metso automation

SERVICE AND INSTALLATION

IMO - 14004
GLOBE VALVE
BODY ASSEMBLIES

V800/801 — DOUBLE SEAT
V802/803 — SINGLE SEAT

STORAGE

When a valve is to be stored for an extended period, remove the line connection covers and spray a light coating of machine oil on the internals. Replace the covers to prevent foreign matter from entering the valve body. Exposed parts should also be sprayed with a protective film of oil.

A packing list, containing a complete description of the valve and accessories (such as a valve positioner etc.), accompanies each valve when shipped. This list should be checked soon after the shipment has been received.

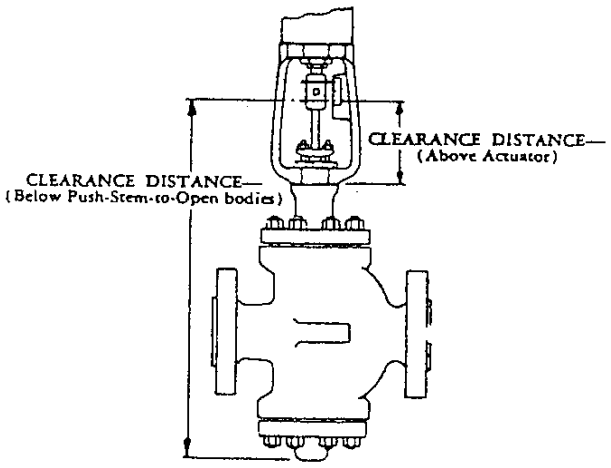
When hoisting the valve, make sure that ropes or cables are of sufficient strength and are positioned so that any tubing or accessories will not be damaged.

INSTALLATION

The valve performs best when placed in a straight run of the main line away from pipe bends or sections of abnormal velocity. The valve may be installed in any position provided the correct direction of flow is maintained. An arrow on the valve body indicates the correct direction of flow. A raised metal pattern cast on the body indicates the location of the seat ring bridge.

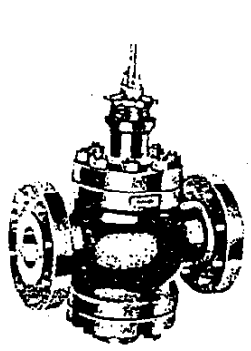
Clearance should be provided above the actuator to permit its removal for servicing, or for inspection of the Pull-Stem-to-Open plug. Clearance should be provided beneath the valve for removal of the Push-Stem-to-Open plug from the bottom of the body. Distances determined from the specific valve, between the points indicated on the drawing below, would provide adequate clearance for these operations.

Clearance determination for servicing valve in line :

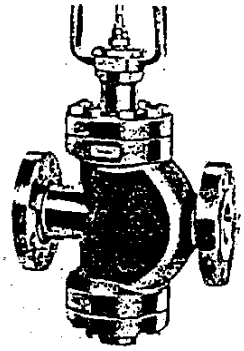


By-Pass: The conventional three valve by-pass should be installed if it is necessary to continue operation during periods of control valve servicing.

Connections: Pipe threads should be clean and sharp. Use pipe compound on the male threads only.



Single Seat



Double Seat

When making flanged connections, tighten the bolts evenly to avoid placing a strain on the body or cracking a flange.

Instruments: An air supply pressure regulator with filter should be installed in the air line ahead of any valve-mounted instruments. Mounted positioners are piped and adjusted at the factory.

Excessive delay in response occurs when air control instruments are placed more than 100 feet from the valve.

Packing Adjustment:

Standard Spring-Loaded Chevron Teflon — Tighten packing flange nuts (24) evenly until the shoulder of the packing follower (14) seats squarely on the top of the bonnet. Spring force expands the chevron rings for optimum seal pressure on the valve stem and packing box walls. No further adjustment of the packing is required.

See Page 6 for other packing materials.

Special Bonnets: The special valve bonnets shown on Page 3 are designed to protect the stem packing from extremes of line temperature. Normalizing bonnets dissipate heat and must not be wrapped with any form of insulating material.

Final Check: After the valve has been installed, make a final check of the following: (1) Valve travel — vary air supply to the actuator to ascertain that actual travel corresponds with the nameplate indication. (2) Air lines to the actuator — check for leaks. (3) Control instruments/valve action — check to be sure that the combined actions (direct or reverse) of controller, positioner (if any), and valve will provide the desired direction of valve movement, and will ensure the required valve position in the event of air failure.

Under actual operating conditions, pressure drop across the valve may differ from the calculated figure. Diaphragm actuators on single seated valves may require readjustment of the spring in order to provide full valve travel and shutoff. See Actuator Instructions for this procedure.

MAINTENANCE

I. GENERAL

A. Maintenance such as diaphragm, packing, or trim replacement can be done without removing the valve from the line. Since most valve locations are not suited for repair operations, however, these instructions assume that the valve is taken to a maintenance shop for servicing.

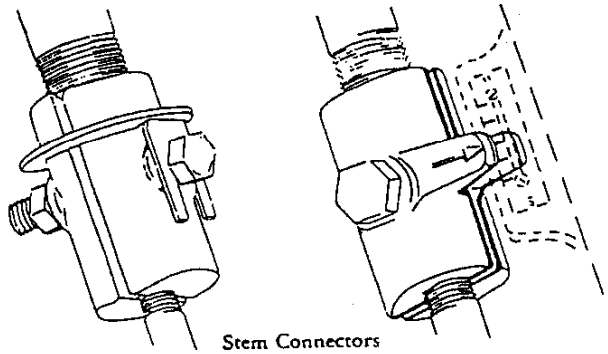
II. REMOVAL OF ACTUATOR FROM BODY ASSEMBLY

NOTE: The valve plug must be off the seat ring while the stem connector is being separated—apply air to the actuator if necessary.

A. Remove any existing checknut or other attachment from the end of the stem connector cap screw.

B. Separating the Stem Connector (Split-coupling)

1. Type I—with separate brass ring travel indicator
   a.) Unscrew the connector screw enough to release the slotted tongue of the travel indicator, then slide the indicator ring above the top of the connector.
   b.) Remove the connector cap screw to free the connector halves, then remove the connector halves and travel indicator.
2. Type II—with integral travel indicator fingers
   a.) Unscrew the connector screw and remove the halves of the connector.
   b.) Remove the rubber dust boot from the end of the actuator packing box.



Stem Connectors

Type I—With brass travel indicator ring

Type II—With integral indicator fingers

C. Dismounting the Actuator

The actuator is removed from the body as a unit, without disturbing the packing box bolting. Clamp nut and actuator yoke will pass over the packing flange.

1. Disconnect the air supply and/or any electrical connections to the actuator.
2. Unscrew the hammer lug clamp nut (25) from the bonnet threads and lift the nut over the plug stem.
3. Lift or hoist the actuator unit off the valve, taking care to avoid damaging the plug stem, instruments, or tubing.

III. DISASSEMBLY OF VALVE BODY

A. Removing Packing

1. Unscrew the packing flange nuts (24), and remove packing flange (15) and packing follower (14).
2. Remove the upper body stud nuts (10) and lift the bonnet (2) carefully over the plug stem. Discard the body gasket (4).
3. Using a narrow hook or bent wire, remove the packing rings.
4. Clean the packing box thoroughly before replacing packing as instructed on Page 6.

B. Removing Valve Trim (Complete Disassembly)

After disassembling the bonnet as per the preceding Paragraph A, the body assembly of Push-Stem-to-Open valves should be inverted for convenience in following the next three Steps.

1. Remove the bottom flange (3) and discard the lower body gasket (4).
2. Remove the valve plug and stem assembly (6 & 8) from the body.
   a.) If plug or stem is to be remachined or replaced, drive out the plug stem pin (19) and unscrew the stem.
3. Unscrew and remove the seat ring(s).

NOTES: (a) Seat rings should be removed only for remachining or replacement. They should not be removed for cleaning purposes. (b) For some applications seat rings are tack-welded (to prevent spin-out) in addition to the threading. A visual check for evidence of welding should be made. (c) Special Hammel-Dahl wrenches are available for seat removal. (d) A lathe or boring mill can be used for unscrewing seat rings. (e) Heating the valve body or chilling the seat rings may be required to loosen extremely tight seats.

4. Upper and lower guide bushings (18) should be removed from bonnet (2) and bottom flange (3) only for replacement. A stud welded into the guide will serve as a jackscrew puller.

IV. ASSEMBLY OF VALVE BODY

The body of Push-Stem-to-Open valve should be inverted for assembly convenience.

A. Installing Seat Ring(s)

1. Clean the inside of the body thoroughly—particularly the seat ring bridge threads.
2. Apply compound to the threads of the seat ring(s) as follows:
   a.) Nominal valve sizes ½" thru 1½"—use good grade pipe compound.
   b.) Nominal valve sizes 2" thru 8" (and on sizes ½"–1½" when such valves have a radiation fin bonnet)—use litharge and glycerin.
3. Screw the seat ring(s) tightly into the body—smaller seat first on double seated valves—then clean up the excess compound.

NOTE: Hammel-Dahl wrenches are available for tightening seat rings.

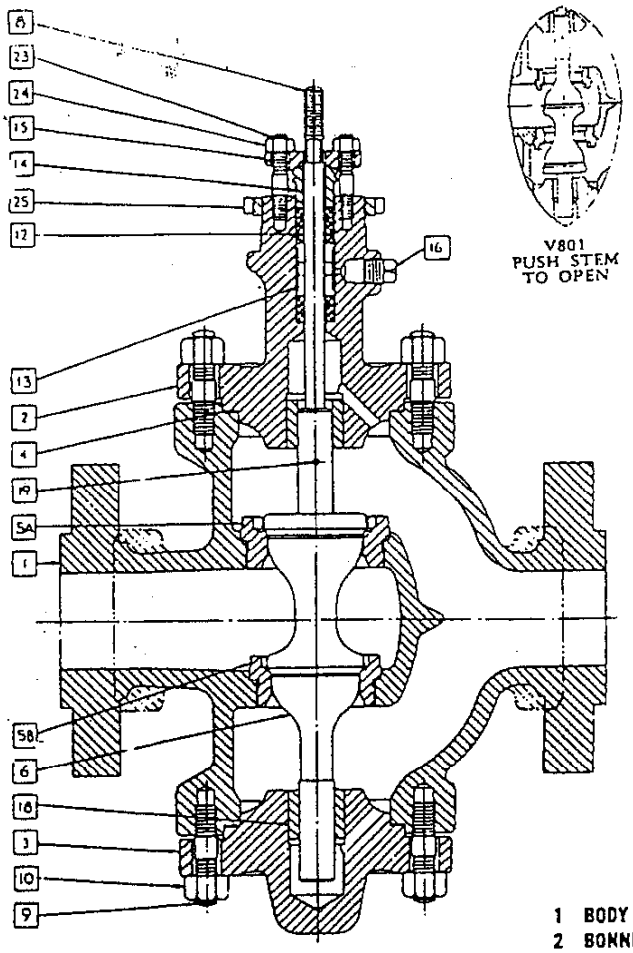
B. Assembling Plug and Stem

Trim is usually renewed as a unit—plug, stem, and seat(s)—but any one of the parts may be replaced separately.

1. A new plug and stem are pinned together at the factory. If only one of these parts is to be renewed or if either part has been remachined: (a) Screw the stem tightly into the plug. (b) Drill through the plug shank and stem, then countersink the hole at both ends. (c) Insert and peen the pin, then machine the pin flush with the plug shank surface. NOTE: The new pin diameter should be the same as the original pin.

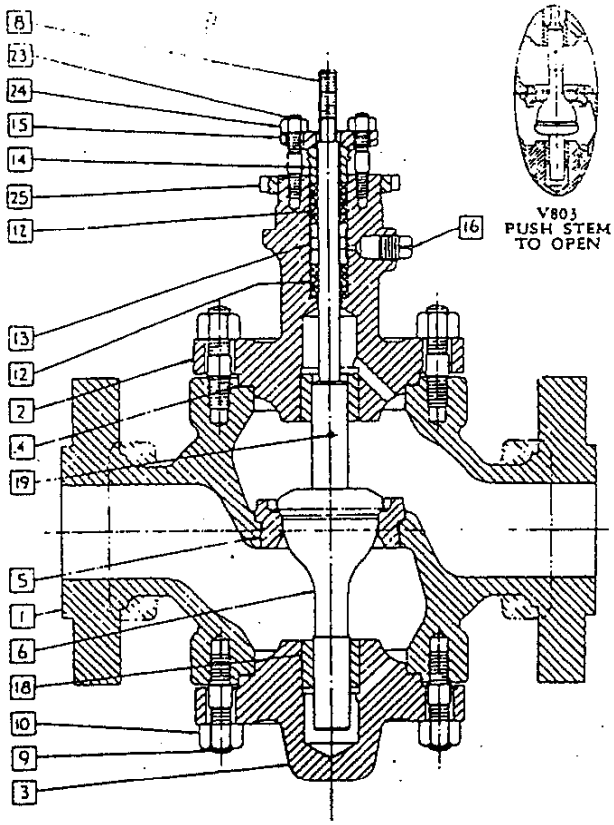
C. Lapping the Plug and Seat

1. If plug and/or seat has been remachined or replaced, the members must be lapped together as directed on Page 5 of this booklet.



V801
PUSH STEM
TO OPEN

V800
PULL STEM TO OPEN



V803
PUSH STEM
TO OPEN

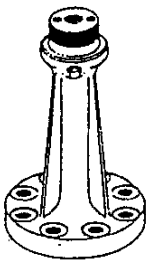
V802 PULL STEM TO OPEN

PARTS LIST

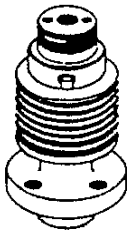
1 BODY	9 BODY STUD	18 GUIDE BUSHING
2 BONNET	10 BODY STUD NUT	*19 PLUG STEM PIN
3 BOTTOM FLANGE	*12 PACKING RING	23 PACKING STUD
*4 BONNET GASKET	*13 LANTERN RING	24 PACKING NUT
*5A UPPER SEAT RING	14 PACKING FOLLOWER	25 CLAMP NUT
*5B LOWER SEAT RING	15 PACKING FLANGE	
*6 VALVE PLUG	16 BONNET LUB. PLUG	
8 PLUG STEM	17 BONNET FLUSH. CONN. PLUG	

*RECOMMENDED SPARE PARTS

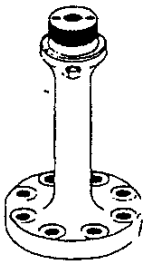
BONNETS



Radiation Fin
1¼"—8"

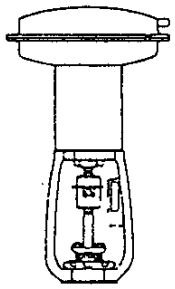


Radiation Fin
½"—1"

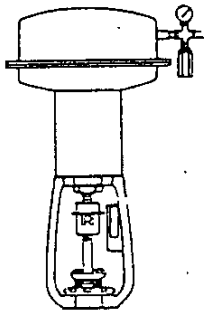


Extension Neck
½"—8"

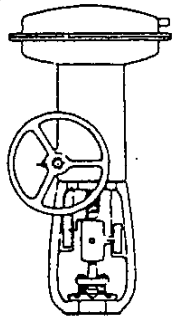
ACTUATOR IDENTIFICATION



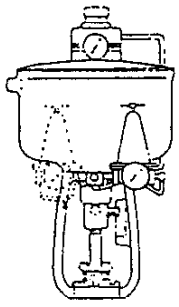
Diaphragm



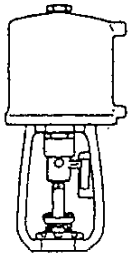
Preloaded



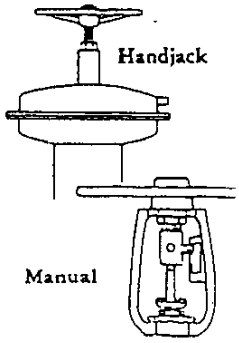
Diaphragm with Side-Mounted Handwheel



Positioning Piston



On-Off Piston



D. Completing Body Assembly

1. If worn guide bushings (18) have been removed, press new bushings into the bonnet (2) and bottom flange (3).
2. Pull-Stem-to-Open Assembly
   a.) Place a new body gasket (4) on the shoulder of the bottom flange (3), then bolt the bottom flange to the body. Tighten all nuts evenly.
   b.) Lower the plug and stem assembly into the body, guiding the lower plug shank into the lower guide bushing (18).
3. Push-Stem-to-Open Assembly
   a.) With the body inverted, lower the plug and stem assembly into the body so that the plug rests on the seat.
   b.) Place a new gasket (4) on the body shoulder, then bolt the bottom flange evenly and securely to the body.
   c.) Turn the valve body upright for bonnet installation.
4. Place a new bonnet gasket (4) on the body, and lower the bonnet carefully over the plug stem to its place on the body.
5. Bolt the bonnet evenly and securely to the body.
6. Install new packing as per the applicable instructions on Page 6.

V. MOUNTING THE ACTUATOR

Assemble and adjust the actuator as instructed in the appropriate Actuator Instructions.

A. Lower the actuator over the plug stem and packing flange to seat squarely on the bonnet shoulder.

B. Rotate the actuator to a convenient position, then screw the hammer lug clamp nut (25) onto the valve bonnet threads and tighten it securely.

C. Connecting Actuator Stem to Valve Plug Stem

The valve plug must be on its seat while the actuator stem is being connected: On Pull-Stem-to-Open valves, the actuator stem must be at its lowest position of travel. On Push-Stem-to-Open valves the actuator stem must be at its highest position, and the valve plug must be raised and held against the seat. (In large valves a wooden lever may be inserted through a line connection for jacking the plug.)

1. Type I Stem Connector—with separate brass ring travel indicator
   a.) Place the brass travel indicator (tongue downward) on the actuator stem. Tape the indicator to the actuator stem temporarily while the stem connector is being applied.
   b.) Press the half of the stem connector which is threaded for the connector cap screw against the actuator stem and valve plug stem so that: (1) The ends of the stems are equidistant from the tapped connector screw hole, and (2) The tapped connector screw hole is on the same side of the actuator as the positioner or other accessories which may require attachment to the connector screw.

NOTE: It may be necessary to move the valve plug off its seat a slight distance in order to mesh the valve plug stem threads with the lower connector threads.

   c.) Apply the other half of the connector, carefully engaging threads, then insert the connector cap screw and tighten it by hand.
   d.) Slide the travel indicator ring over the connector, and back off the connector cap screw enough to permit the slotted tongue of the indicator to slide behind the cap screw head. Position the indicator approximately opposite the "Shut" marking on the travel indicator scale, then retighten the connector cap screw by hand.
2. Type II Stem Connector—with integral travel indicator fingers
   a.) Push the dust boot upward on the actuator stem while applying the connector.
   b.) Follow Steps b.) and c.) above, for the Type I connector, but note that the indicator fingers of the Type II connector must straddle the indicator scale boss.

D. Establishing Valve Travel and Plug Seating Tension

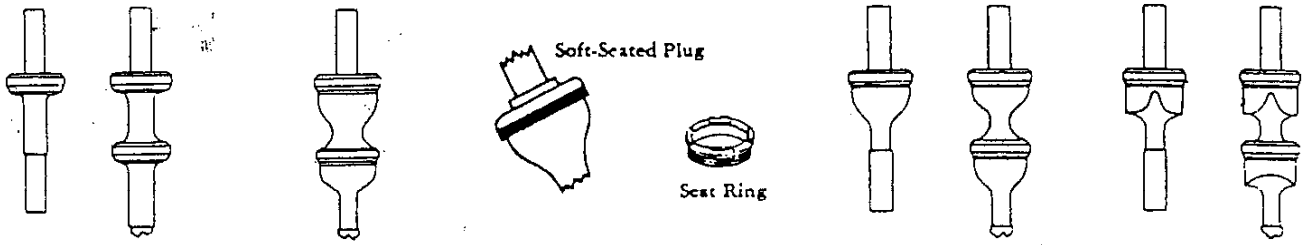
1. Pull-Stem-to-Open Valves
   a.) Maintain the actuator stem at its lowest position of travel.
   b.) In case the plug was moved off the seat during the stem connection procedure: Prevent the stem connector from rotating, then unscrew the valve plug stem from the connector until the plug is firmly seated.
   c.) Move the plug off the seat, then unscrew the valve plug stem an additional one-half turn *out* of the connector to ensure positive seating.
   d.) Tighten the connector cap screw securely.
   e.) Seat the valve plug firmly by means of the actuator.
   f.) Adjust the travel indicator scale so that the "Shut" mark is opposite the travel indicator ring (Type I connector), or finger arrows (Type II connector).
   g.) Disconnect the air line used for assembly procedure, then apply the check nut or attachments (if any) to the connector cap screw.
2. Push-Stem-to-Open Valves
   a.) Maintain the actuator stem at its highest position of travel.
   b.) In case the plug was moved off the seat during the stem connection procedure: Prevent the stem connector from rotating and screw the valve plug stem into the connector until the plug is firmly seated.
   c.) Move the plug off the seat, then screw the valve stem an additional one-half turn *into* the connector to insure positive seating.
   d.) Tighten the connector cap screw securely.
   e.) Seat the valve plug firmly by means of the actuator.
   f.) Adjust the travel indicator scale so that the "Shut" mark is opposite the travel indicator ring (Type I connector), or finger arrows (Type II connector).
   g.) Disconnect the air line used for assembly procedure, then apply the check nut or attachments (if any) to the connector cap screw.

VI. REVERSAL OF VALVE ACTION IN THE FIELD

NOTE: Bellows Seal Valves are not reversible—A new actuator is required if the valve action must be changed.

1. Disassemble the valve as directed under Section III.
2. Drive out the plug stem pin (19) and unscrew the stem.
3. Screw the stem into the other end of the valve plug, then drill a hole through the plug and stem and pin them together. (See Section IV, Paragraph B.)
4. Invert the body so that in reassembling the valve, the bonnet will be fastened to the body flange where the bottom flange was originally.
5. Assemble the valve as directed in Section IV.
6. Invert the travel indicator scale, so that its reading of valve travel is in accordance with the change in action that has been effected.

PLUG IDENTIFICATION



Quick Opening | Intermediate | Linear | Equal Percentage

LAPPING INSTRUCTIONS

I. GENERAL

A. Soft seating material, retained in the valve plug head, provides dead tight shutoff as the soft material is pressed onto the metal seat edge. Soft materials should be replaced when worn, and should never be lapped.

B. Metal-to-metal trim in single and double seated valves should be lapped to ensure minimum leakage when the valve is shut. Lapping can correct shallow scratches or slight roughness only. Excessive lapping produces a groove in the valve plug, therefore plugs or seats having relatively deep scratches must be remachined.

II. MACHINING OF TRIM

A. Plugs or seats having a hard facing such as Stellite can be remachined before being lapped, but care should be taken to leave sufficient hard facing material intact.

B. Plugs should be machined on their seating surfaces only. Machining of the contours or V-Ports will alter the characteristic and rangeability of the trim.

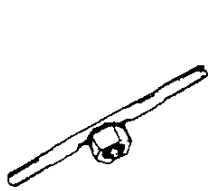
C. Double Seated Plug/Seat Machining

1. Whenever one plug head is machined to restore a seating surface, the other plug head must be machined correspondingly in order to preserve the distance between seating surfaces. Similarly, machining of one seat ring involves machining the other.
2. Changing line temperatures can alter the original distance between seats; therefore, new or remachined trim should be tested for the simultaneous seating of both plug heads:
   a.) Apply template bluing to both plug heads, then seat the plug and turn it gently to mark seat contact in the bluing.
   b.) If one plug head is not contacting its seat, machine the opposite plug head then repeat the bluing test.

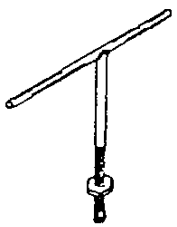
III LAPPING

A. General

1. Grinding compound should be Grade "A" or finer.
2. Apply grinding compound to the *seating surfaces* of the valve plug only. Compound on the characterized portion of the plug could increase the clearance between plug and seat, thus changing the flow characteristic and rangeability of the valve.
3. Thoroughly clean seat rings and plugs before and after lapping.



Lapping tool for Pull-Stem-to-Open valves



Lapping tool for Push-Stem-to-Open valves

B. Fabricating Lapping Tools

1. For Pull-Stem-to-Open Valves, a "T" handle for the valve plug stem can be made by welding a nut (with threading to match the plug stem threads) to the center of a rod.
2. For Push-Stem-to-Open valves, a stem with "T" handle can be made, with the stem threaded to match the tapped axial hole in the valve plug shank.
3. Use a coil spring to support the excessive weight of valve plugs (in valves 8" and larger) during the lapping operation.

C. Lapping Procedure—Single Seated Valves

1. Pull-Stem-to-Open Preparation
   a.) Spot grinding compound on the seating surface of the valve plug and place the plug and stem assembly in the body.
   b.) Place the bonnet on the body (omit body gasket) and hand tighten two opposing body stud nuts (10) to secure the bonnet.
   c.) Install temporary packing so that the valve plug stem will be aligned during the lapping operation. Any rope packing may be used for this purpose.
   d.) Screw a lock nut onto the valve plug stem, then screw the lapping handle onto the stem and lock it in position.
2. Push-Stem-to-Open Preparation
   a.) Follow Step b.), immediately above, then invert the body and follow steps a.) and c.).
   b.) Screw a lock nut onto the stem of the "T" handle lapping tool, then screw the tool stem into the tapped hole in the valve plug shank.
3. Lap with short oscillating strokes. Raise the plug after several strokes, and lower it to another position to ensure an even lap.
4. After a smooth fit has been obtained, disassemble the valve and clean all parts thoroughly to remove traces of grinding compound. Remove the temporary bonnet packing and clean the packing box

D. Lapping Procedure—Double Seated Valves

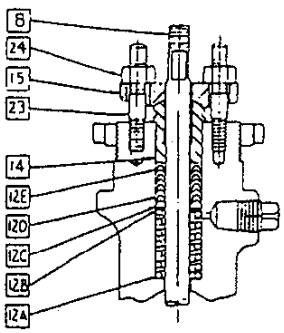
1. After checking for an approximate fit (and machining the trim if necessary) as outlined in Seciton II-C, above: Hold the plug on its seats by hand and apply compressed air to the inlet side of the valve to determine which seat leaks more
2. Prepare the valve for lapping as described in Section III, Paragraph C, above, but apply lapping compound to the plug head which permitted *less* air leakage. Apply a light machine oil to the other plug head.
3. Lap the one plug head until both heads are equally seated, then apply compound to both plug heads and lap them simultaneously until a satisfactory fit is obtained.
4. Disassemble the valve and clean all parts thoroughly to remove traces of grinding compound. Remove the temporary bonnet packing and clean the packing box.

PACKING INSTRUCTIONS

Before proceeding with the appropriate packing operation below, clean the valve packing box thoroughly and assemble the valve body as per Maintenance Section IV. Teflon or Mica packings normally do not require periodic lubrication.

CAUTION: ALL PACKINGS WITHOUT SPRING LOADING — Finger tightening of the packing flange nuts (24) should provide ample sealing pressure to the packing rings. When the valve is placed in service this adjustment should be checked, and the nuts tightened just enough to prevent any leakage. Excessive tightening will bind the valve stem and prevent sensitive response.

SPRING-LOADED CHEVRON TEFLON



1. Lubricate the five teflon rings lightly with silicone lubricant for ease in assembly (one male adapter, one female adapter, and three chevron rings).

2. Slide the compression spring (12A) over the valve plug stem to the bottom of the packing box.

3. Drop the packing washer (12B) over the stem to rest on the packing spring.

4. Place the teflon male adapter (12C) flat side down, against the packing washer (12B), then fit the three chevron rings (12D) into the packing box, with grooved sides down. Seat the female adapter (12E), flat side up, on the topmost chevron ring.

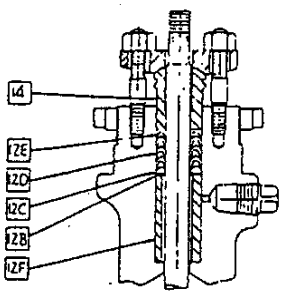
NOTE: Avoid damage to the teflon rings when slipping them over the stem threads, and be sure each ring is pushed firmly into the packing box.

5. Slide the packing follower (14) over the stem to rest on the female adapter.

6. Place the packing flange (15), flat side up, over the stem and flange studs (8 & 23) to rest on the packing follower.

7. Screw the packing flange nuts (24) onto the studs and tighten them evenly until the packing follower shoulder contacts the top of the bonnet. No further packing adjustment is required because packing spring compression maintains the proper sealing pressure on the chevron rings.

CHEVRON TEFLON



1. Lubricate the five teflon rings lightly with silicone lubricant for ease in assembly (one male adapter, one female adapter, and three chevron rings).

2. Slide the packing spacer (12F) over the valve plug stem to the bottom of the packing box.

3. Drop the packing washer (12B) over the stem to rest on the spacer.

4. Place the teflon male adapter (12C) flat side down, against the packing washer (12B), then fit the three chevron rings (12D) into the packing box, with grooved sides down. Seat the female adapter (12E), flat side up, on the topmost chevron ring.

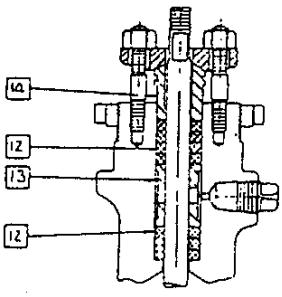
NOTE: Avoid damage to the teflon rings when slipping them over the stem threads, and be sure each ring is pushed firmly into the packing box.

5. Slide the packing follower (14) over the stem to rest on the female adapter.

6. Place the packing flange (15), flat side up, over the stem and flange studs (8 & 23) to rest on the packing follower.

7. Screw the packing flange nuts (24) onto the studs and tighten them evenly to avoid cocking the flange (15). Finger tightening is sufficient.

TEFLON ~~OR MICA~~ IMPREGNATED ASBESTOS



1. For the purpose of assembly only, lubricate the seven packing rings (12) lightly with silicone lubricant.

2. Slide three packing rings over the valve plug stem to the bottom of the packing box.

3. Place the lantern ring (13) on top of the packing. Check to be sure that the channel in the lantern ring is opposite the lubricator hole in the valve bonnet.

4. Insert the remaining four packing rings above lantern ring (13).

5. Slide the packing follower (14) over the stem and guide it into the packing box at least ⅛".

6. Place the packing flange (15), flat side up, over the stem and flange studs (8 & 23) to rest on the packing follower.

7. Screw the packing flange nuts (24) onto the studs and tighten them evenly to avoid cocking the flange (15). Finger tightening is sufficient.