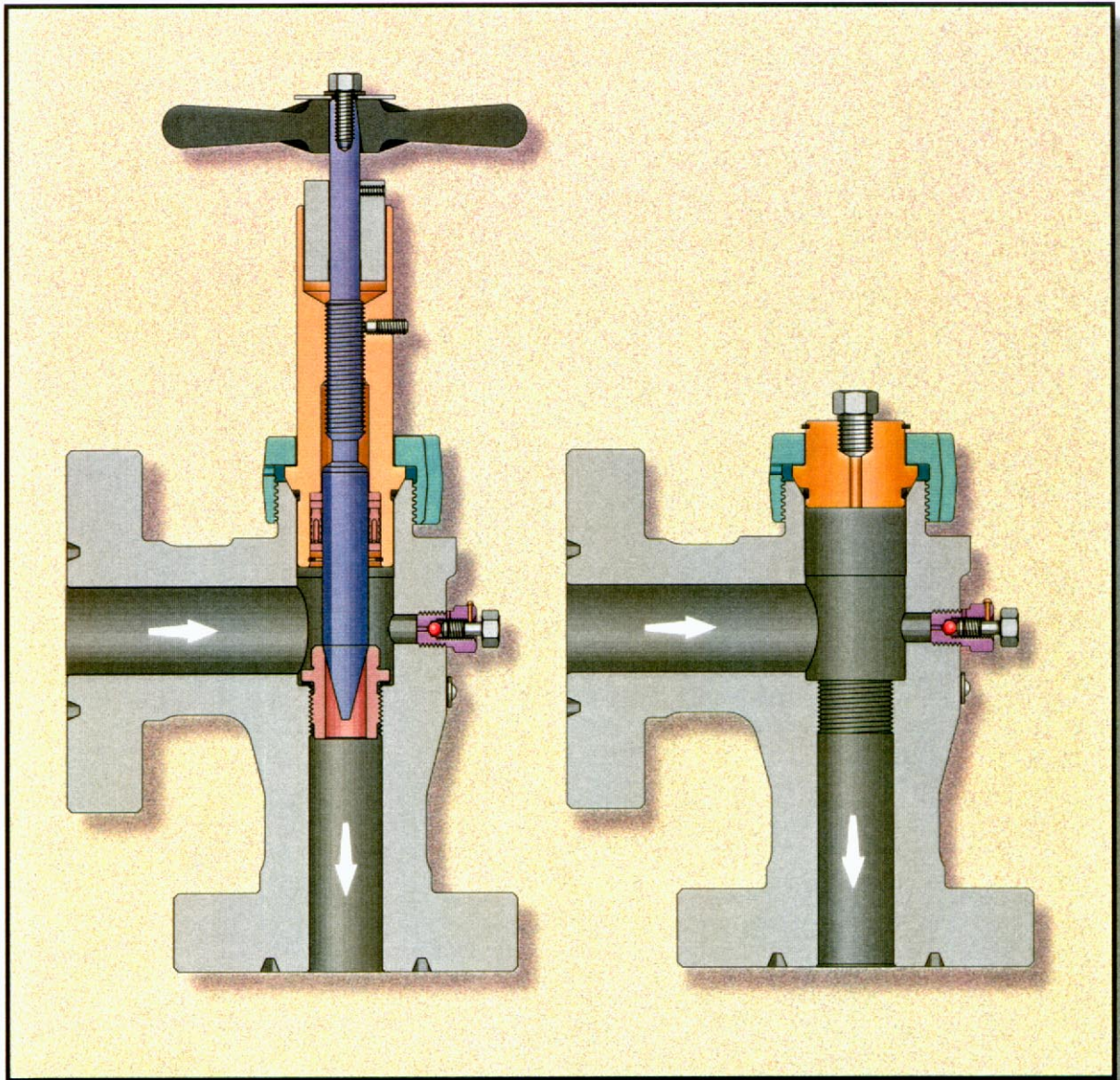


# H2 Chokes



SD1798

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### **H2 CHOKE SERVICE INSTRUCTIONS AND PARTS LIST SECTION 1**

#### **1.1 H2 UPDATE**

#### **1.2 AVAILABLE SIZES AND CONFIGURATIONS**

- Positive Choke
- Adjustable Choke
- Combination Choke

# 1.0 GENERAL INSTRUCTIONS

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## 1.1 H2 Choke Update

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As part of Cameron's on-going Quality Improvement Process and to further enhance the reliability and safety of using our H2 chokes, the following features have been incorporated with each new H2 choke ordered after September 1, 1988.

<b>Bleed Plug</b>	A bleed plug has been added to all Cameron H2 choke bodies. This bleed plug will allow the operator to vent the body cavity pressure prior to removal of the blanking plug/bonnet assembly. The bleed plug is approved for use in NACE and CO2 service.
<b>Bleed Hole</b>	A bleed hole has been added to all Cameron H2 choke bonnet nuts. This bleed hole will allow quicker venting of pressure from this body cavity after only one turn of the bonnet nut in the counter-clockwise direction.
<b>Superior Bonded Beans and Seats</b>	Cameron has perfected the ultimate bond between the tungsten carbide and steel carriers in their beans and seats. This bonding process has been field tested and has proven to be superior to the commonly known brazing process. For more information, contact your Cameron/Willis representative.
<b>Position Indicators</b>	Cameron now offers PVC position indicators as an option to the standard aluminum position indicators.

The H2 product line is now managed by Willis Flow Control, Division of Cameron Iron Works, USA, Inc.

**REFERENCE DOCUMENTS:**

- Engineering Bulletin #662H**
- Engineering Bulletin #661W**
- Cameron "BEAN SELECTOR"**

## 1.2 Available Sizes and Configurations

The Model H2 Choke is an established economical and dependable means of controlling moderate pressure in less severe service applications.

The H2 Choke is available in 3 different configurations: positive (fixed orifice), adjustable, or combination (positive and adjustable).

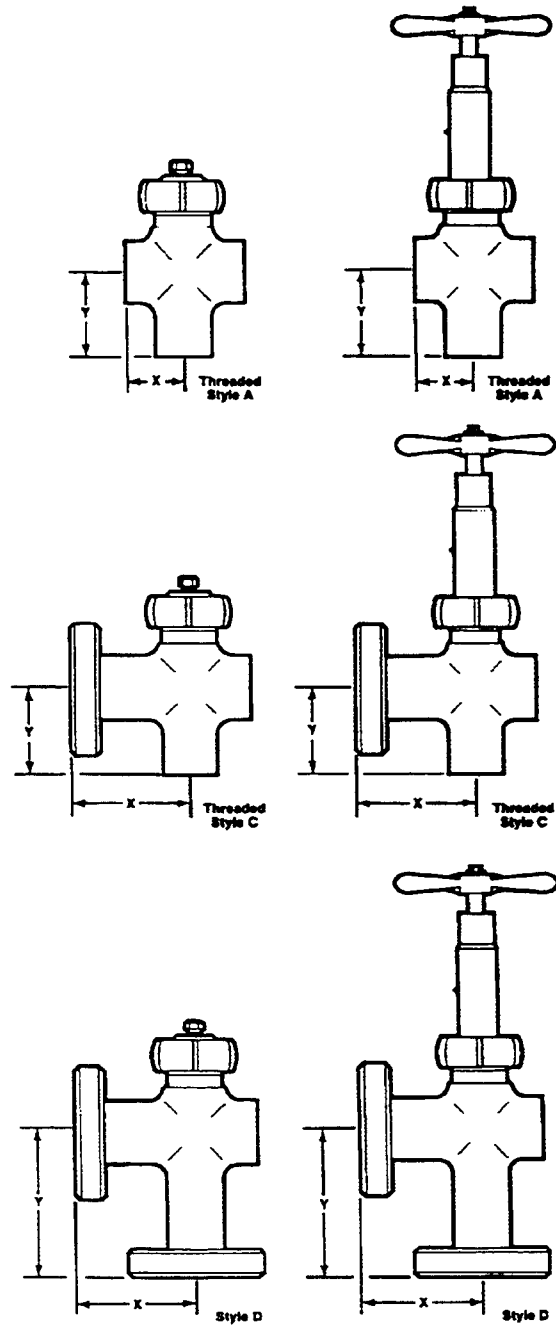
- **H2 POSITIVE CHOKE** has replaceable elements (flow beans) with a fixed orifice diameter.
- **H2 ADJUSTABLE CHOKE** features an externally controlled variable orifice with a visual mechanism to indicate orifice size.
- **H2 COMBINATION CHOKE** allows maximum flow through a flow bean but can also reduce flow from the maximum value via the adjustable orifice.

The Cameron H2 chokes feature interchangeable components which give the operator maximum flexibility of choice in arranging choke assemblies. By utilizing one body and changing beans, seats and bonnet parts, it is possible to assemble either a combination choke, a positive choke or an adjustable choke. All Cameron H2 chokes are offered for manual or automated operation and meet or exceed the minimum requirements specified in the latest edition of API 6A.

### AVAILABLE SIZES AND PRESSURES

Nominal Size (in.)	Model Number -	Maximum Orifice (in.)	Pressure Range (psi)
2	H2	1	2000 - 10,000
2	H2	1	15,000
3	H2	2	2000 - 10,000
4	H2	3	2000 - 5,000

## AVAILABLE BODY STYLES

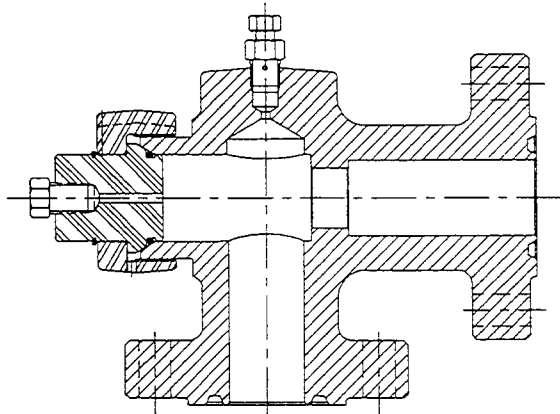




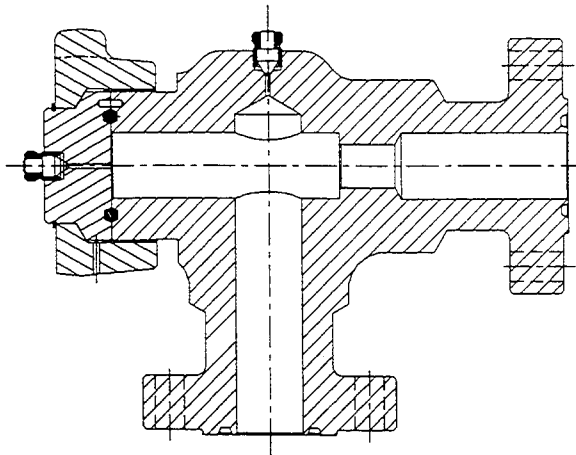
## POSITIVE CONFIGURATION

A positive H2 choke, the simplest production choke in the Cameron line, has a blanking plug assembly and flow bean in a standard body. Cameron positive choke flow beans have a tapered entrance to provide smooth fluid flow. With turbulence minimized, beans retain their accuracy for longer time periods than with sharp-edged entry.

All standard positive chokes under 15,000 psi wp are furnished with a blanking plug that has a 1/2" port for attaching a needle valve and/or pressure gauge. Positive chokes 15,000 psi wp and over are supplied with a 9/16" autoclave port.



**ASSEMBLY - 2" NOMINAL H2 CHOKE  
5M - 10M POSITIVE**



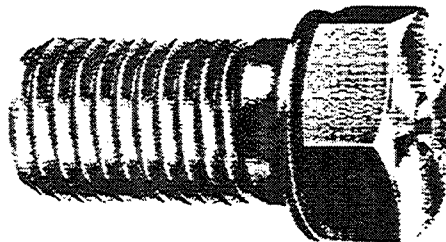
**ASSEMBLY - 2" NOMINAL H2 CHOKE  
15M PSI WP POSITIVE**

The Cameron "Honest John" bean is an insert used with an adapter in a positive choke body. The "Big John" or combination bean and seat is used without an adapter in a positive or adjustable choke.

The size of the Honest John or Big John choke bean is designated in 64ths of an inch by the dash number following the base number. For example, xxxxx-12 is an Honest John bean with a 12/64" orifice. Between 2/64" and 12/64", beans of both integral and fractional 64ths are available. Tungsten carbide beans are available on request. Big John and Honest John beans, seats and adapters are furnished with hex heads through 2" maximum orifice. The 3" maximum orifice Big John beans and seats have ears instead of hex head and require a J bean wrench.

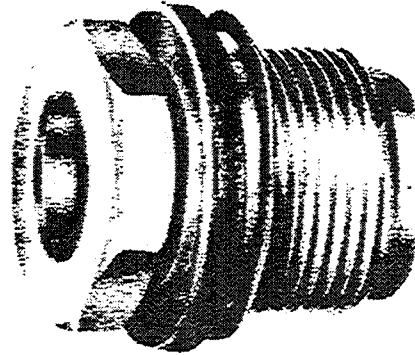
#### **Features**

- Flared orifice entrance reduces erosion on sharp entrance surface.
- Accuracy levels are maintained over extended periods of use.
- Cameron choke beans save time and money because replacement intervals are extended.



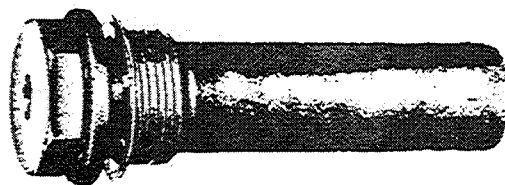
#### **HONEST JOHN (HJ)**

Honest John (HJ) choke beans are inserted in HJ bean adapters. Bean sizes range from 2/64" to 40/64".



#### **HONEST JOHN BEAN ADAPTER**

The HJ bean adapter serve as holder for Honest John (HJ) choke beans. The HJ adapter fits Cameron H2 chokes.



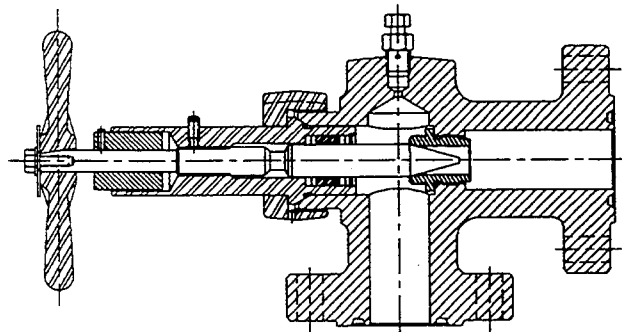
#### **BIG JOHN (BJ)**

Big John (BJ) is a 6" long positive flow bean which fits Cameron H2 chokes. Orifice sizes range from 2/64" to 64/64" in the 1" maximum orifice, from 2/64" to 128/64" in the 2" maximum orifice, and from 8/64" to 192/64" in the 3" maximum orifice.

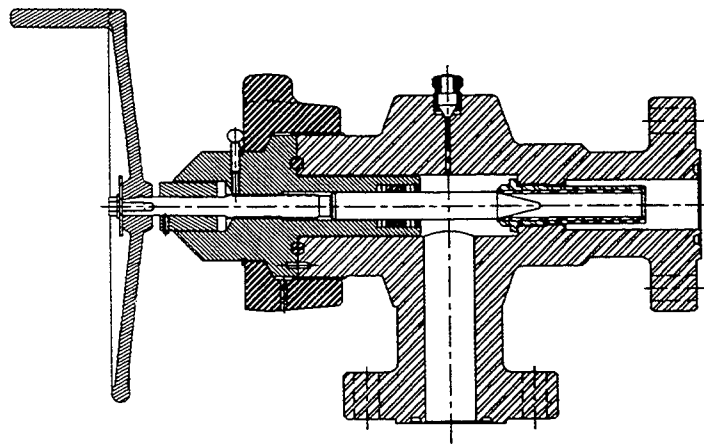
## ADJUSTABLE CONFIGURATION

An adjustable H2 choke has a standard body with an adjustable choke bonnet assembly and seat installed. This assembly features a conical-tip stainless steel rising needle, stainless steel seat, and an indicator calibrated in 1/64" increments to show effective orifice diameter.

The needle packing is a J-shaped chemically inert PTFE shell with preloaded resilient elastomer backing that provides long packing life while protecting needle threads from contamination and corrosion. The PTFE surface reduces torque required to adjust the choke. In highly erosive environments, a tungsten carbide-tipped needle and tungsten carbide-lined seat can be supplied. The needle thread OD is smaller than the seal ID to make insertion of a replacement needle easy without packing damage. A needle lock device retains needle position.



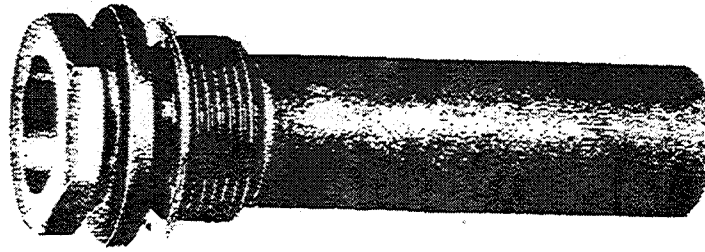
**ASSEMBLY - 2" NOMINAL CHOKE**  
**5,000 - 10,000 PSI WP**  
**ADJUSTABLE**



**ASSEMBLY - 2" NOMINAL H2 CHOKE**  
**15,000 PSI WP**  
**ADJUSTABLE**

## **COMBINATION CONFIGURATION**

The Combination H2 choke combines benefits of positive and adjustable choke designs. An H2 adjustable choke bonnet assembly is installed with a BJ combination bean and seat. The combination assembly is the same as an adjustable except for the seat; it has a smaller fixed orifice and is like a choke bean with an adjustable choke seat. Thus, constant flow can be maintained even after seat wear. Standard BJ (Big John) combination beans are made from heat-treated, stainless, or alloy steel. They are available with a tungsten carbide lining.



### **BIG JOHN (BJ) COMBINATION**

The Big John (BJ) combination bean and seat is used with an adjustable needle in a Cameron H2 adjustable choke for positive orifice maximum flow and with needle throttling when desired. Orifice sizes range from 6/64" to 64/64" in the 1" maximum orifice, from 6/64" to 128/64" in the 2" maximum orifice, and from 8/64" to 192/64" in the 3" maximum orifice.

# CAMERON CHOKE BEANS



Size and Type of Choke used with Bean

BEAN	2" POSITIVE	3" POSITIVE	2" COMBINATION	3" COMBINATION
HONEST JOHN STANDARD (to be used w/HJC ADAPTER)	from 2/64" to 40/64" with increments of 1/64"	same as 2" POSITIVE	NONE	NONE
HONEST JOHN TUNGSTEN CARBIDE LINED (to be used w/ HJC ADAPTER)	from 2/64" to 32/64" with increments of 1/64"	same as 2" POSITIVE	NONE	NONE
BIG JOHN STANDARD	from 2/64" to 64/64" with increments of 1/64"	from 2/64" to 128/64" with increments of 1/64"	NONE	NONE
BIG JOHN TUNGSTEN CARBIDE LINED	from 2/64" to 64/64" with increments of 1/64"	from 2/64" to 128/64" with increments of 1/64"	NONE	NONE
BIG JOHN COMBINATION BEAN AND SEAT STANDARD	NONE	NONE	from 6/64" to 64/64" with increments of 1/64"	from 6/64" to 128/64" with incre- ments of 1/64"
BIG JOHN COMBINATION BEAN AND SEAT TUNGSTEN CARBIDE LINED	NONE	NONE	from 6/64" to 64/64" with increments of 1/64"	from 6/64" to 128/64" with incre- ments of 1/64"

NOTE: For current cost and part number of respective beans, please contact your CAMERON/WILLIS sales or Customer Service Representative.

## **2.0 ROUTINE MAINTENANCE**

---

**H2 CHOKE**

**SERVICE INSTRUCTIONS AND PARTS LIST**

**SECTION 2**

### **2.1 PREPARATION**

### **2.2 PREVENTATIVE MAINTENANCE**

- Choke Body
- Bonnet Nut
- Blanking Plug/Bonnet

### **2.3 SIZING REQUIREMENTS**

## **2.0 ROUTINE MAINTENANCE**

---

### **2.1 Preparation**

#### **Note**

It is not necessary to remove the choke from the tree (or the manifold) to perform the procedures outlined below.

- A. Close all valves necessary to isolate the choke being serviced from well pressures.
- B. Place a warning tag on each valve closed in Step 1 above, to prevent the opening of the valves while maintenance is in progress.

#### **Warning**

**A serious accident may result if well pressure enters the choke while it is disassembled.**

### **2.2 Preventative Maintenance**

#### **IMPORTANT**

It is recommended that this maintenance be performed as soon as practical after well clean-up or taking a kick.

#### **2.2.1 CHOKE BODY**

- A. Ensure that the choke needle is fully retracted.
- B. Loosen the bleed plug to vent the body cavity. Slowly loosen the bonnet nut.

#### **IMPORTANT**

Always stand to the side of the choke when removing the bonnet assembly. Pressure may be trapped in the choke. H2 chokes have a built-in safety feature that will allow any residual pressure to escape before the bonnet is completely removed.



The inside of the choke body is vented to the atmosphere after one turn of the bonnet nut. (See APPENDIX for "ADDED FEATURES" Section of EB #662H, latest revision)

- C. Once the pressure has been completely bled off, back off the bonnet nut and remove bonnet assembly.
- D. Remove the seat assembly.
- E. Inspect the following critical areas on the choke body:
  - 1. The bonnet-to-body seal surface. Ensure that the surface is clean and free from nicks and scratches.
  - 2. The bore of the choke body that surrounds the bonnet. Ensure the bore is clean and free from burrs.
  - 3. The seat threads of the choke body. This area is susceptible to wear and erosion. The threads should be free from burrs and trash. If the threads are worn or eroded, the body should be returned to Cameron for repair.
- F. Clean the choke body O.D. threads, seat threads, and bonnet bore. Apply coat of grease to these areas before re-installation.

#### **2.2.2 BONNET NUT**

- A. Remove the bonnet nut from the blanking plug/bonnet assembly.
- B. Visually inspect the bonnet nut O.D. and hammer lugs for abuse. If any of the lugs are beaten down into the O.D. of the nut, the nut should be replaced.
- C. Clean the threads with solvent and a wire brush. This area is susceptible to wear and corrosion. Inspect the threads per EB #662H (latest revision).
- D. After inspection, grease threads with heavy grease before re-installation.

#### **2.2.3 BLANKING PLUG/BONNET BODY**

- A. Inspect the bonnet-to-body seal surface on the O.D. of the blanking plug/bonnet body. Ensure that the surface is free from burrs or nicks.
- B. Inspect the o-ring/bonnet gasket and groove in the bonnet each time the bonnet is removed from the choke body. Remove any nicks or burrs with a fine emery cloth.
- C. Apply light coat of grease or heavy oil to seal surface of choke body and on o-ring/bonnet gasket before re-installation.

## 2.3 SIZING REQUIREMENTS

Chokes are by definition devices to restrict and regulate the flow of well fluids and are not intended to be used as shut-off valves. For this reason, it is not necessary for adjustable or combination chokes to provide a positive fluid-tight shut-off. In chokes having special trim (tungsten carbide, ceramic, etc.) it is imperative that the needle NOT be forced against the seat; to do so may result in damage to the hard trim. Chokes are not to be used to get a fluid-tight seal. In order to minimize the abrasive cutting action of well fluids, a choke should be installed so the flow of fluid is away from the bonnet or blanking plug. This is a practice recommended by both Cameron and API. The inlet flange nominal size and pressure rating usually determine the nominal size and pressure of the choke bonnet assembly. Chokes which have an inlet flange with a higher pressure rating than that of the outlet flange have a double pressure rating. The rating of the inlet flange, body and bonnet assembly determine the maximum rating of the choke. The rating of the outlet flange may be a lower pressure. This is a procedure set down by API.

In ordering a choke, specify:

1. Working pressure and flowing medium (i.e., gas, oil, water, H<sub>2</sub>S, CO<sub>2</sub>, etc.)
2. Inlet connection.
3. Outlet connection.
4. Type choke (positive, adjustable, combination).
5. Choke maximum orifice size for adjustable choke.
6. For positive chokes, specify the type of removable bean and its orifice size.
7. Temperature.

## CAMERON CHOKE TRIMS

Trim Designation	Service Application	Expected Conditions	
		H <sub>2</sub> S	CO <sub>2</sub>
Regular Trim	General service non-corrosive oil and gas applications, such as manifolds and Christmas trees.	—	—
Full Stainless Steel Trim	General service oil and gas applications where resistance to weight loss corrosion is required due to CO <sub>2</sub> conditions.	—	7 psia Minimum Partial Pressure
Super Trim*	General service sour oil and gas applications where resistance to sulfide stress cracking is required due to H <sub>2</sub> S conditions.	.05 psia Minimum Partial Pressure	—
Full Stainless Steel with Super Trim*	Extreme sour oil and gas applications where resistance to both sulfide stress cracking and weight loss corrosion are required due to H <sub>2</sub> S and CO <sub>2</sub> conditions.	.05 psia Minimum Partial Pressure	7 psia Minimum Partial Pressure

\*These trims conform to NACE MR-01-75 standards.

### APPLICATION:

Temperature Range:

☐ Standard (–20° to +250°F)      ☐ –75°F Min      ☐ +350°F

### TRIM SELECTION:

☐ Regular      ☐ Full SST      ☐ Super Trim      ☐ Full SST w/Super Trim

☐ CAMCLAD™      ☐ Other \_\_\_\_\_

Stainless Steel Inlay

☐ End Connection Ring Grooves      ☐ Bonnet Gasket Groove

## **3.0 ASSEMBLY DRAWINGS AND PARTS LIST**

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### **H2 CHOKE**

### **SERVICE INSTRUCTIONS AND PARTS LIST**

### **SECTION 3**

#### **3.1 POSITIVE CHOKES**

- Nominal 2" (2,000 - 10,000 psi wp)
- Nominal 2" (15,000 psi wp)
- Nominal 3" (2,000 - 10,000 psi wp)
- Nominal 4" (2,000 - 15,000 psi wp)

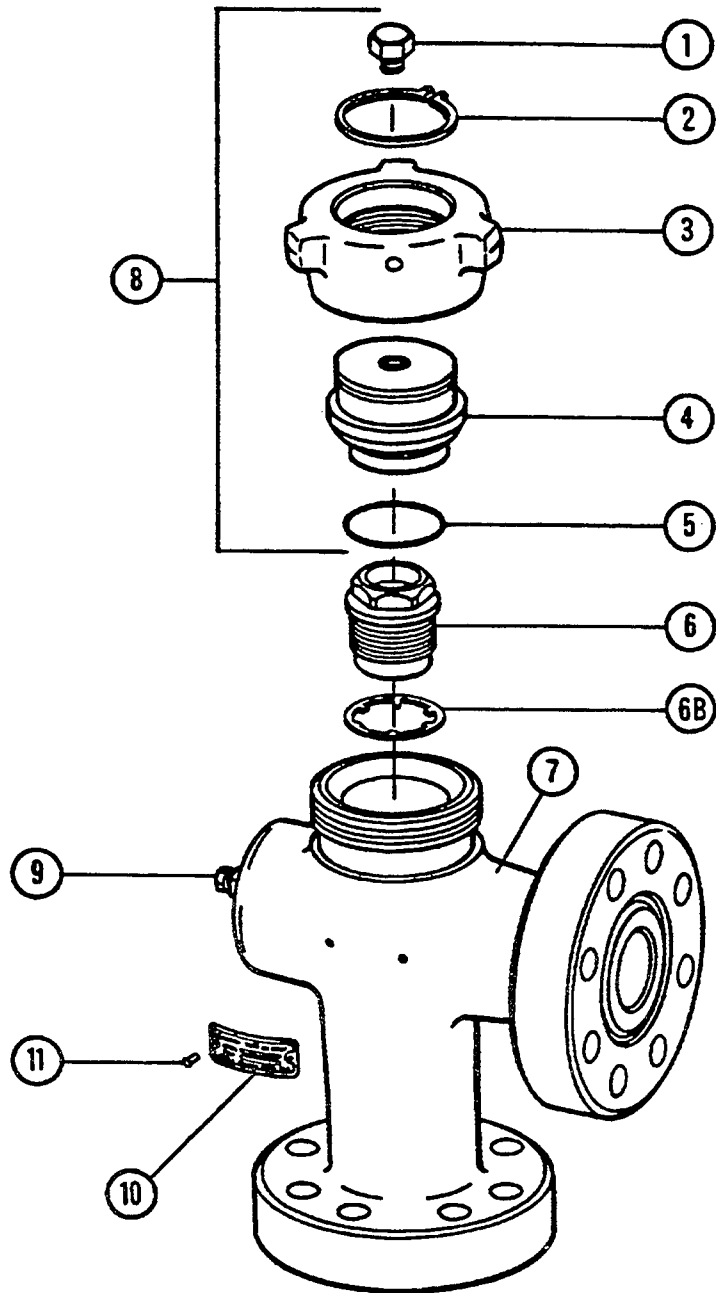
#### **3.2 ADJUSTABLE CHOKES**

- Nominal 2" (2,000 - 10,000 psi wp)
- Nominal 2" (15,000 psi wp)
- Nominal 3" (2,000 - 10,000 psi wp)
- Nominal 4" (2,000 - 15,000 psi wp)

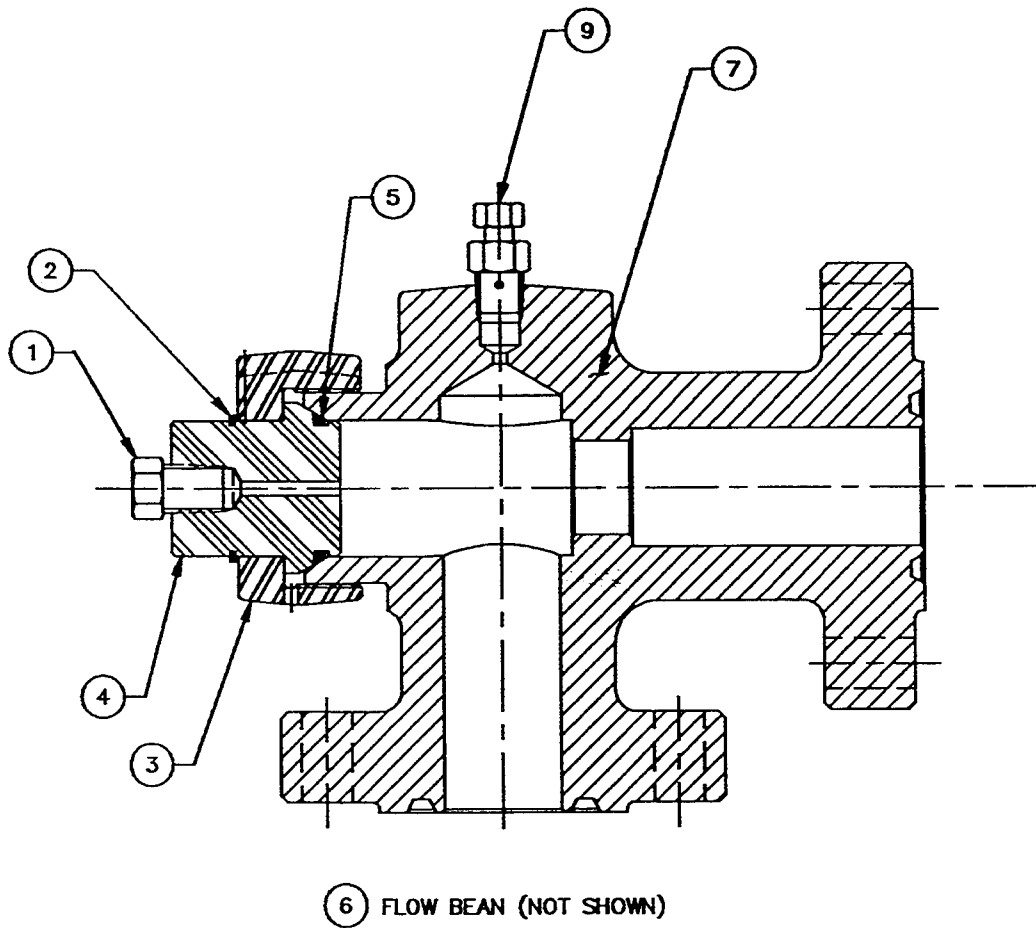
#### **3.3 H2 PAC NOMINAL 3" (2,000 - 10,000 PSI WP)**

### 3.1 POSITIVE CHOKES

---



**EXPLODED VIEW OF H-2 POSITIVE CHOKE**



**ASSEMBLY - 2" NOMINAL H2 CHOKE  
5M - 10M POSITIVE**

### PARTS LIST: H2 POSITIVE CHOKE

**1" MAXIMUM ORIFICE  
2,000 - 10,000 PSI WP**

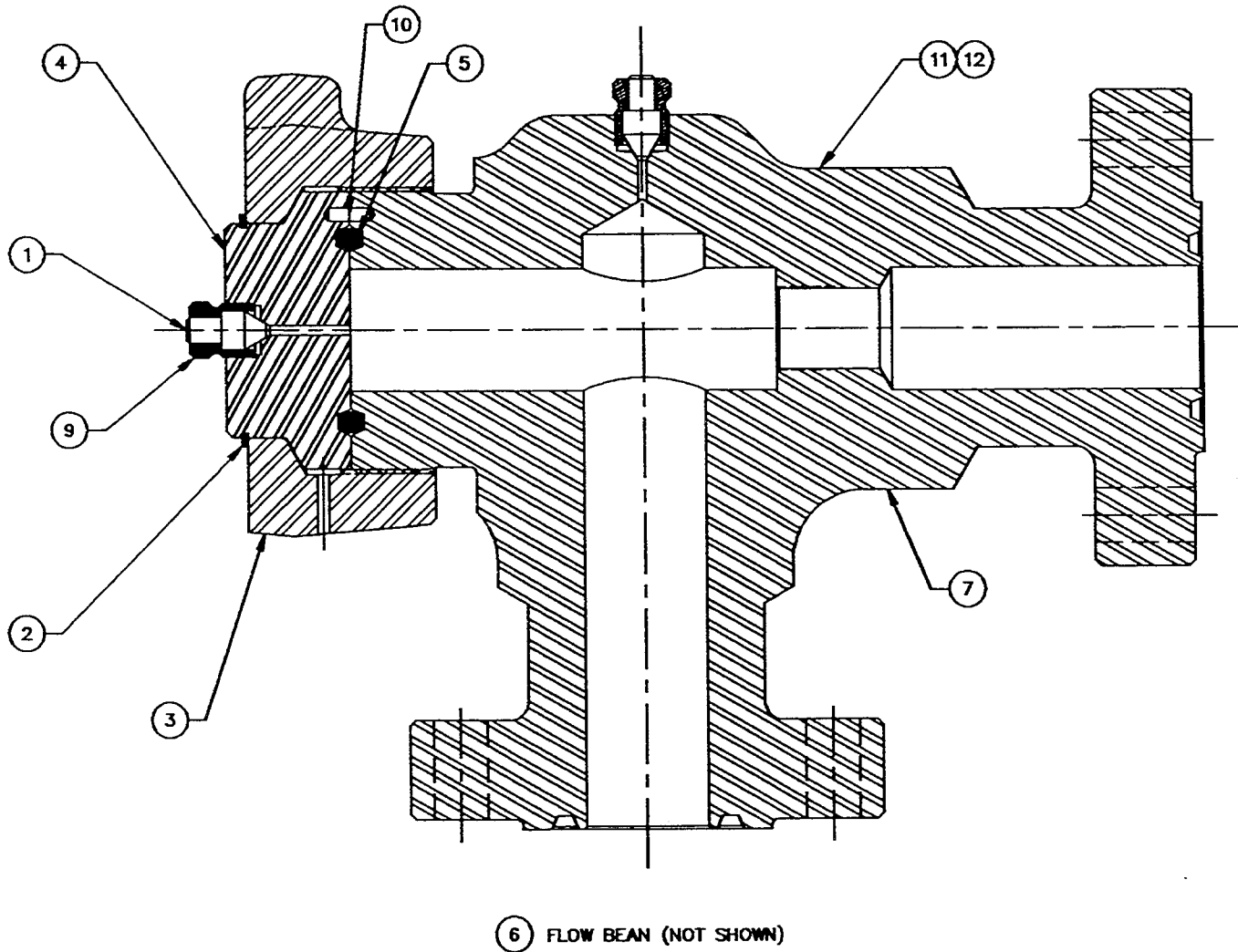
ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
1	1	PIPE PLUG	ALLOY STEEL	ALLOY STEEL
2	1	RETAINER RING	S.S.	S.S.
3	1	BONNET NUT	ALLOY STEEL	ALLOY STEEL
4	1	BLANKING PLUG	ALLOY STEEL	ALLOY STEEL
5	1	O-RING	NITRILE	NITRILE
6*	1	FLOW BEAN	ALLOY STEEL	ALLOY STEEL
7	1	BODY	ALLOY STEEL	ALLOY STEEL
8	1	BLANKING PLUG ASSY	---	---
9	1	BLEED PLUG	S.S.	S.S.
10	1	NAMEPLATE	S.S.	S.S.
11	4	DRIVE SCREW	S.S.	S.S.

\* NOT PART OF CHOKE ASSY, SOLD SEPARATELY

### RECOMMENDED SPARE PARTS LIST

ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
5	1	O-RING	NITRILE	NITRILE
6	*	FLOW BEAN	ALLOY STEEL	ALLOY STEEL

WRENCH, 2" FOR FLOW BEAN/SEAT REMOVAL AND INSTALLATION: P/N  
626964-1



**ASSEMBLY - 2" NOMINAL H2 CHOKE**  
**15M PSI WP POSITIVE**



**PARTS LIST: H2 POSITIVE CHOKE**  
**1" MAXIMUM ORIFICE**  
**15,000 PSI WP**

ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
1	1	BLIND PLUG	S.S.	S.S.
2	1	RETAINER RING	S.S.	S.S.
3	1	BONNET NUT	ALLOY STEEL	ALLOY STEEL
4	1	BLANKING PLUG	ALLOY STEEL	ALLOY STEEL
5	1	BONNET GASKET	S.S.	S.S.
6	1	FLOW BEAN	ALLOY STEEL	ALLOY STEEL
7	1	BODY	ALLOY STEEL	ALLOY STEEL
8	1	BLANKING PLUG ASSY	---	---
9	1	GLAND	S.S.	S.S.
10	1	ROLL PIN	ALLOY STEEL	ALLOY STEEL
11	1	NAMEPLATE	S.S.	S.S.
12	4	DRIVE SCREW	S.S.	S.S.

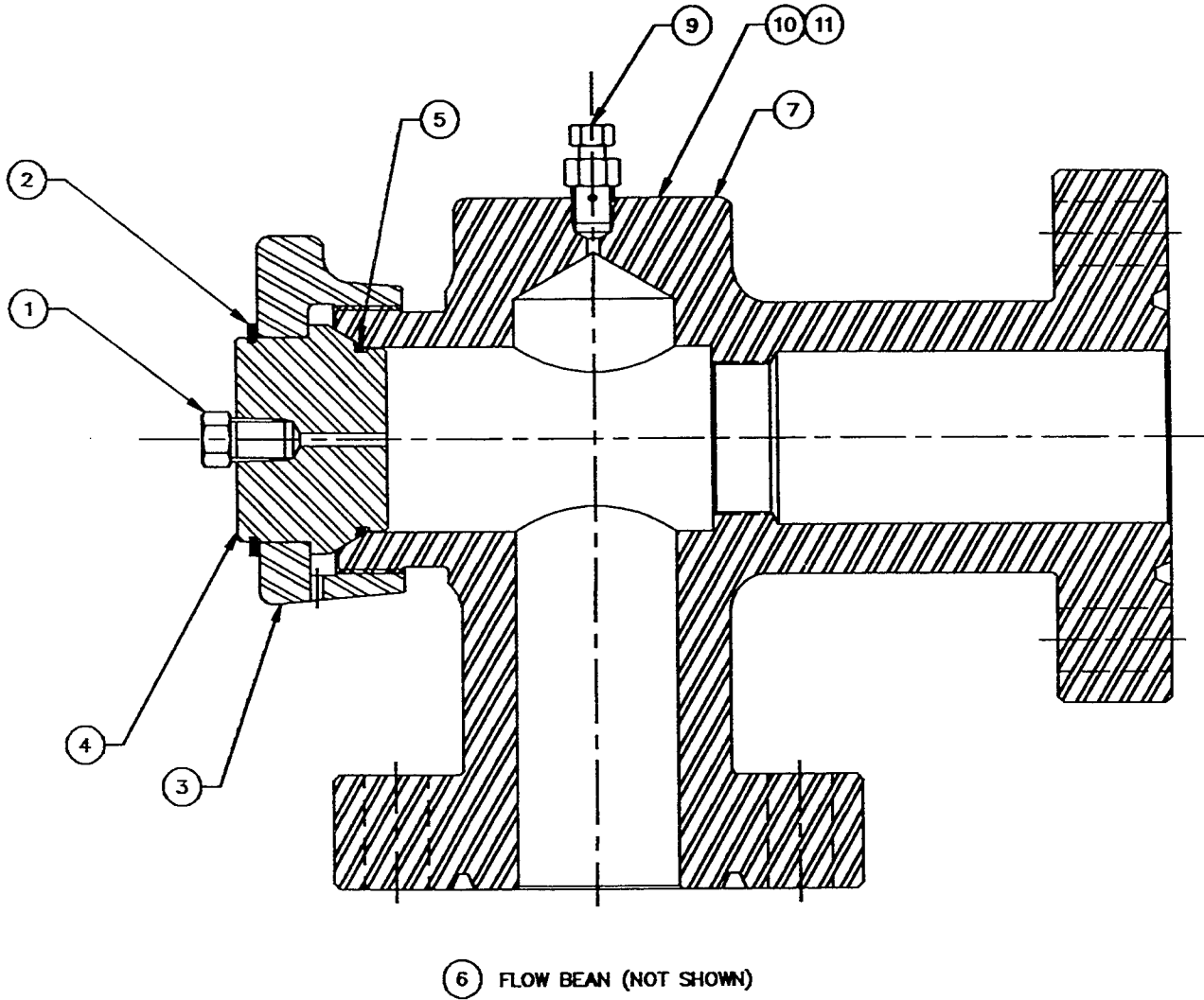
\* NOT PART OF CHOKE ASSY, SOLD SEPARATELY

**RECOMMENDED SPARE PARTS LIST**

ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
5	1	O-RING	NITRILE	NITRILE
6	*	FLOW BEAN	ALLOY STEEL	ALLOY STEEL

\*AS REQUIRED

WRENCH, 2" FOR FLOW BEAN/SEAT REMOVAL AND INSTALLATION: P/N 626964-1



**ASSEMBLY - 3" NOMINAL H2 CHOKE  
5M PSI WP POSITIVE**

**PARTS LIST: H2 POSITIVE CHOKE**  
**2" MAXIMUM ORIFICE**  
**2,000 - 10,000 PSI WP**

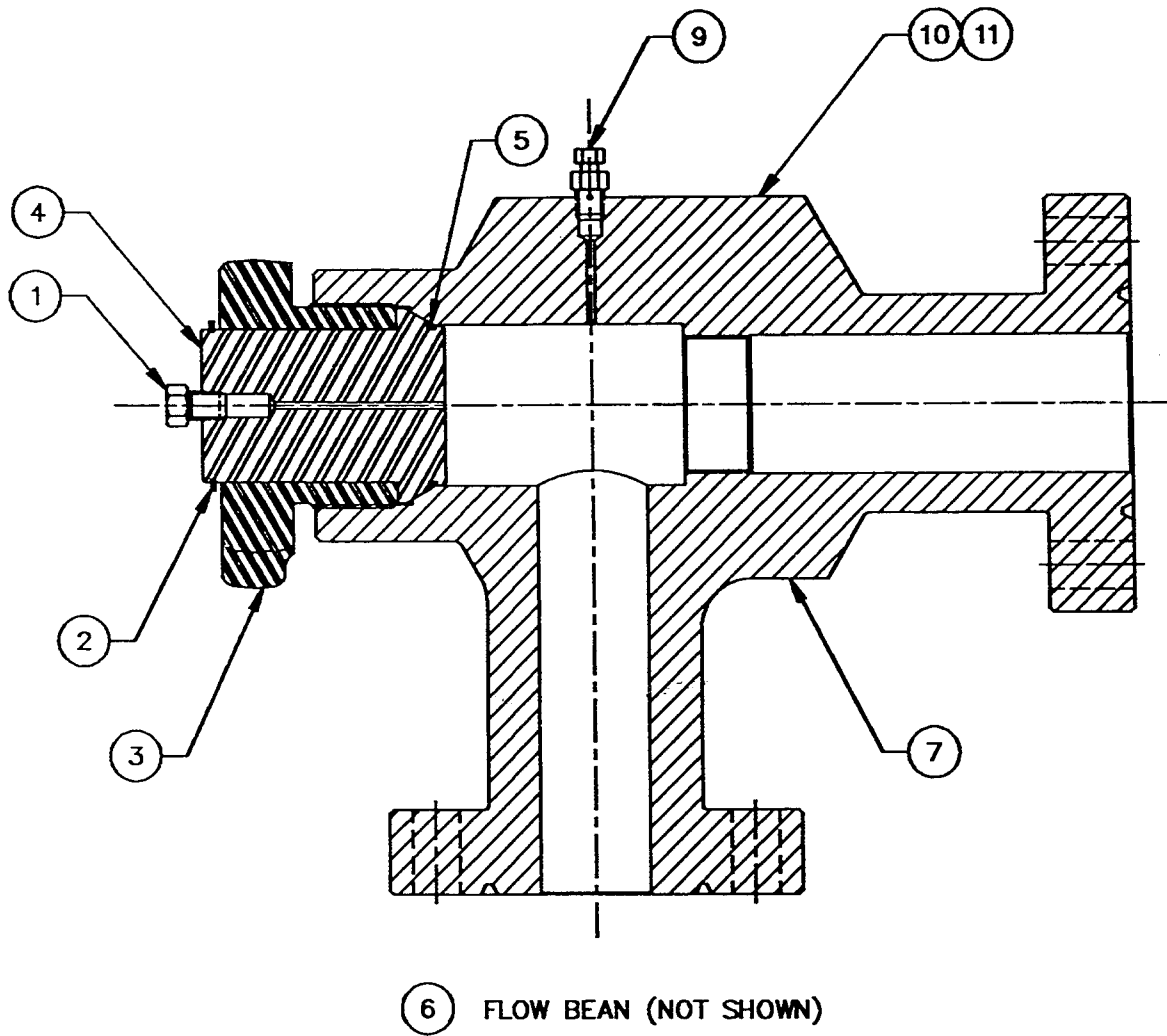
ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
1	1	PIPE PLUG	ALLOY STEEL	ALLOY STEEL
2	1	RETAINER RING	S.S.	S.S.
3	1	BONNET NUT	ALLOY STEEL	ALLOY STEEL
4	1	BLANKING PLUG	ALLOY STEEL	ALLOY STEEL
5	1	O-RING	NITRILE	NITRILE
6*	1	FLOW BEAN	ALLOY STEEL	ALLOY STEEL
7	1	BODY	ALLOY STEEL	ALLOY STEEL
8	1	BLANKING PLUG ASSY	---	---
9	1	BLEED PLUG	S.S.	S.S.
10	1	NAMEPLATE	S.S.	S.S.
11	4	DRIVE SCREWS	S.S.	S.S.

\* NOT PART OF CHOKE ASSY, SOLD SEPARATELY

**RECOMMENDED SPARE PARTS LIST**

ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
5	1	O-RING	NITRILE	NITRILE
6	*	FLOW BEAN	ALLOY STEEL	ALLOY STEEL

WRENCH, 3" FOR FLOW BEAN/SEAT REMOVAL AND INSTALLATION: P/N  
626963-1



**ASSEMBLY - 4" NOMINAL H2 CHOKE  
5M PSI WP POSITIVE**

**PARTS LIST: H2 POSITIVE CHOKE**  
**3" MAXIMUM ORIFICE**  
**2,000 - 5,000 PSI WP**

ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
1	1	PIPE PLUG	ALLOY STEEL	ALLOY STEEL
2	1	RETAINER RING	S.S.	S.S.
3	1	BONNET NUT	ALLOY STEEL	ALLOY STEEL
4	1	BLANKING PLUG	ALLOY STEEL	ALLOY STEEL
5	1	O-RING	NITRILE	NITRILE
6*	1	FLOW BEAN	ALLOY STEEL	ALLOY STEEL
7	1	BODY	ALLOY STEEL	ALLOY STEEL
8	1	BLANKING PLUG ASSY	—	—
9	1	BLEED PLUG	S.S.	S.S.
10	1	NAMEPLATE	S.S.	S.S.
11	4	DRIVE SCREWS	S.S.	S.S.

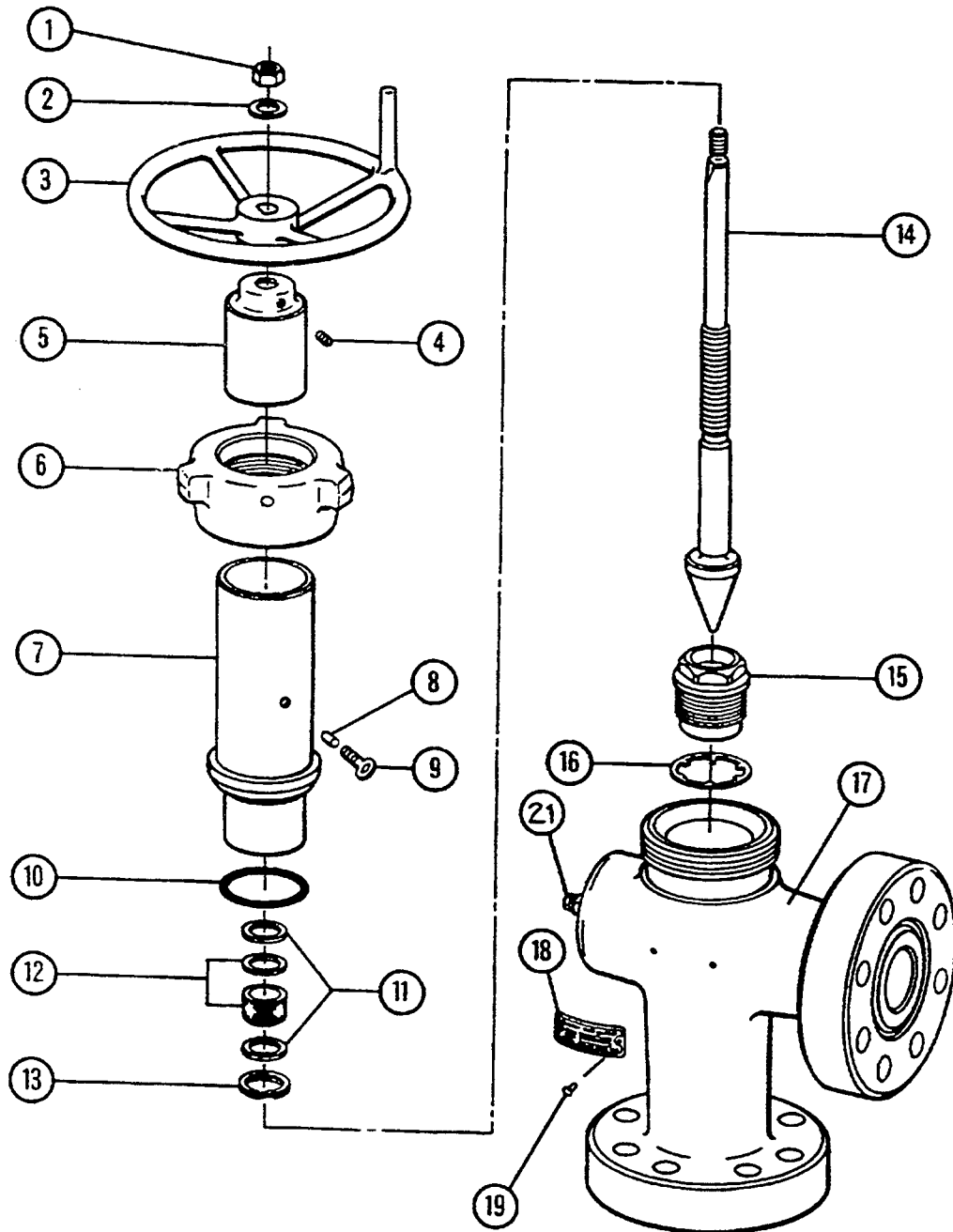
\* NOT PART OF CHOKE ASSY, SOLD SEPARATELY

**RECOMMENDED SPARE PARTS LIST**

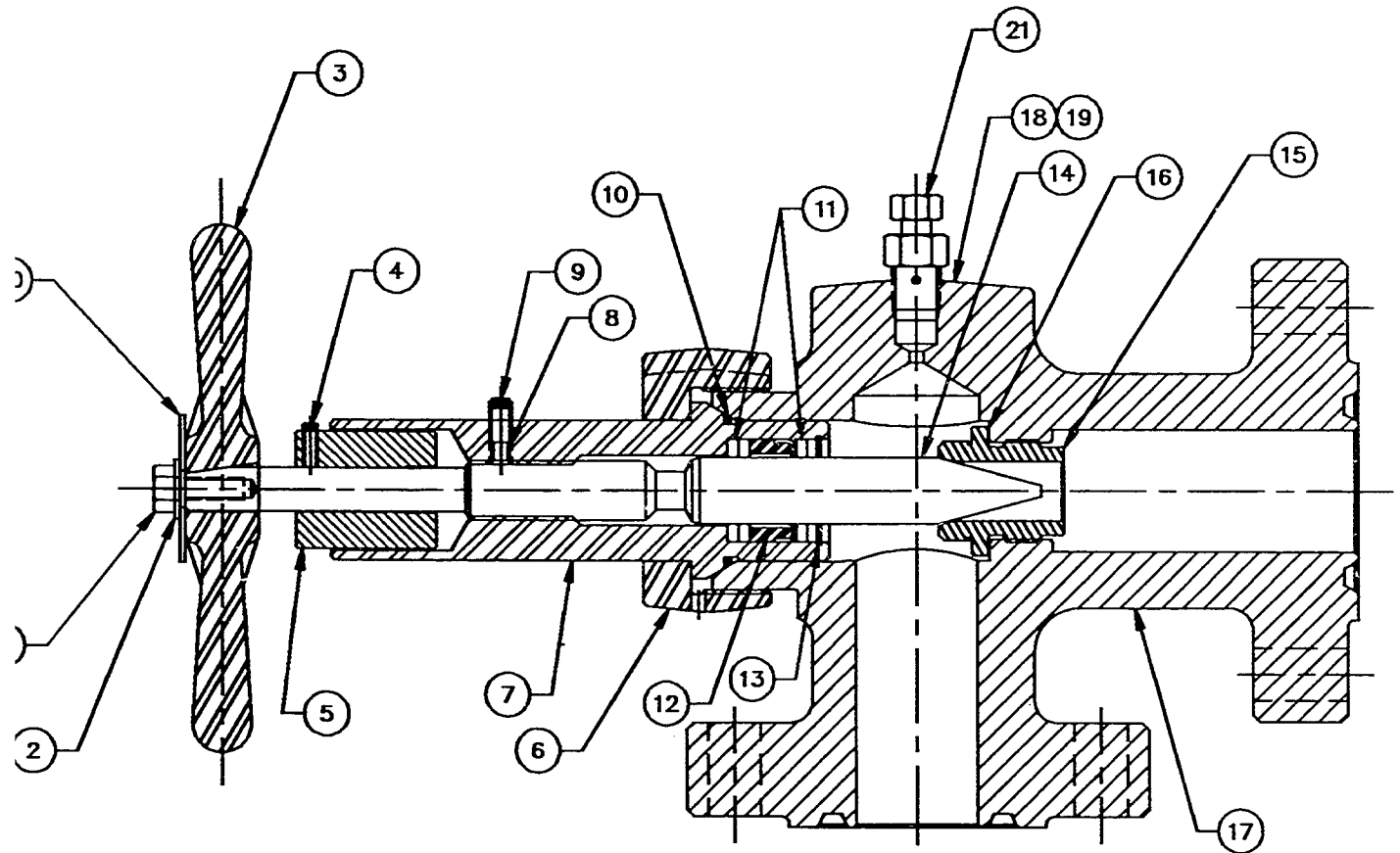
ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
5	1	O-RING	NITRILE	NITRILE
6	*	FLOW BEAN	ALLOY STEEL	ALLOY STEEL

WRENCH, 4" FOR FLOW BEAN/SEAT REMOVAL AND INSTALLATION: P/N  
19892

### 3.2 ADJUSTABLE CHOKES



**EXPLODED VIEW OF H-2 ADJUSTABLE CHOKE**



**ASSEMBLY - 2" NOMINAL CHOKE**  
**5,000 - 10,000 PSI WP**  
**ADJUSTABLE**

## PARTS LIST: H2 ADJUSTABLE CHOKE

**1" MAXIMUM ORIFICE**

**2,000 - 10,000 PSI WP**

ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
1	1	HEX BOLT OR NUT	ALLOY STEEL	ALLOY STEEL
2	1	WASHER	CARBON STEEL	CARBON STEEL
3	1	HANDWHEEL	CAST IRON	CAST IRON
4	1	SET SCREW	S.S.	S.S.
5	1	INDICATOR	ALUMINUM	ALUMINUM
6	1	BONNET NUT	ALLOY STEEL	ALLOY STEEL
7	1	BONNET	ALLOY STEEL	ALLOY STEEL
8	1	PLUG	BRASS	BRASS
9	1	SET SCREW	S.S.	S.S.
10	1	O-RING	NITRILE	NITRILE
11	2	JUNK RING	S.S.	S.S.
12	1	J-PACKING	NITRILE/TEFLON	NITRILE/TEFLON
13	1	RETAINER RING	S.S.	S.S.
14	1	NEEDLE	S.S.	S.S.
15	1	SEAT	S.S.	S.S.
16	1	GASKET	COPPER	S.S.
17	1	BODY	ALLOY STEEL	ALLOY STEEL
18	1	NAMEPLATE	S.S.	S.S.
19	2	DRIVE SCREW	S.S.	S.S.
20*	1	INSTRUCTION PLATE	- -	BRASS
21	1	BLEED PLUG	S.S.	S.S.

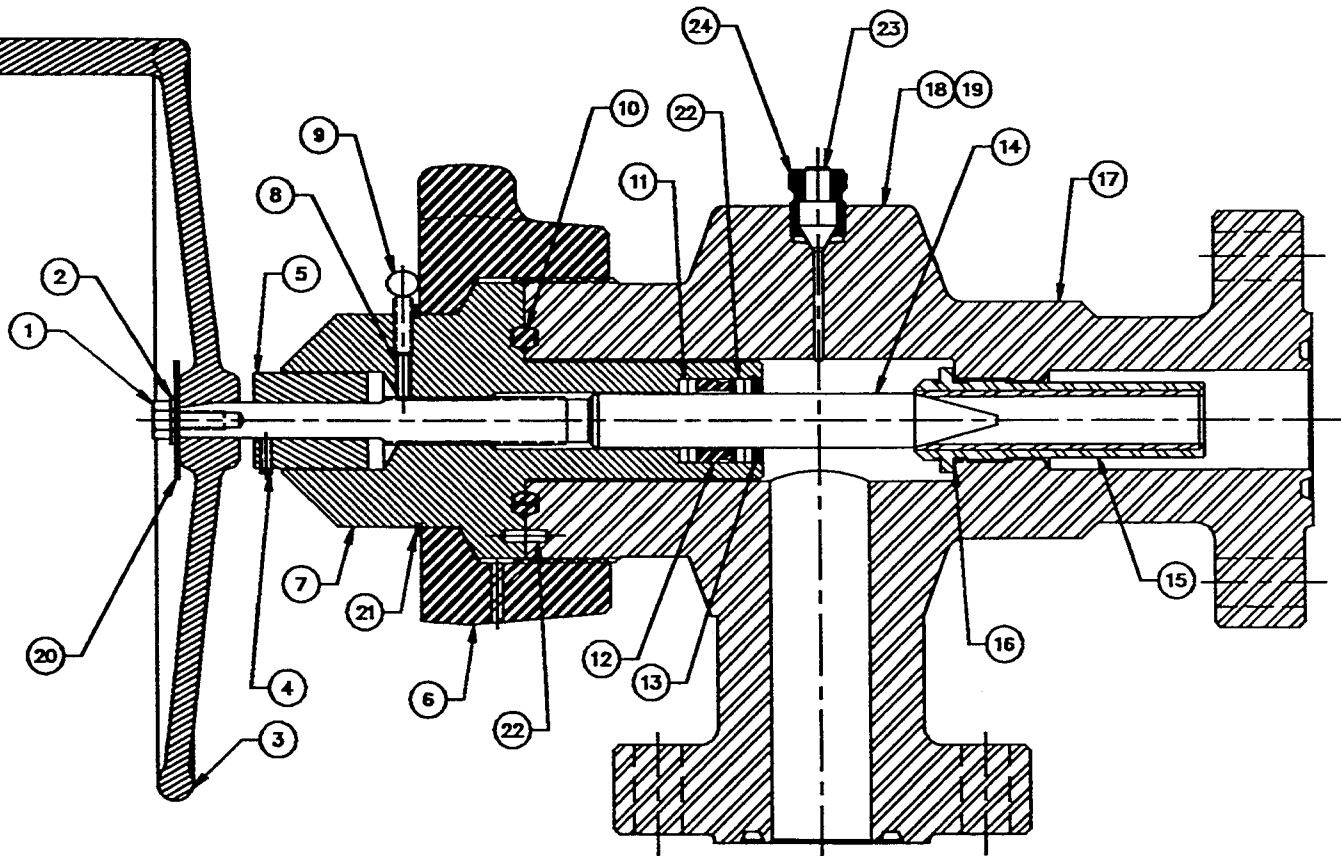
\* FOR SUPER TRIM ASSY, W/TUNGSTEN CARBIDE NEEDLE TIP AND SEAT INSERT

## RECOMMENDED SPARE PARTS LIST

ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
8	1	PLUG	BRASS	BRASS
10	1	O-RING	NITRILE	NITRILE
12	1	J-PACKING	NITRILE/TEFLON	NITRILE/TEFLON
14	1	NEEDLE	S.S.	S.S.
15	1	SEAT	S.S.	S.S.

WRENCH, 2" FOR SEAT REMOVAL AND INSTALLATION: P/N 626964-1





**ASSEMBLY - 2" NOMINAL H2 CHOKE**  
**15,000 PSI WP**  
**ADJUSTABLE**

**PARTS LIST: H2 ADJUSTABLE CHOKE  
1" MAXIMUM ORIFICE  
15,000 PSI WP**

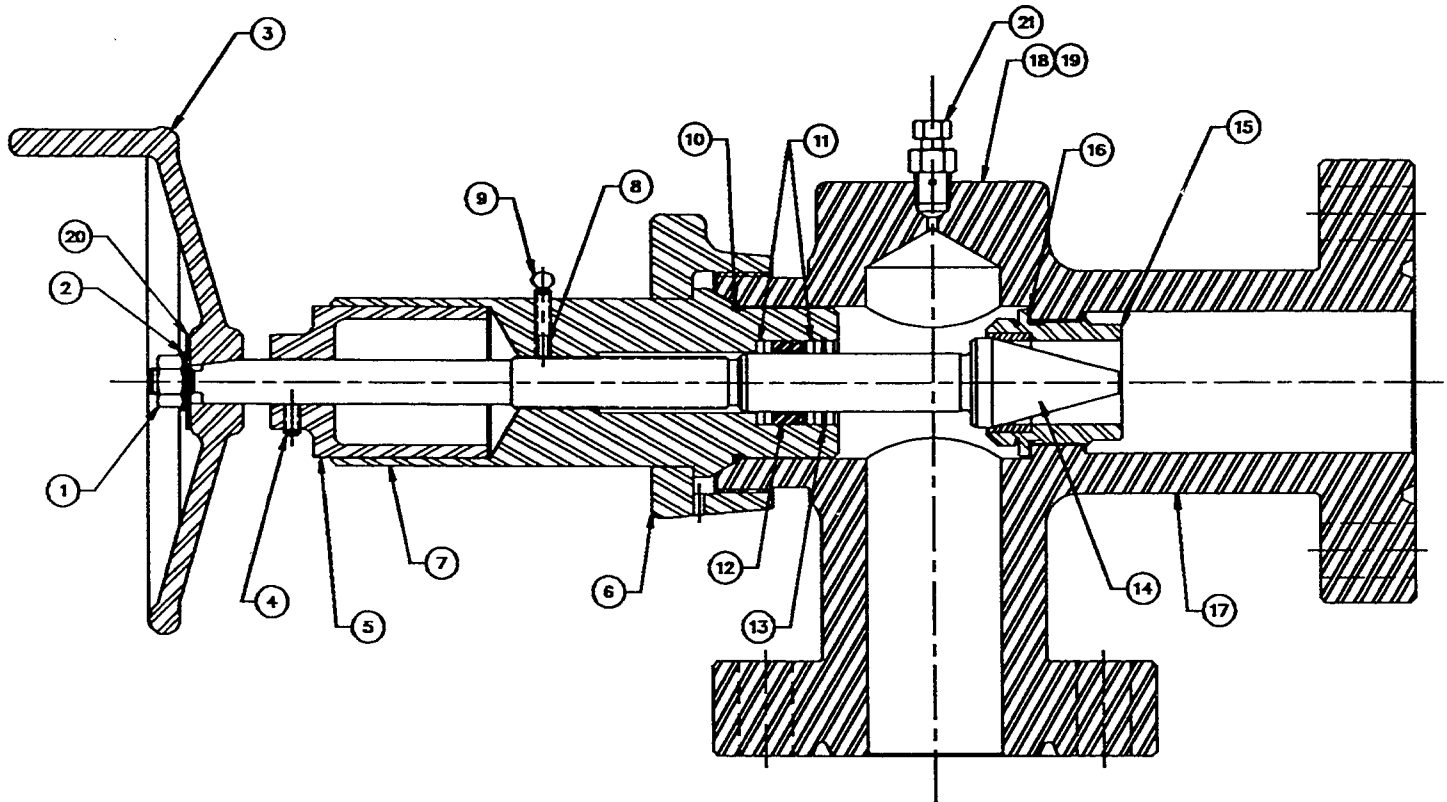
ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
1	1	HEX BOLT OR NUT	ALLOY STEEL	ALLOY STEEL
2	1	WASHER	CARBON STEEL	CARBON STEEL
3	1	HANDWHEEL	CAST IRON	CAST IRON
4	1	SET SCREW	S.S.	S.S.
5	1	INDICATOR	ALUMINUM	ALUMINUM
6	1	BONNET NUT	ALLOY STEEL	ALLOY STEEL
7	1	BONNET	ALLOY STEEL	ALLOY STEEL
8	1	PLUG	BRASS	BRASS
9	1	SET SCREW	S.S.	S.S.
10	1	O-RING	NITRILE	NITRILE
11	2	JUNK RING	S.S.	S.S.
12	1	J-PACKING	NITRILE/TEFLON	NITRILE/TEFLON
13	1	RETAINER RING	S.S.	S.S.
14	1	NEEDLE	S.S.	S.S.
15	1	SEAT	S.S.	S.S.
16	1	GASKET	COPPER	S.S.
17	1	BODY	ALLOY STEEL	ALLOY STEEL
18	1	NAMEPLATE	S.S.	S.S.
19	2	DRIVE SCREW	S.S.	S.S.
20*	1	INSTRUCTION PLATE	--	BRASS
21	1	BLEED PLUG	S.S.	S.S.
22	1	ROLL PIN	ALLOY STEEL	ALLOY STEEL

\* FOR SUPER TRIM ASSY, W/TUNGSTEN CARBIDE NEEDLE TIP AND SEAT INSERT

**RECOMMENDED SPARE PARTS LIST**

ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
8	1	PLUG	BRASS	BRASS
10	1	O-RING	NITRILE	NITRILE
12	1	J-PACKING	NITRILE/TEFLON	NITRILE/TEFLON
14	1	NEEDLE	S.S.	S.S.
15	1	SEAT	S.S.	S.S.

WRENCH, 2" FOR SEAT REMOVAL AND INSTALLATION: P/N 626964-1



**ASSEMBLY - 3" NOMINAL H2 CHOKE**  
**2,000 - 10,000 PSI WP**  
**ADJUSTABLE**

## PARTS LIST: H2 ADJUSTABLE CHOKE

**2" MAXIMUM ORIFICE**

**2,000 - 10,000 PSI WP**

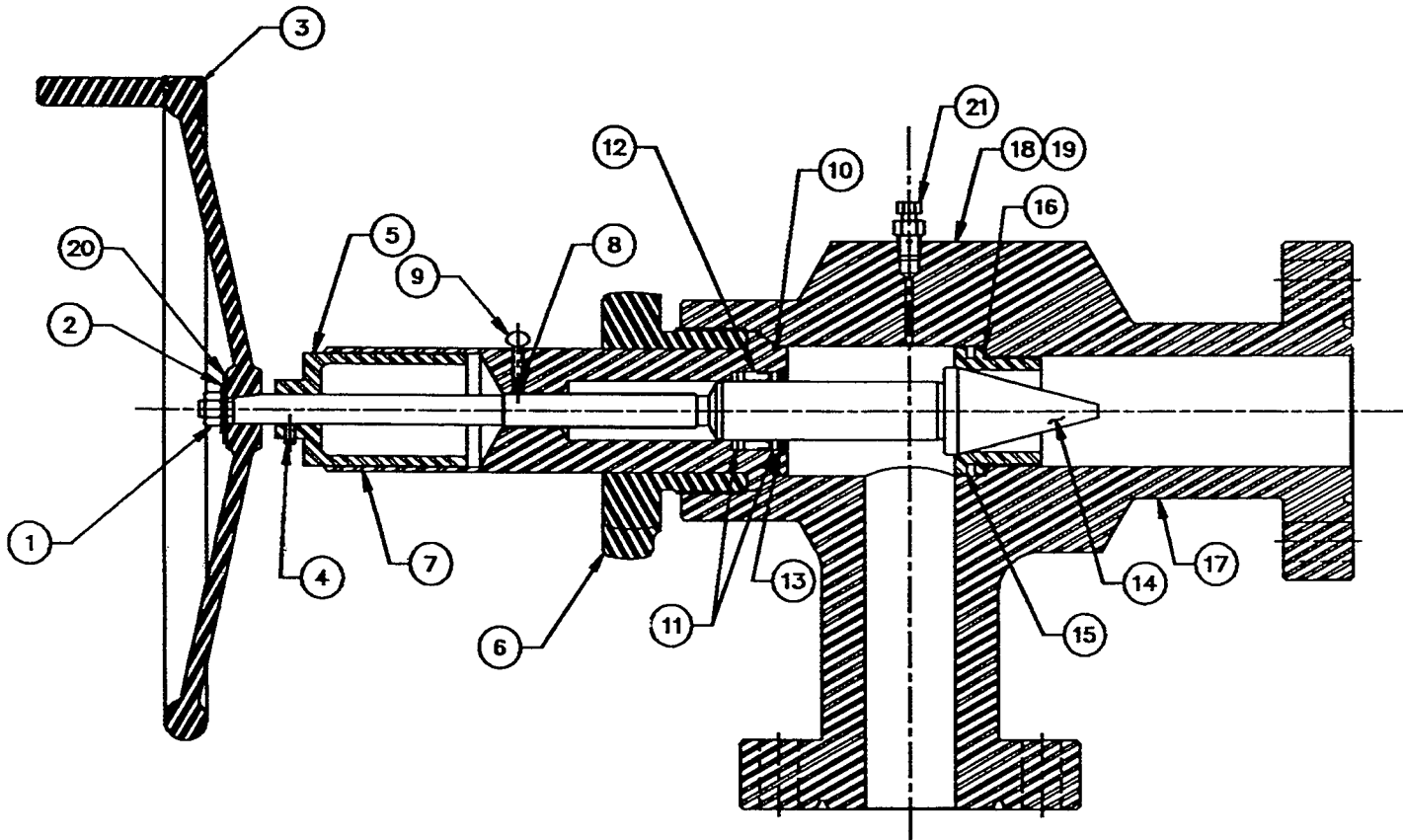
ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
1	1	HEX BOLT OR NUT	ALLOY STEEL	ALLOY STEEL
2	1	WASHER	CARBON STEEL	CARBON STEEL
3	1	HANDWHEEL	CAST IRON	CAST IRON
4	1	SET SCREW	S.S.	S.S.
5	1	INDICATOR	ALUMINUM	ALUMINUM
6	1	BONNET NUT	ALLOY STEEL	ALLOY STEEL
7	1	BONNET	ALLOY STEEL	ALLOY STEEL
8	1	PLUG	BRASS	BRASS
9	1	SET SCREW	S.S.	S.S.
10	1	O-RING	NITRILE	NITRILE
11	2	JUNK RING	S.S.	S.S.
12	1	J-PACKING	NITRILE/TEFLON	NITRILE/TEFLON
13	1	RETAINER RING	S.S.	S.S.
14	1	NEEDLE	S.S.	S.S.
15	1	SEAT	S.S.	S.S.
16	1	GASKET	COPPER	S.S.
17	1	BODY	ALLOY STEEL	ALLOY STEEL
18	1	NAMEPLATE	S.S.	S.S.
19	2	DRIVE SCREW	S.S.	S.S.
20*	1	INSTRUCTION PLATE	--	BRASS
21	1	BLEED PLUG	S.S.	S.S.

\* FOR SUPER TRIM ASSY, W/TUNGSTEN CARBIDE NEEDLE TIP AND SEAT INSERT

## RECOMMENDED SPARE PARTS LIST

ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
8	1	PLUG	BRASS	BRASS
10	1	O-RING	NITRILE	NITRILE
12	1	J-PACKING	NITRILE/TEFLON	NITRILE/TEFLON
14	1	NEEDLE	S.S.	S.S.
15	1	SEAT	S.S.	S.S.

WRENCH, 2" FOR SEAT REMOVAL AND INSTALLATION: P/N 626964-1



**ASSEMBLY - 4" NOMINAL H2 CHOKE**  
**2,000 - 5,000 PSI WP**  
**ADJUSTABLE**

**PARTS LIST: H2 ADJUSTABLE CHOKE**  
**3" MAXIMUM ORIFICE**  
**2,000 - 5,000 PSI WP**

ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
1	1	HEX BOLT OR NUT	ALLOY STEEL	ALLOY STEEL
2	1	WASHER	CARBON STEEL	CARBON STEEL
3	1	HANDWHEEL	CAST IRON	CAST IRON
4	1	SET SCREW	S.S.	S.S.
5	1	INDICATOR	ALUMINUM	ALUMINUM
6	1	BONNET NUT	ALLOY STEEL	ALLOY STEEL
7	1	BONNET	ALLOY STEEL	ALLOY STEEL
8	1	PLUG	BRASS	BRASS
9	1	SET SCREW	S.S.	S.S.
10	1	O-RING	NITRILE	NITRILE
11	2	JUNK RING	S.S.	S.S.
12	1	J-PACKING	NITRILE/TEFLON	NITRILE/TEFLON
13	1	RETAINER RING	S.S.	S.S.
14	1	NEEDLE	S.S.	S.S.
15	1	SEAT	S.S.	S.S.
16	1	GASKET	COPPER	S.S.
17	1	BODY	ALLOY STEEL	ALLOY STEEL
18	1	NAMEPLATE	S.S.	S.S.
19	2	DRIVE SCREW	S.S.	S.S.
20*	1	INSTRUCTION PLATE	- -	BRASS
21	1	BLEED PLUG	S.S.	S.S.

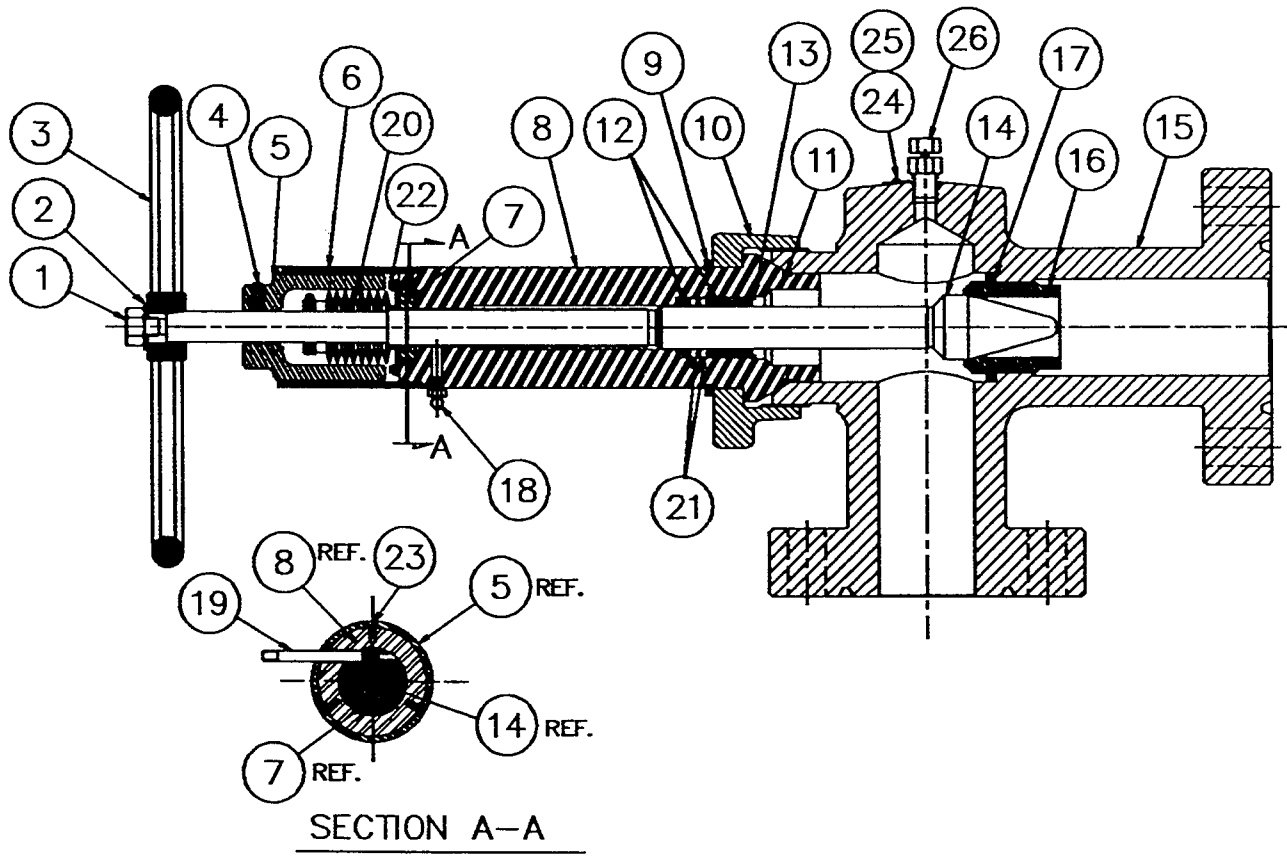
\* FOR SUPER TRIM ASSY, W/TUNGSTEN CARBIDE NEEDLE TIP AND SEAT INSERT

**RECOMMENDED SPARE PARTS LIST**

ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
8	1	PLUG	BRASS	BRASS
10	1	O-RING	NITRILE	NITRILE
12	1	J-PACKING	NITRILE/TEFLON	NITRILE/TEFLON
14	1	NEEDLE	S.S.	S.S.
15	1	SEAT	S.S.	S.S.

WRENCH, 2" FOR SEAT REMOVAL AND INSTALLATION: P/N 626963-1

### 3.3 H2 PAC



**ASSEMBLY - 3" NOMINAL H2 PAC**  
**2000 - 10,000 PSI WP**  
**ADJUSTABLE**

**PARTS LIST: H2 PAC**  
**3" NOMINAL, 2" MAXIMUM ORIFICE**  
**2,000 - 10,000 PSI WP**

ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
1	1	HEX BOLT OR NUT	ALLOY STEEL	ALLOY STEEL
2	1	WASHER	CARBON STEEL	CARBON STEEL
3	1	HANDWHEEL	CAST IRON	CAST IRON
4	1	SET SCREW	S.S.	S.S.
5	1	INDICATOR	PVC	PVC
6	1	BONNET NUT	CARBON STEEL	CARBON STEEL
7	1	BONNET	ALLOY STEEL	ALLOY STEEL
8	1	STEM LOCK COLLAR	ALLOY STEEL	ALLOY STEEL
9	1	STEM LOCK SCREW	ALLOY STEEL	ALLOY STEEL
10	1	O-RING	NITRILE	VITON A
11	2	STEM BUSHING	NAVAL BRASS	NAVAL BRASS
12	1	POLY PAC	NITRILE/TEFLON	NITRILE/TEFLON
13	1	RETAINER RING	S.S.	S.S.
14	1	NEEDLE	S.S. S.S.	S.S./T.C.
15	1	SEAT/BEAN	ALLOY STL/CERAMIC	S.S./T.C.
16	1	SEAT SEAL	DELRIN	DELRIN
17	1	BODY	ALLOY STEEL	ALLOY STEEL
18	1	NAMEPLATE	S.S.	S.S.
19	2	DRIVE SCREW	S.S.	S.S.
20*	1	INSTRUCTION PLATE	--	BRASS
21	1	BLEED PLUG	S.S.	S.S.
22	2	BELLOWS SCREW	ALLOY STEEL	ALLOY STEEL
23	3	BONNET EXT. SCREW	S.S.	S.S.
24	1	BONNET EXTENSION	CARBON STEEL	CARBON STEEL
25	1	BELLOWS	FABRIC/HYPALON	FABRIC/HYPALON
26	1	BONNET RETAINER RING	S.S.	S.S.

\* FOR SUPER TRIM ASSY, W/TUNGSTEN CARBIDE NEEDLE TIP AND SEAT INSERT

**RECOMMENDED SPARE PARTS LIST**

ITEM	QTY	DESCRIPTION	STANDARD TRIM	SUPER TRIM
8	1	STEM LOCK COLLAR	ALLOY STEEL	ALLOY STEEL
10	1	O-RING	NITRILE	VITON A
12	1	POLY PACPOLYMYTE	FLUOROELASTOMER	
14	1	NEEDLE	S.S.	S.S./T.C.
15	1	SEAT/BEAN ASSY	ALLOY STL/CERAMIC	S.S./T.C.

WRENCH, 4" FOR SEAT REMOVAL AND INSTALLATION: P/N 626963-1



## **4.0 ASSEMBLY INSTRUCTIONS**

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### **H2 CHOKE**

### **SERVICE INSTRUCTIONS AND PARTS LIST**

### **SECTION 4**

#### **4.1 POSITIVE CHOKE (2,000 - 10,000 psi wp)**

- Bean Installation/Removal

#### **4.2 POSITIVE CHOKE (15,000 psi wp)**

- Bean Installation/Removal

#### **4.3 ADJUSTABLE CHOKE (2,000 - 10,000 psi wp)**

- Packing Installation
- Needle Installation
- Seat Installation
- Bonnet Assembly Installation
- Calibrating the Choke

#### **4.4 ADJUSTABLE CHOKE (15,000 psi wp)**

- Packing Installation
- Needle Installation
- Seat Installation
- Bonnet Assembly Installation
- Calibrating the Choke

## **4.0 ASSEMBLY INSTRUCTIONS**

---

### **4.1 H2 POSITIVE (2,000 - 10,000 PSI WP)**

**4.1.1 General** All item numbers in parenthesis (XX) refer to Assembly Drawing #1 in Section 3, Page 3.

**4.1.2 Preparation** Prior to assembly, all components should be thoroughly cleaned of all chips and lubricants. This includes all threads, holes, grooves, and vents.

Ensure that solvent used does not remove molybdenum disulfide or PTFE on coated parts.

**4.1.3 Tools Required:**

<b>PART NUMBER</b>	<b>DESCRIPTION</b>
626964-1	Bean/Seat wrench
N/A	Hammer
N/A	Flat head screwdriver
N/A	Multi-purpose grease
N/A	1500 Ft. Lb. torque wrench

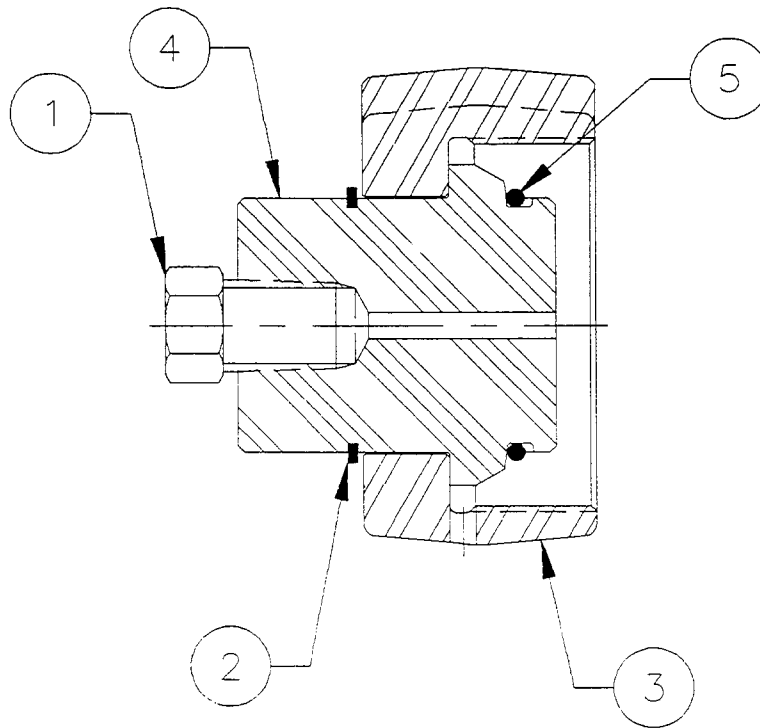
**4.1.4 Flow Bean Replacement**

**NOTE**

The volume of flow through the positive choke will change depending on the size and condition of the flow bean. Replace the flow bean if it is worn or if another size is required.

**Parts Required:**

1. Flow bean, appropriate size and material.
2. Flow bean gasket.



**ASSEMBLY - BLANKING PLUG FOR  
2" NOMINAL, 5M - 10M POSITIVE CHOKE**

#### **4.1.5 Flow Bean Removal**

- A. Using a hammer, loosen the bonnet nut (3).
- B. Remove the blanking plug assembly (8). The pipe plug (1), retainer ring (2), blanking plug (4), and o-ring (5) will come out in the bonnet nut as an assembly.
- C. Remove the blanking plug o-ring (5).
- D. Inspect the o-ring (5) for damage. Replace if necessary.
- E. Remove the flow bean (6) using the appropriate wrench.

#### **4.1.6 Flow Bean Installation**

- A. Inspect the new flow bean.
  - 1. Ensure that the gasket is clean and flat against the shoulder of the flow bean.
  - 2. Center the gasket on the flow bean by bending down the lugs on the gasket.
- B. Apply a light coat of grease to the flow bean threads and gasket.
- C. Install the new flow bean (6) using the appropriate wrench and torque to 500 ft. lbs.
- D. Install the o'ring (5) onto the blanking plug (4).
- E. Inspect the body and bonnet nut threads per EB #662H.(Latest Revision)
- F. Apply a light coat of grease to the seal area, the external threads of the choke body (7), and the threads of the bonnet nut (3).
- G. Install the blanking plug assembly (8) onto the choke (7).
- H. Using a hammer, tighten the bonnet nut (3) completely.

## 4.2 H2 POSITIVE (15,000 PSI WP)

**4.2.1 General** All item numbers in parenthesis (xx) refer to Assembly Drawing No.2 in Section 3, Page 5.

**4.2.2 Preparation:**

- A. Prior to assembly, all components should be thoroughly cleaned of all chips and lubricants. This includes all threads, holes, grooves, and vents. Ensure that solvent used does not remove molybdenum disulfide or PTFE on coated parts.
- B. Visually inspect all parts for damage after cleaning, but before assembly.

**4.2.3 Tools Required**

PART NUMBER	DESCRIPTION
626964-1	Bean/Seat wrench
N/A	Hammer
N/A	Flat head screwdriver
N/A	Multi-purpose grease
N/A	1500 ft. lb. torque wrench

**4.2.4 Flow Bean Replacement**

**Note**

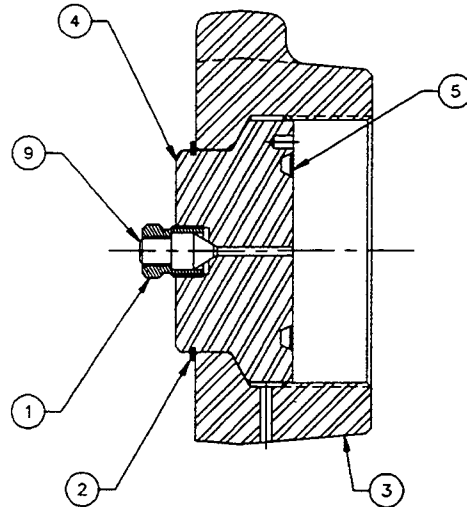
The volume of flow through the positive choke will change depending on the size and condition of the flow bean. Replace the flow bean if it is worn or if another size is required.

**Parts Required:**

- 1. Flow bean, appropriate size and material.
- 2. Flow bean gasket.

**4.2.5 Flow Bean Removal**

- A. Using a soft hammer, loosen the bonnet nut (3).
- B. Remove the blanking plug assembly (8). The gland nut (1), plug (9), retainer ring (2), and blanking plug (4) will come out in the bonnet nut as an assembly.



**BLANKING PLUG SUB-ASSEMBLY**  
**2" NOMINAL H2 CHOKE - 15M PSI WP**

- C. Remove the blanking plug bonnet gasket (5).
- D. Inspect the bonnet gasket (5) for damage. Replace if necessary.
- E. Remove the flow bean (6) using the appropriate wrench.

**4.2.6 Flow Bean Installation**

- A. Inspect the new flow bean.
  - 1. Ensure that the gasket is clean and flat against the shoulder of the flow bean.
  - 2. Center the gasket on the flow bean by bending down the lugs on the gasket.
- B. Apply a light coat of grease to the flow bean threads and gasket.
- C. Install the new flow bean (6) using the appropriate wrench and torque to 1500 ft. lbs.
- D. Inspect the body (7) and bonnet nut (3) threads per EB 662H. (Latest Revision)
- E. Apply a light coat of grease to the seal area, the external threads of the choke body (7), and the threads of the bonnet nut (3).
- F. Install the bonnet gasket (5) in the blanking plug assembly (8).
- G. Install the blanking plug assembly (8) onto the choke (7).
- H. Using a hammer, tighten the bonnet nut (3) completely.

## 4.3 H2 ADJUSTABLE (2,000 - 10,000 PSI WP)

### 4.3.1 General

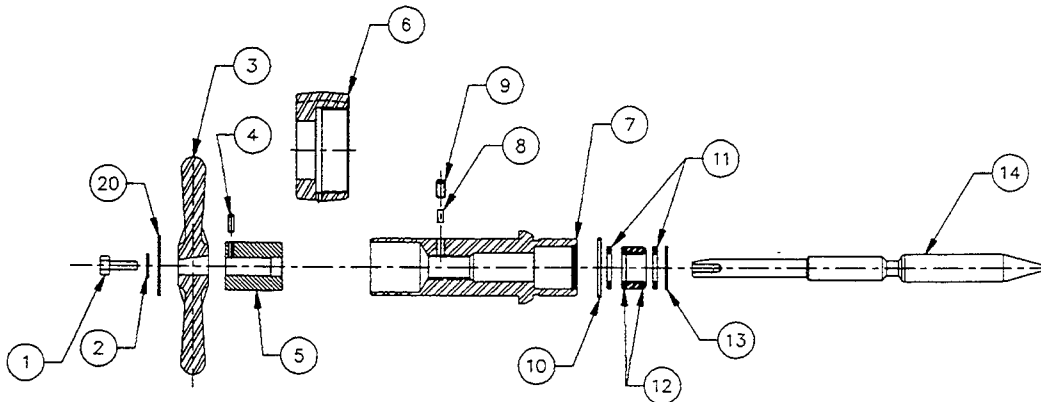
All item numbers in parenthesis (xx) refer to Assembly Drawing No.3 in Section 3, Page 12.

### 4.3.2 Preparation:

- A. Prior to assembly, all components should be thoroughly cleaned of all chips and lubricants. This includes all threads, holes, grooves and vents. Ensure that solvent used does not remove molybdenum disulfide or PTFE on coated parts.
- B. Visually inspect all parts for damage after cleaning, but before assembly.

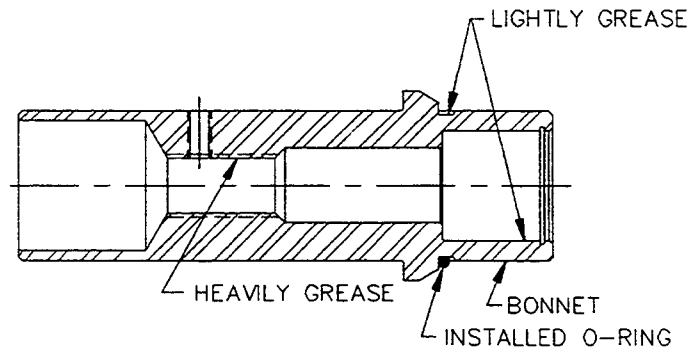
### 4.3.3 Tools Required:

PART NUMBER	DESCRIPTION
626964-1	Bean/Seat wrench
N/A	Hammer
N/A	Flat head screwdriver
N/A	Multi-purpose grease
N/A	1500 Ft. Lb. torque wrench

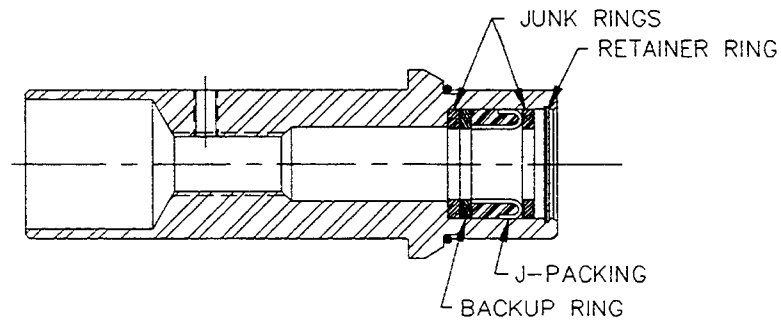


### 4.3.4 Bonnet Assembly

- A. Lightly grease the o'ring groove and packing bore of the bonnet body(7). Heavily grease the threads in the bonnet body (7).
- B. Lightly grease the o'ring (10) and install in groove of bonnet body (7).



- C. Place bonnet body (7) on flat surface with packing bore up. Lubricate the J-packing (12) and junk rings (11) with light grease or heavy oil. Install the metal junk ring (11), back-up ring (part of packing set), J-packing (12), support ring (22) and retainer ring (13).

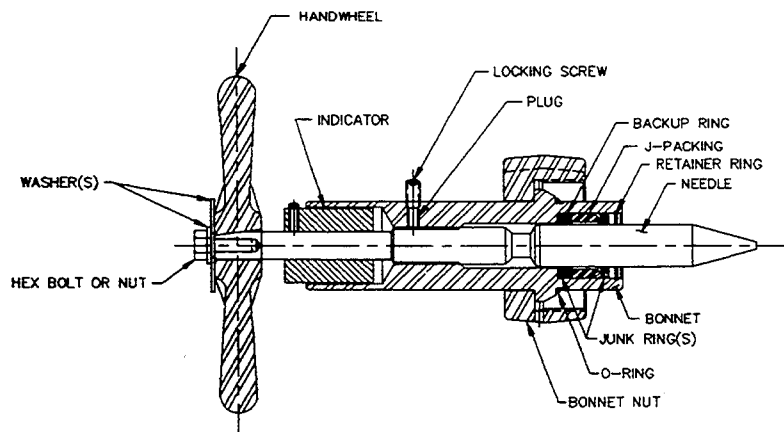
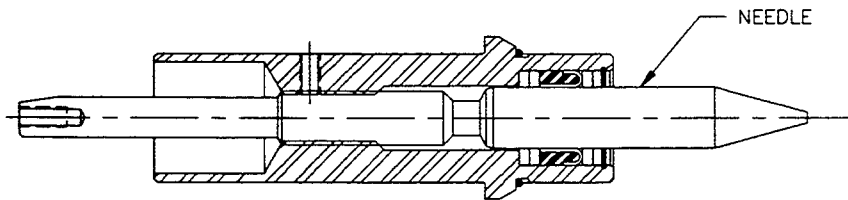


#### 4.3.5 Needle Installation

- A. Lubricate the needle (14) threads with heavy grease. Grease the sealing surface with light grease or heavy oil. Place the bonnet body (7) on its side and slowly slide the needle (14) threaded end first, through the packing end of the bonnet body (7). Engage the threads of the needle (14) with the threads of the bonnet body (7). Temporarily install handwheel (3) on needle (14) and install needle (14) in bonnet body (7) by rotating handwheel (3) counter-clockwise. After installation, remove the handwheel (3).
- B. Slide the indicator (5) over the handwheel end of the needle (14). Install set screw (4) in the indicator (5) hand tight.



- C. Lubricate the threads of the bonnet nut (6) with a heavy grease. Slide bonnet nut (6) over bonnet body (7) until it bottoms out against the bonnet flange.
- D. Rotate bonnet body (7) until the needle locking screw hole faces up. Insert the plug (8) into the hole. Grease and install the needle locking screw (9) in the tapped hole hand tight.
- E. Install handwheel (3), hex bolt or nut (1), and washer (2) to needle(14).



## H2 ADJUSTABLE CHOKE BONNET ASSEMBLY

#### **4.3.5 Seat Installation**

- A. Lubricate the seat threads in the choke body (17) with heavy grease.
- B. Inspect the new seat (15).
  - 1. Ensure the gasket (16) is clean and flat against the shoulder of the seat (15).
  - 2. Center the gasket (16) on the seat (15) by bending down the lugs on the gasket.
- C. Apply a light coat of grease to the seat (15) threads and gasket.
- D. Install the new seat (15) using the appropriate wrench and torque to 500 ft. lbs.

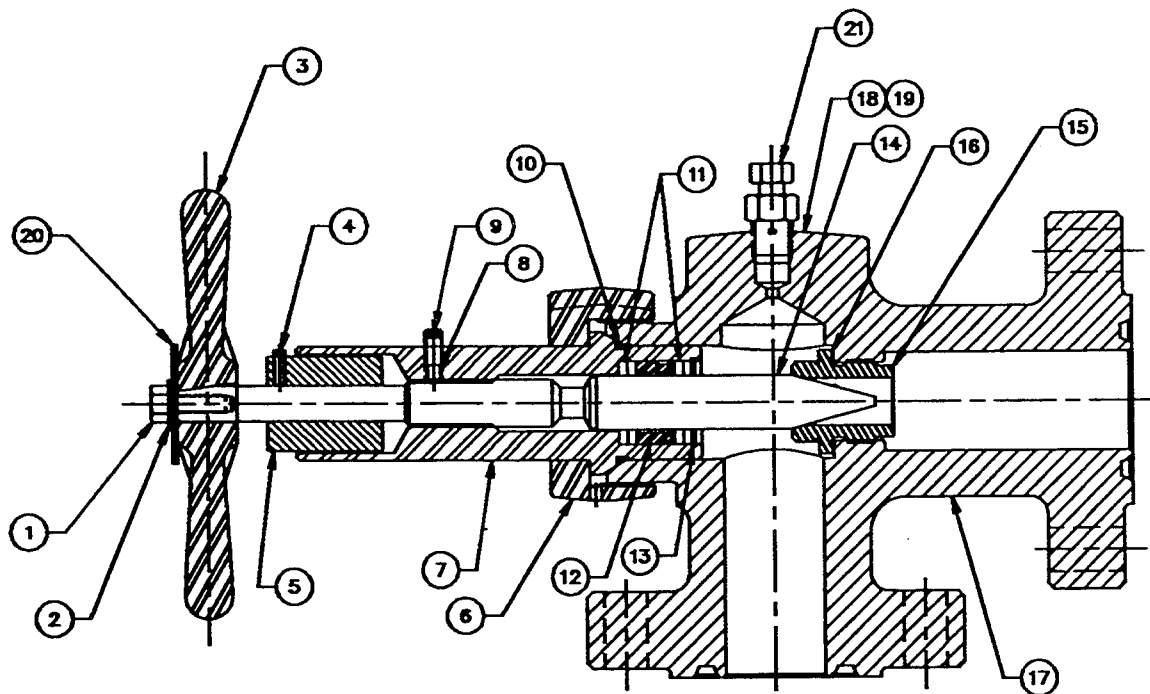
#### **Note**

The needle (14) should be backed well into the bonnet assembly before installing the bonnet assembly on the choke body (17) to be sure that it does not damage the seat (15) during installation.

- E. Lubricate the bonnet seal surface of the choke body (17) with light grease and the bonnet (6) nut threads with a heavy grease.
- F. Install bonnet assembly in choke body (17). Make up bonnet nut (6) hand tight. Using a hammer, tighten the bonnet nut (6) completely.

#### 4.3.6 Calibrating the Choke

After the bonnet nut (6) is tight, run the needle (14) in against the seat (15), align the zero setting on the indicator with notch on the bonnet body (7) and tighten the indicator set screw (4). Do not tighten the bonnet to needle set screw (9) until the choke is positioned in the desired setting.



**ASSEMBLY - 2" NOMINAL CHOKE**  
**5,000 - 10,000 PSI WP**  
**ADJUSTABLE**

## 4.4 H2 ADJUSTABLE (15,000 PSI WP)

### 4.4.1 General

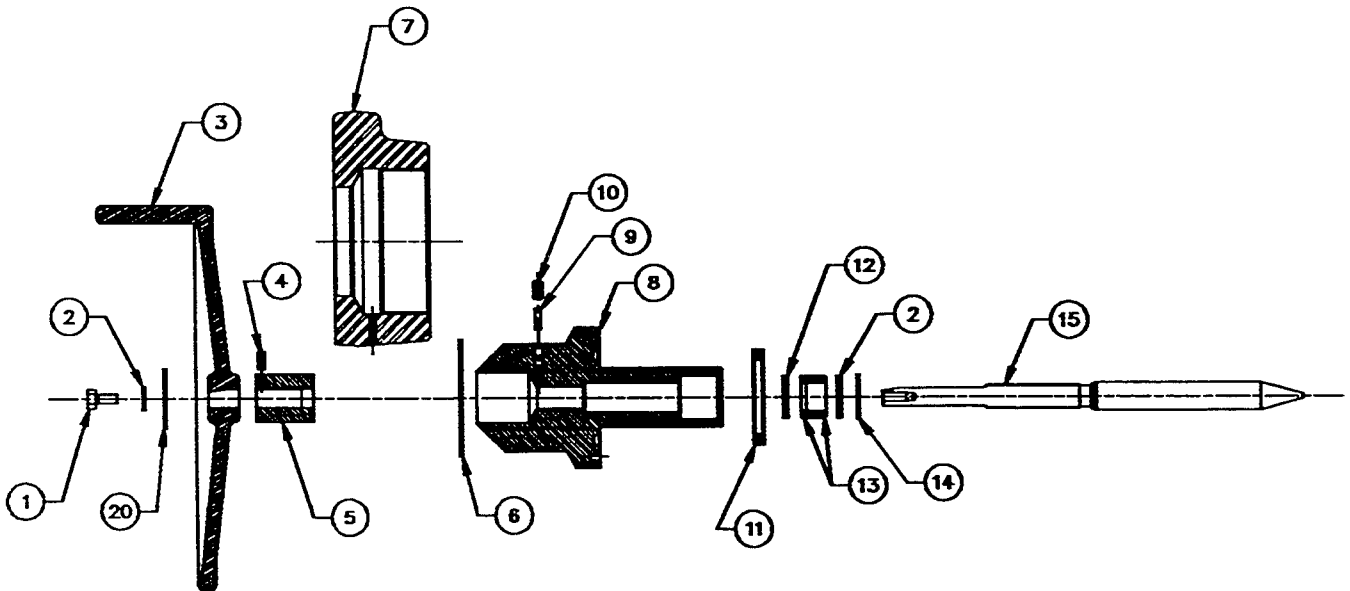
All item numbers in parenthesis (xx) refer to Assembly Drawing No.4 in Section 3, Page 14.

### 4.4.2 Preparation:

- a. Prior to assembly, all components should be thoroughly cleaned of all chips and lubricants. This includes all threads, holes, grooves, and vents. Ensure that solvent used does not remove molybdenum disulfide or PTFE on coated parts.
- b. Visually inspect all parts for damage after cleaning, but before assembly.

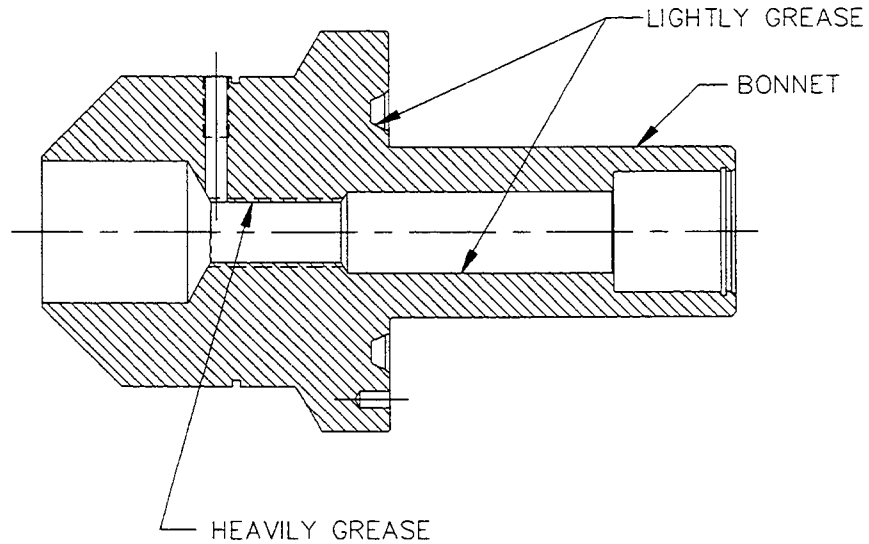
### 4.4.3 Tools Required:

PART NUMBER	DESCRIPTION
626964-1	Bean/Seat wrench
N/A	Hammer
N/A	screwdriver
N/A	Multi-purpose grease
N/A	1500 ft. lb. torque wrench

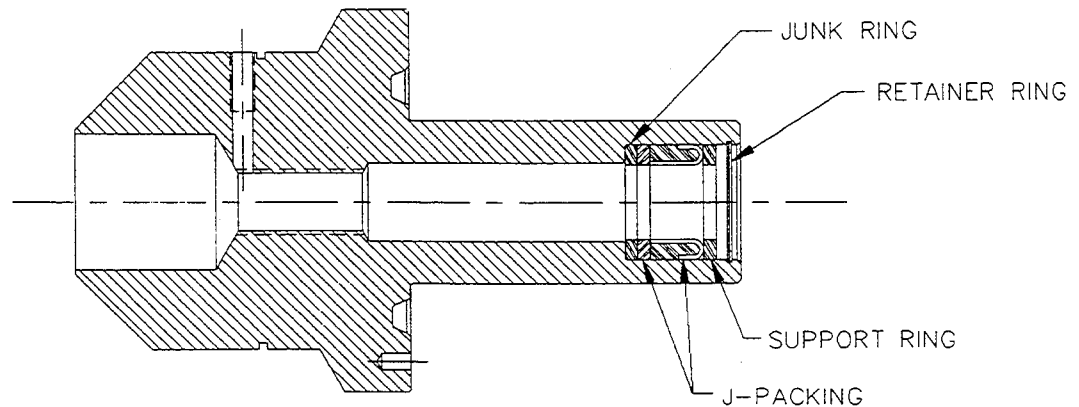


#### 4.4.4 Bonnet Assembly

1. Lightly grease the bonnet gasket groove and packing bore of the bonnetbody (7). Heavily grease the threads in the bonnet body (7).

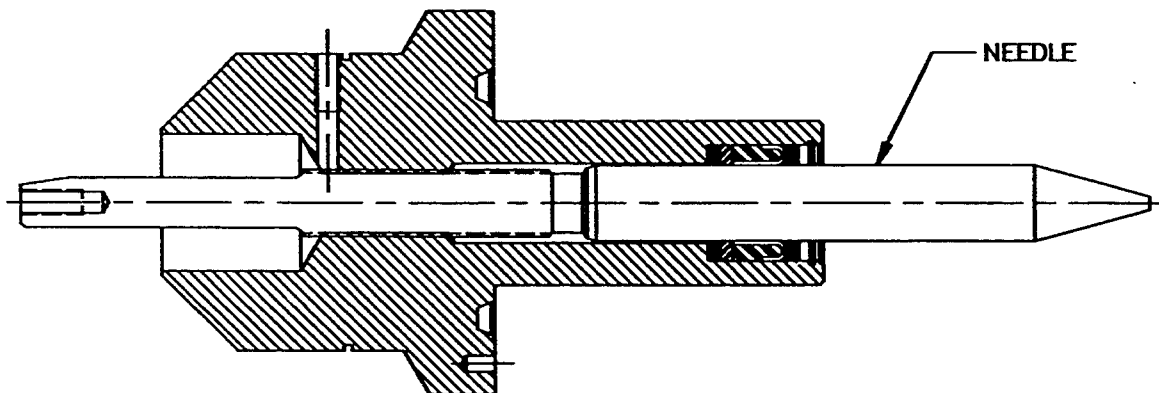


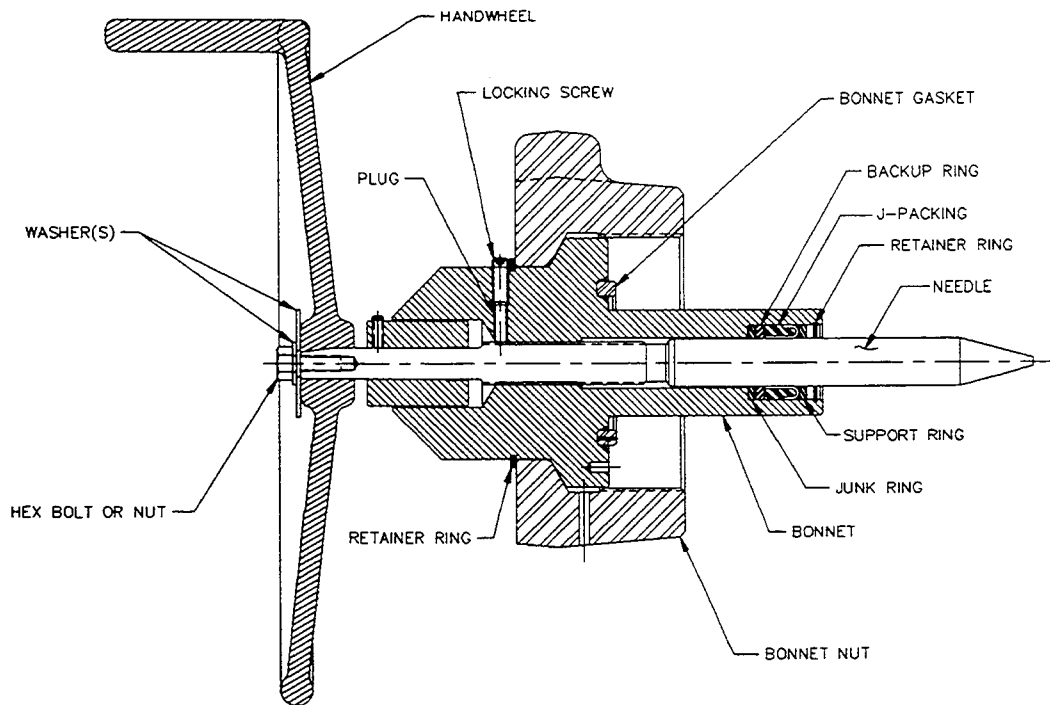
2. Place bonnet body (7) on flat surface with packing bore up. Lubricate the J-packing (12) and junk rings (11) with light grease or heavy oil. Install the metal junk ring (11), back-up ring (part of packing set), J-packing (12) support ring (22), and retainer ring (13).



#### 4.4.5 Needle Installation

- A. Lubricate the needle (14) threads with heavy grease. Grease the sealing surface with light grease or heavy oil. Place the bonnet body (7) on its side and slowly slide the needle (14) threaded end first, through the packing end of the bonnet body (7). Engage the threads of the needle (14) with the threads of the bonnet body (7). Temporarily install handwheel (3) on needle (14) and install needle (14) in bonnet body (7) by rotating handwheel (3) counter-clockwise. After installation, remove the handwheel (3).
- B. Slide the indicator (5) over the handwheel end of the needle (14). Install set screw (4) in the indicator (5).
- C. Lubricate the threads of the bonnet nut (6) with a heavy grease. Slide bonnet nut (6) over bonnet body (7) until bottoms out against the bonnet flange.
- D. Install retainer ring (21) on bonnet body (7).
- E. Rotate bonnet body (7) until the needle locking screw hole face up. Insert the plug (8) into the hole. Grease and install the needle locking screw (9) in the tapped hole hand tight.
- F. Install handwheel (3), hex bolt or nut (1), and washer (2) to needle (14).





#### 4.4.6 Seat Installation

- A. Lubricate the seat threads in the choke body (17) with heavy grease.
- B. Inspect the new seat (15).
  1. Ensure the gasket (16) is clean and flat against the shoulder of the seat (15).
  2. Center the gasket (16) on the seat (15) by bending down the lugs on the gasket.
- C. Apply a light coat of grease to the seat (15) threads and gasket.
- D. Install the new seat (15) using the appropriate wrench and torque to 1500 ft. lbs.

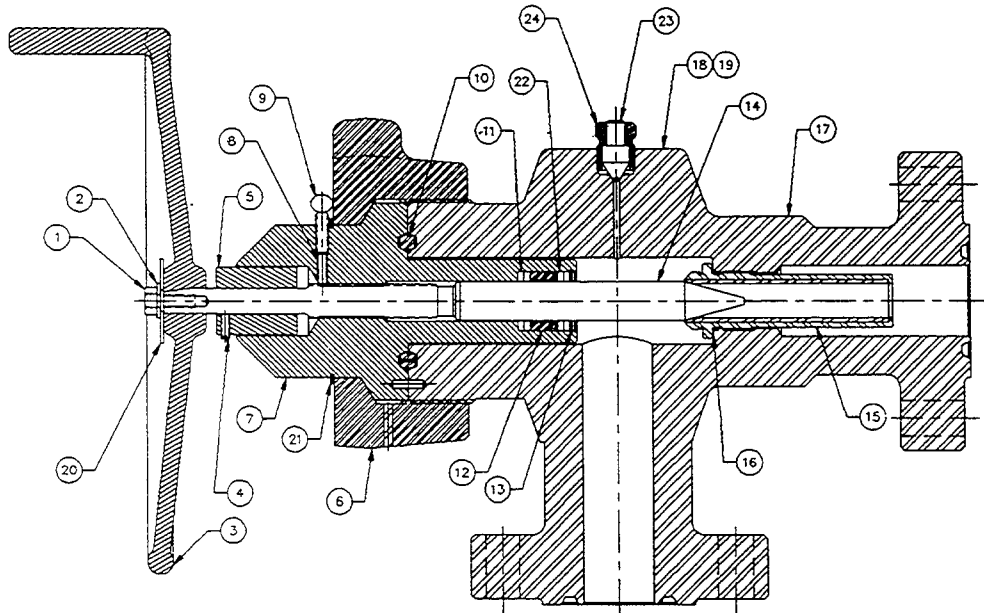
#### Note

The needle (14) should be backed well into the bonnet assembly before installing the bonnet assembly on the choke body (17) to be sure that it does not damage the seat (15) during installation.

- E. Lubricate the bonnet gasket seal surface of the choke body (17) with light grease and the bonnet nut threads with a heavy grease.
- F. Place bonnet gasket (10) in groove on choke body.
- G. Install bonnet assembly in choke body (17). Make up bonnet nut (6) hand tight. Using a hammer, tighten the bonnet nut (6) completely.

#### 4.4.7 Calibrating the Choke

After the bonnet nut (6) is tight, run the needle (4) in against the seat (15), align the zero setting on the indicator with notch on the bonnet body (7) and tighten the indicator set screw (4). Do not tighten the bonnet-to-needle set screw (9) until the choke is positioned in the desired setting.



**ASSEMBLY - 2" NOMINAL H2 CHOKE**

**15,000 PSI WP  
ADJUSTABLE**



## **5.0 SPECIFICATIONS**

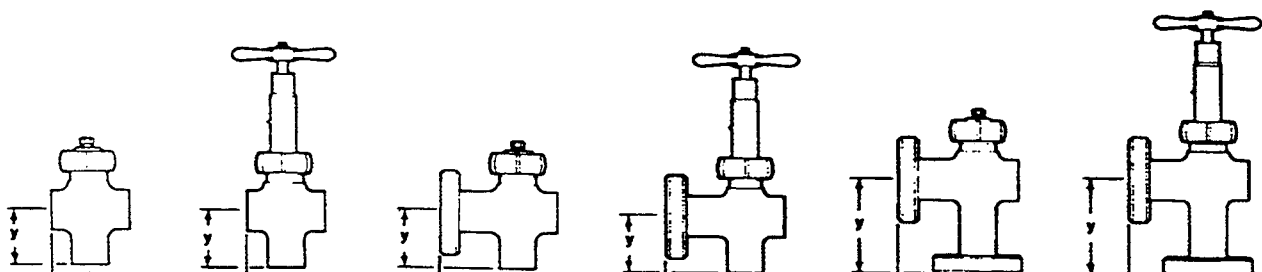
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### **H2 CHOKE SERVICE INSTRUCTIONS AND PARTS LIST SECTION 5**

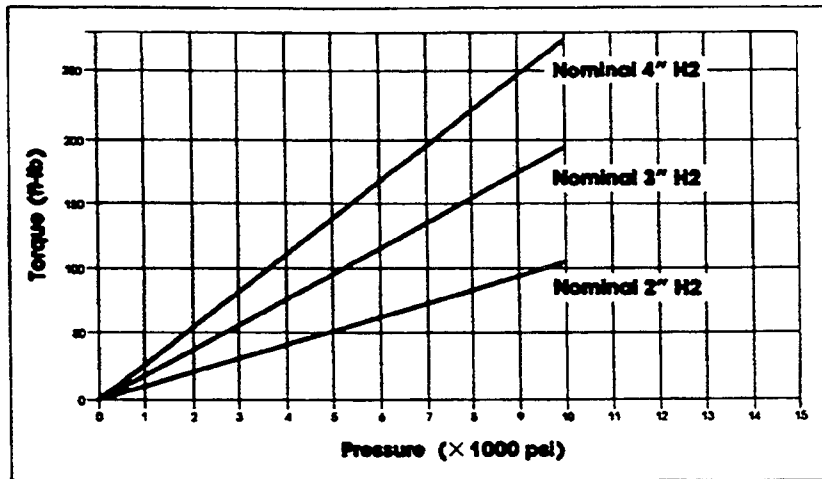
- **5.1 PHYSICAL SPECIFICATIONS**
- **5.2 TORQUE VS PRESSURE**
- **5.3 CV VALUE FLOW COEFFICIENT**

## 5.1 PHYSICAL SPECIFICATIONS

Inlet	Outlet	Working Pressure	Body Style	Dimensions	
				X	Y
1" Maximum Orifice					
2" LP	2" LP	3000	A	3 <sup>1</sup> / <sub>16</sub> "	4 <sup>1</sup> / <sub>16</sub> "
2" LP	2" LP	5000	A	3 <sup>1</sup> / <sub>16</sub> "	4 <sup>1</sup> / <sub>16</sub> "
2 <sup>1</sup> / <sub>16</sub> " 2000 Fig	2" LP	2000	C	6 <sup>1</sup> / <sub>16</sub> "	4 <sup>1</sup> / <sub>16</sub> "
2 <sup>1</sup> / <sub>16</sub> " 5000 Fig	2" LP	3000	C	6 <sup>1</sup> / <sub>16</sub> "	4 <sup>1</sup> / <sub>16</sub> "
2 <sup>1</sup> / <sub>16</sub> " 5000 Fig	2" LP	5000	C	6 <sup>1</sup> / <sub>16</sub> "	4 <sup>1</sup> / <sub>16</sub> "
2 <sup>1</sup> / <sub>16</sub> " 2000 Fig	2 <sup>1</sup> / <sub>16</sub> " 2000 Fig	2000	D	6 <sup>1</sup> / <sub>16</sub> "	7 <sup>1</sup> / <sub>16</sub> "
2 <sup>1</sup> / <sub>16</sub> " 5000 Fig	2 <sup>1</sup> / <sub>16</sub> " 5000 Fig	3000	D	6 <sup>1</sup> / <sub>16</sub> "	8"
2 <sup>1</sup> / <sub>16</sub> " 5000 Fig	2 <sup>1</sup> / <sub>16</sub> " 5000 Fig	5000	D	6 <sup>1</sup> / <sub>16</sub> "	8"
2 <sup>1</sup> / <sub>16</sub> " 5000 Fig	2 <sup>1</sup> / <sub>16</sub> " 5000 Fig	3000	D	6 <sup>1</sup> / <sub>16</sub> "	8 <sup>1</sup> / <sub>16</sub> "
2 <sup>1</sup> / <sub>16</sub> " 5000 Fig	2 <sup>1</sup> / <sub>16</sub> " 5000 Fig	5000	D	6 <sup>1</sup> / <sub>16</sub> "	8 <sup>1</sup> / <sub>16</sub> "
3 <sup>1</sup> / <sub>16</sub> " 3000 Fig	3 <sup>1</sup> / <sub>16</sub> " 3000 Fig	3000	D	7 <sup>1</sup> / <sub>16</sub> "	8 <sup>1</sup> / <sub>16</sub> "
3 <sup>1</sup> / <sub>16</sub> " 5000 Fig	3 <sup>1</sup> / <sub>16</sub> " 5000 Fig	5000	D	9 <sup>1</sup> / <sub>16</sub> "	9 <sup>1</sup> / <sub>16</sub> "
1 <sup>1</sup> / <sub>16</sub> " 10,000 Fig	1 <sup>1</sup> / <sub>16</sub> " 10,000 Fig	10,000	D	7 <sup>1</sup> / <sub>16</sub> "	8 <sup>1</sup> / <sub>16</sub> "
2 <sup>1</sup> / <sub>16</sub> " 10,000 Fig	2 <sup>1</sup> / <sub>16</sub> " 10,000 Fig	10,000	D	7 <sup>1</sup> / <sub>16</sub> "	8 <sup>1</sup> / <sub>16</sub> "
2 <sup>1</sup> / <sub>16</sub> " 10,000 Fig	2 <sup>1</sup> / <sub>16</sub> " 10,000 Fig	10,000	D	8 <sup>1</sup> / <sub>16</sub> "	9 <sup>1</sup> / <sub>16</sub> "
1 <sup>1</sup> / <sub>16</sub> " 15,000 Fig	1 <sup>1</sup> / <sub>16</sub> " 15,000 Fig	15,000	D	8 <sup>1</sup> / <sub>16</sub> "	9 <sup>1</sup> / <sub>16</sub> "
2 <sup>1</sup> / <sub>16</sub> " 15,000 Fig	2 <sup>1</sup> / <sub>16</sub> " 15,000 Fig	15,000	D	8 <sup>1</sup> / <sub>16</sub> "	10 <sup>1</sup> / <sub>16</sub> "
2 <sup>1</sup> / <sub>16</sub> " 15,000 Fig	2 <sup>1</sup> / <sub>16</sub> " 15,000 Fig	15,000	D	10 <sup>1</sup> / <sub>16</sub> "	11 <sup>1</sup> / <sub>16</sub> "
3 <sup>1</sup> / <sub>16</sub> " 15,000 Fig	3 <sup>1</sup> / <sub>16</sub> " 15,000 Fig	15,000	D	10 <sup>1</sup> / <sub>16</sub> "	11 <sup>1</sup> / <sub>16</sub> "
2" Maximum Orifice					
3" LP	3" LP	3000	A	4 <sup>1</sup> / <sub>2</sub> "	7"
3 <sup>1</sup> / <sub>16</sub> " 3000 Fig	3" LP	3000	C	8 <sup>1</sup> / <sub>16</sub> "	7"
3 <sup>1</sup> / <sub>16</sub> " 5000 Fig	3" LP	3000	C	8 <sup>1</sup> / <sub>16</sub> "	7"
2 <sup>1</sup> / <sub>16</sub> " 5000 Fig	2 <sup>1</sup> / <sub>16</sub> " 5000 Fig	5000	D	8 <sup>1</sup> / <sub>16</sub> "	11 <sup>1</sup> / <sub>16</sub> "
2 <sup>1</sup> / <sub>16</sub> " 5000 Fig	2 <sup>1</sup> / <sub>16</sub> " 5000 Fig	5000	D	8 <sup>1</sup> / <sub>16</sub> "	11 <sup>1</sup> / <sub>16</sub> "
3 <sup>1</sup> / <sub>16</sub> " 2000 Fig	3 <sup>1</sup> / <sub>16</sub> " 2000 Fig	2000	D	8 <sup>1</sup> / <sub>16</sub> "	11 <sup>1</sup> / <sub>16</sub> "
3 <sup>1</sup> / <sub>16</sub> " 3000 Fig	3 <sup>1</sup> / <sub>16</sub> " 3000 Fig	3000	D	8 <sup>1</sup> / <sub>16</sub> "	11 <sup>1</sup> / <sub>16</sub> "
3 <sup>1</sup> / <sub>16</sub> " 5000 Fig	3 <sup>1</sup> / <sub>16</sub> " 5000 Fig	5000	D	8 <sup>1</sup> / <sub>16</sub> "	11 <sup>1</sup> / <sub>16</sub> "
4 <sup>1</sup> / <sub>16</sub> " 3000 Fig	4 <sup>1</sup> / <sub>16</sub> " 3000 Fig	3000	D	10 <sup>1</sup> / <sub>16</sub> "	11 <sup>1</sup> / <sub>16</sub> "
4 <sup>1</sup> / <sub>16</sub> " 5000 Fig	4 <sup>1</sup> / <sub>16</sub> " 5000 Fig	5000	D	10 <sup>1</sup> / <sub>16</sub> "	12 <sup>1</sup> / <sub>16</sub> "
2 <sup>1</sup> / <sub>16</sub> " 10,000 Fig	2 <sup>1</sup> / <sub>16</sub> " 10,000 Fig	10,000	D	10 <sup>1</sup> / <sub>16</sub> "	12"
2 <sup>1</sup> / <sub>16</sub> " 10,000 Fig	2 <sup>1</sup> / <sub>16</sub> " 10,000 Fig	10,000	D	10 <sup>1</sup> / <sub>16</sub> "	11 <sup>1</sup> / <sub>16</sub> "
3 <sup>1</sup> / <sub>16</sub> " 10,000 Fig	3 <sup>1</sup> / <sub>16</sub> " 10,000 Fig	10,000	D	10 <sup>1</sup> / <sub>16</sub> "	11 <sup>1</sup> / <sub>16</sub> "
4 <sup>1</sup> / <sub>16</sub> " 10,000 Fig	4 <sup>1</sup> / <sub>16</sub> " 10,000 Fig	10,000	D	9 <sup>1</sup> / <sub>16</sub> "	11 <sup>1</sup> / <sub>16</sub> "
3" Maximum Orifice					
4" LP	4" LP	3000	A	6 <sup>1</sup> / <sub>16</sub> "	7 <sup>1</sup> / <sub>16</sub> "
4 <sup>1</sup> / <sub>16</sub> " 3000 Fig	4" LP	3000	C	9 <sup>1</sup> / <sub>16</sub> "	7 <sup>1</sup> / <sub>16</sub> "
3 <sup>1</sup> / <sub>16</sub> " 5000 Fig	3 <sup>1</sup> / <sub>16</sub> " 5000 Fig	5000	D	14 <sup>1</sup> / <sub>16</sub> "	15 <sup>1</sup> / <sub>16</sub> "
4 <sup>1</sup> / <sub>16</sub> " 3000 Fig	4 <sup>1</sup> / <sub>16</sub> " 3000 Fig	3000	D	9 <sup>1</sup> / <sub>16</sub> "	9 <sup>1</sup> / <sub>16</sub> "
4 <sup>1</sup> / <sub>16</sub> " 5000 Fig	4 <sup>1</sup> / <sub>16</sub> " 5000 Fig	5000	D	12 <sup>1</sup> / <sub>16</sub> "	12 <sup>1</sup> / <sub>16</sub> "



## 5.2 TORQUE TO CLOSE -vs- PRESSURE



Note: Torque values apply only to liquid flow.

SD-658R

## 5.3 VALVE FLOW COEFFICIENT\*

Flow through a choke can be determined from the pressure differential, specific gravity of fluid flowing, and the valve flow coefficient ( $C_v$ ). The  $C_v$  factor is the number of U.S. gallons of water that pass through a given orifice area in one minute at a pressure drop of one psi. Cameron provides graphs of the coefficient versus choke travel such as the one displayed below. The data can be used to find a flow coefficient

(and choke configuration for a given flow volume) or to find the flow for a given set of conditions.

**Flow Equation:**  $Q = C_d A_o \sqrt{\frac{2\Delta P}{\rho}}$

**Mathematical Definition of the  $C_v$  Factor:**

$$Q = \left[ C_d A_o \sqrt{\frac{2}{\rho_w}} 0.26 \right] \sqrt{\frac{\Delta P}{S.G.}}$$

$Q$  = Flow (in<sup>3</sup>/sec)

$C_d$  = Orifice Discharge Coefficient (0.611 for a sharp-edged orifice)

$A_o$  = Area of Orifice (in<sup>2</sup>)

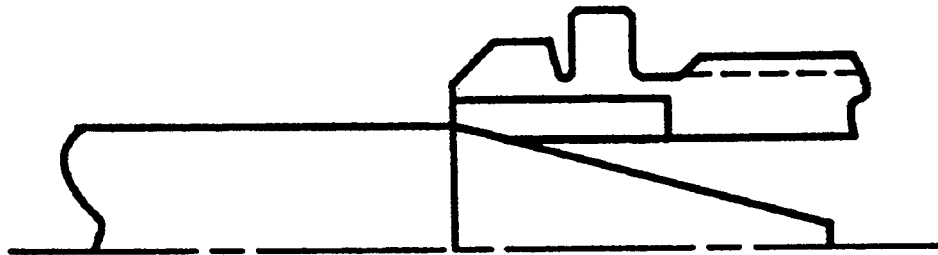
$\Delta P$  = Pressure Drop Across the Orifice (lb/in<sup>2</sup>)

$\rho$  = Density of the Fluid Passing Through the Orifice (lb-sec<sup>2</sup>/in<sup>4</sup>)

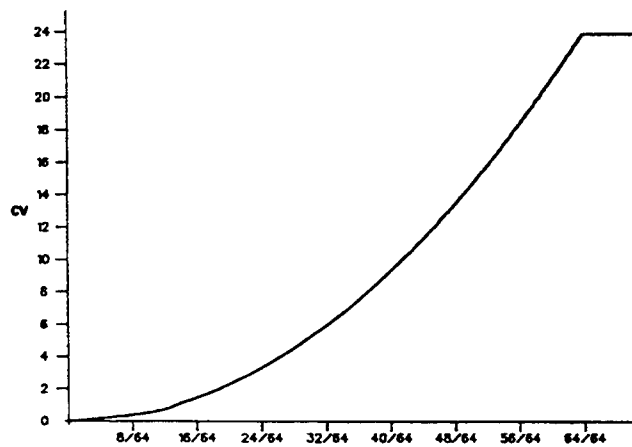
$\rho_w$  = Density of Water

S.G. = Specific Gravity of Fluid

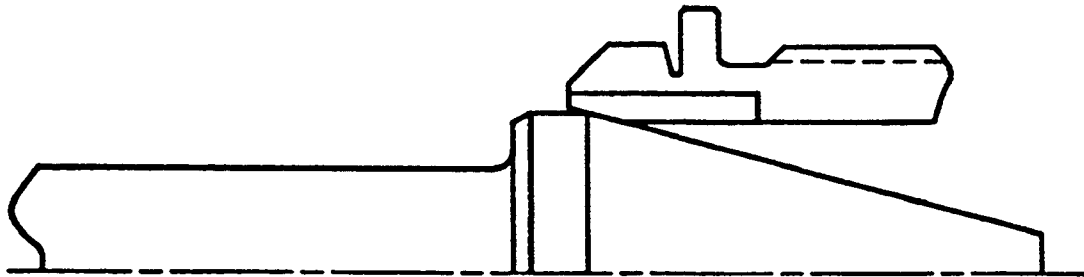
\*Parker Hannifin, Fluid Power Design Engineers' Handbook



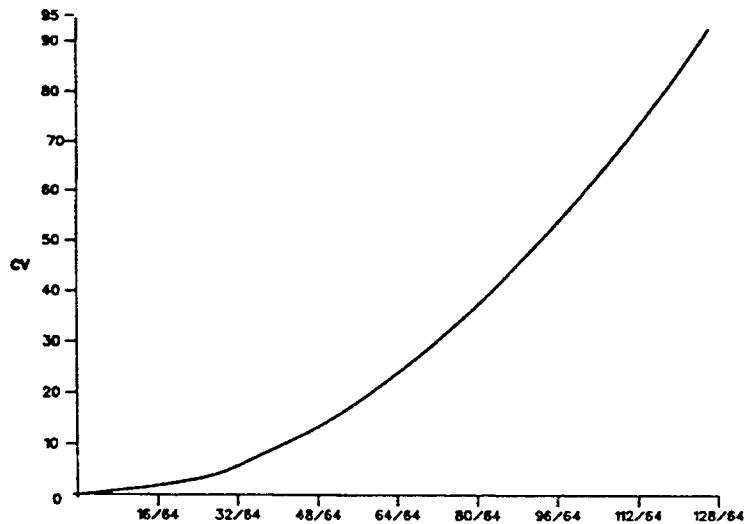
**2" NOMINAL CHOKE**  
**SEAT BORE**  
**(DT) = 1.000"**  
**GATE ANGLE (TG) = 15°**  
**TRAVEL (TRAV) = 2.125"**



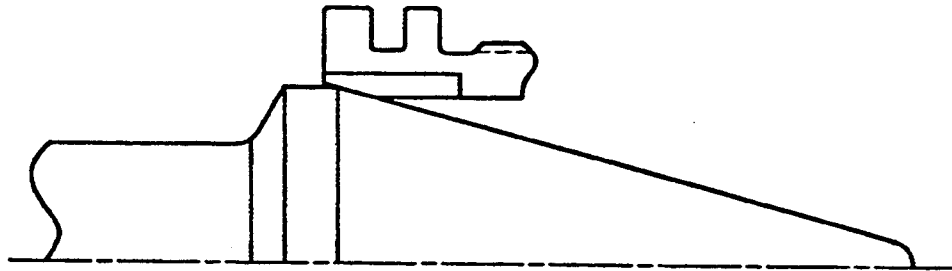
**2" NOMINAL H2 ADJUSTABLE CHOKE**  
**1" ORIFICE**  
**2.125" TRAVEL**  
**(ORIFICE DIAMETER IN 1/64")**



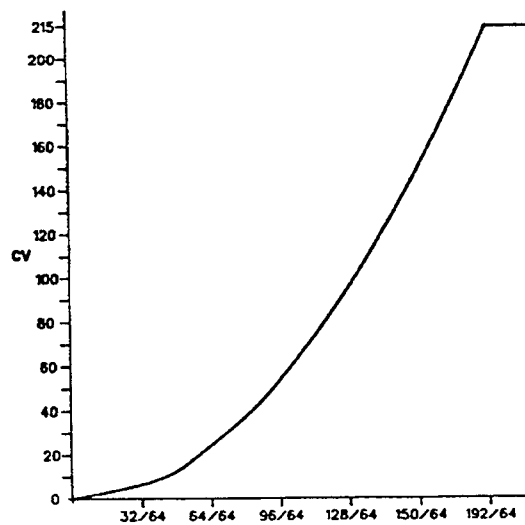
**3" NOMINAL H2 CHOKE**  
**SEAT BORE (DT) = 2.000"**  
**GATE ANGLE (TG) = 15°**  
**TRAVEL (TRAV) = 3.000"**



**3" NOMINAL H2 ADJUSTABLE CHOKE**  
**2" ORIFICE**  
**3.000" TRAVEL**  
**(ORIFICE DIAMETER IN 1/64")**



**4" NOMINAL H2 CHOKE**  
**SEAT BORE (DT) = 3.000"**  
**GATE ANGLE (TG) = 15°**  
**TRAVEL (TRAV) = 5.375"**



**4" NOMINAL H2 ADJUSTABLE CHOKE**  
**3" ORIFICE**  
**5.375" TRAVEL**  
**(ORIFICE DIAMETER IN 1/64")**





**CAMERON**

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