

CARBON STEEL ONLY



LESLIE
CONTROLS, INC.

A subsidiary of CIRCOR International, Inc.
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INSTALLATION, OPERATING, AND MAINTENANCE INSTRUCTIONS DIAGRAMS & PARTS LIST

10/2.5.1
REV. 2

AEROFLOW

CONTROL VALVE BODIES

SIZES 1" - 14", CLASSES 150 - 2500

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**TABLE I
BONNET NUT TORQUE**

VALVE SIZE	PRESSURE CLASS	STUD SIZE*	NUT SIZE**	TORQUE* (ft/lbs) ± 10 %
1"	150 - 600	5/8"	1 1/16"	80
1"	900 - 2500	1"	1 3/8"	340
1 1/2"	150 - 600	5/8"	1 1/16"	80
1 1/2"	900 - 2500	1"	1 3/8"	340
2"	150 - 600	3/4"	1 1/4"	140
2"	900 - 2500	1 1/4"	2"	700
3"	150 - 600	7/8"	1 7/16"	225
3"	900 - 2500	1 1/2"	2 3/8"	1300
4"	150 - 600	3/4"	1 1/4"	140
4"	900 - 1500	1 3/8"	2 3/8"	1000
4"	2500	1 3/4"	2 3/4"	2100
6"	150 - 600	1"	1 5/8"	340
6"	900 - 1500	1 3/4"	2 3/4"	2100
6"	2500	1 3/4"	2 3/4"	2100
8"	150 - 600	1 1/4"	2"	700
8"	900 - 1500	1 3/4"	2 3/4"	2100
8"	2500	2 1/4"	3 1/2"	4700
10"	150 - 600	1 1/2"	2 3/8"	1300
12"	150 - 600	1 3/4"	2"	700
14"	1500	2 1/4"	3 1/2"	4700

* Assumes studs are lubricated

** Torque values for Special Class, Intermediate Class, Intermediate Rated Special Class and Manufacturer Rated Valves should be the same as above based on the stud and nut size.

INSTALLATION

- Before starting installation of the valve/actuator assembly, the units should be unpacked and checked against the packing list and/or the approved customer drawing.
- The AeroFlow valves may be mounted in a pipeline in any orientation, as long as installation and disassembly (removal) dimensions are observed. Final and/or approved customer drawing gives installation and disassembly dimensions. It is recommended (but not required) that the valve be mounted in a horizontal pipe run with the actuator assembly above the body to provide the best possible performance and service orientation.

WELDING VALVE IN PIPELINE

CAUTION!

The piping system must be adequately designed and supported to prevent extraordinary loads to the pressure equipment.

- Prior to installation into the line, it is imperative that the line be free from dirt, weld slag, machining burrs or pipe scale to insure future satisfactory performance of the valve. If, after installation in the line, it is desired to carry out system flushing or back flushing, the valve trim should be removed first in accordance with the Installation, Operation and Maintenance Instruction.

NOTE: When lining up the valve for welding, it is imperative that the flow arrow on the valve body is in the direction of the desired flow.

- When welding a valve with butt weld ends per ANSI B16.25, it is necessary that the portion of the valve 2 to 3 inches from the weld preparation not exceed the design temperature as stated on the nameplate. If the temperature from welding or stress relieving does exceed the design temperature, then it is recommended that the valve be disassembled prior to welding. It is also recommended for valves with butt weld preparations that backing rings or a TIG root pass be employed to minimize the risk of weld slag in the line from initial installation. For all bodies where stress relieving is recommended, it is required that only localized methods be used if the valve was not disassembled. If there are any specific concerns relative to welding into the line, please contact the factory.
- Class 150-600, 1" - 3" valves with slip-on flanges should remain in sling or be supported until flange bolts are tight in pipeline.
- After installation into the pipeline, it is important to NOT insulate any portion of the valve ABOVE the bonnet studs.

PNEUMATIC AND ELECTRICAL CONNECTIONS

Pneumatic

See enclosed instruction sheet/manual for the positioner installed. The following should be considered:

- A clean dry air supply with a filter and pressure regulator.
- Air supply line to be 3/8" O.D. minimum.
- Control signal line to be 1/4" O.D.

Electrical

See enclosed instruction sheet/manual for E/P Positioner, PMC-1 Controller, DPS (Digital Positioner), or other equipment.

STEM ADJUSTMENT

Stem adjustment may be checked by stroking the valve through its full range of travel. The valve seat should be the lower stop and the actuator should be the upper stop. The proper stroke is listed on the valve's name plate (see Fig. 1). Changes in the valve stroke are accomplished by threading the valve stem into or out of the stem coupling/actuator stem. Threading the valve stem further into the coupling will lengthen the stroke. Changes should be made while the valve is away from the two extremes of travel to prevent damage to the seat or actuator. To adjust the stroke properly, it is best to first shorten the stroke to less than the final stroke length. The valve should first be stroked upward away from the seat until contact is made inside the actuator, either by adding full supply to the actuator or by removing

all air depending on the action of the actuator. The travel indicator should be set to indicate full travel. Next, the valve should be stroked until seat contact is made by providing or removing air as required. Note the indication on the travel indicator. If adjustment needs to be made, stroke the valve stem off of the seat and adjust. After proper adjustment is made, make sure all locking screws are tightened.

OPERATION

See name plate (Fig. 1) for valve stroke ("STROKE"), actuator operation ("NORMALLY"), failure mode ("FAIL"), and actuator lower pressure setting ("PRELOAD").

DIRECT-ACTING - (NORMALLY OPEN)

For this construction, a spring provides a force in direction of the valve opening. Therefore, air is supplied to the top chamber of the cylinder actuator to close the valve with increasing air pressure. The actuator spring should be adjusted to just initiate travel from the full open position by application of the lower pressure setting of the bench set ("PRELOAD" entry on nameplate Fig. 1).

REVERSE-ACTING - (NORMALLY CLOSED)

For this construction, the spring provides seating load for the valve plug. Consequently, the size and spring rate of the spring is normally substantially greater than direct-acting actuator springs. Air is supplied in this situation to the lower chamber of the cylinder actuator to open the valve by increasing air pressure. The actuator spring should be adjusted to just initiate travel from the full closed position by application of the lower pressure setting of the bench set ("PRELOAD" entry on nameplate Fig. 1).

DOUBLE-ACTING

For this construction, air is supplied to both the upper and lower chambers of the cylinder actuator. The valve/actuator assembly may be checked for correct operation, i.e., for increasing control signal, the valve opens or closes. (Also, the range may be checked 3 - 15 PSIG, 4 - 20 ma, etc. for full stroke.)

The Aeroflow with double acting piston actuator may also be equipped with a spring biased fail action. That is, the spring provides sufficient force to make the valve go either open or closed under failure mode. The air pressure increases the force in either opening or closing the valve in the normal operation mode. For reverse-acting actuators, this means much higher seating loads (lb./linear inch of seat) may be generated with the addition of air pressure for significantly longer seat life.

MAINTENANCE

VALVE DISASSEMBLY

1. Refer to Table II for recommended parts for inspection and overhaul. Refer to Actuator IOM for particular actuator.

2. Close inlet and outlet stop valves and relieve all pressure from piping involved.

WARNING

Injury or death can occur due to failure to completely isolate valve from all sources of pressure before beginning disassembly. Do not proceed until valve has been completely isolated from the process and vented to atmosphere.

- 3a. NORMALLY OPEN VALVES - Relieve air pressure from top end of cylinder actuator. Remove tubing from upper cylinder connection.
- 3b. NORMALLY CLOSED VALVES - Supply sufficient air to the lower end of the cylinder actuator to keep plug from touching seat.
- 3c. i.) For 13", 16" and 20" diameter actuators: (See Fig. 2) Support valve plug/stem assembly so that it does not fall back onto seat, causing damage to seating surfaces when stem is freed from actuator. Remove two socket head capscrews from actuator/stem adapter to disconnect valve stem from actuator stem. Remove hex head bolts holding actuator yoke to bonnet and lift off actuator. (Eyebolts may be attached to cylinder tie bolts or unit may be lifted with straps.)
ii) For 6" and 10" diameter actuators: remove hex head bolts holding actuator yoke to bonnet, loosen stem nut and rotate actuator to unthread actuator stem from valve stem. (*Note: Use wrench on the flats of the stem to prevent it from turning while rotating actuator.*) Lift off actuator.
4. (See Fig.9) Loosen the valve stem packing to relieve the load on the stem and to prevent damage to the packing upon assembly.
5. (See Fig. 2 & 9) Remove actuator stem adapter (on 13", 16" & 20" actuators only), stem nut, travel indicator, packing flange, and packing follower. (See Fig. 9) On Anti-Vibration Act/Stem Adapter, Loosen two socket head capscrews that lock stem adapter to stem.
6. (See Fig. 3) Remove bonnet nuts and lift bonnet straight up until it clears valve plug stem being careful not to damage threads. Take out bonnet gasket.
- 7a. CAGE THROTTLING (See Fig. 4a - 4f) Lift out valve plug assembly and cage. The 4", 6" and 8" cages may have 3/8" - 16 UNC lifting holes.

CAUTION

Cage can be unintentionally lifted with the bonnet and plug stem assembly. This can result in a dangerous situation where the cage falls from the plug. This could lead to damage or personal injury. Insure that the cage does not lift with the bonnet and plug stem assembly.

- 7b. PLUG THROTTLING (See Fig. 5a-5c) Lift out plug/stem assembly & cage.
- 8a. Class 150-600, 10", 12" & 14". (See Fig. 10B) Remove load ring, seat ring gasket.

- 8b. CLASS 150 - 600, 1" - 8" VALVES (See Fig. 10A) Remove seat ring and seat ring gasket.
- 8c. CLASS 900 - 2500, 1" - 3" VALVES (See Fig. 10A) Remove seat ring and seat ring gasket.
- 8d. CLASS 900-2500 4" - 14" VALVES - (See Fig. 10C)

NOTE: If the seat ring has minor imperfections in the seat area, it may be possible to refinish the seat by lapping without removing seat ring assembly from body. If the seat has major imperfections, or if operational history indicates significant leakage, it will be necessary to replace the seat ring gasket and remachine or replace the seat ring.

To remove the seat ring, loosen screws in load ring with hex key (7/32" for 4" valve, 1/4" for all others). Loosen screws gradually in 2 or 3 steps (1/4 turn per step), moving around the ring going from screw to the next adjacent screw, until all load is removed from seat ring. Remove seat ring retainer with the use of 2 screwdrivers. The first screwdriver is used to pry the notched end of the spiral ring out of its groove and the second screwdriver is used to move the free end of the spiral ring upward. Remove seat ring retainer, seat ring and seat ring gasket.

CAUTION!

Pilot balanced trims contain compressed springs and should be disassembled carefully to prevent injury.

- 9a. PILOT BALANCED VALVE PLUG - Remove piston ring. (Use caution when removing piston rings to prevent damage if they are to be reused.) Before removing pilot/plug stem assembly, check to ensure pilot assembly is loaded against the retaining plate by the spring. Remove socket head capscrews, pilot retaining plate and pilot plug/stem assembly. For 2" & 3" valves, if spring load is present, the spring does not need to be removed. If spring load is not present, grind out tack weld (see Fig. 4A), unthread spring adjusting guide from the plug and remove the spring and the upper spring guide. If threads are damaged, parts will need to be replaced before reassembly. For all other Pilot Balanced Trims see Fig. 4B.
- 9b. HI-GAIN VALVE PLUG - Remove piston ring. (Use caution when removing piston rings to prevent damage if they are to be reused.) Remove socket head capscrews, pilot retaining plate and pilot plug/stem assembly. (Fig. 4F)
- 9c. BALANCED HIGH TEMP VALVE PLUG (See Fig. 4C) Remove piston rings. (Use caution when removing piston rings to prevent damage if they are to be reused.)
- 9d. BALANCED LOW TEMP VALVE PLUG (See Fig. 4D) Remove spiral retaining ring, seal retainer and seal.
- 9e. UNBALANCED VALVE PLUG (See Fig. 4E) Remove piston ring. (Use caution when removing piston rings to prevent damage if they are to be reused.)

- 9f. LINEAR, EQUAL PERCENT, MINI-P AND MICRO TAPER PLUGS (See Fig. 5A, 5B & 5C) No further disassembly is required.

INSPECTION AND CLEANING

1. (See Fig. 9) Remove the old packing from the bonnet and clean and polish the stuffing box with fine grit aluminum oxide cloth.
2. Clean all parts with solvent and remove all scale, dirt or residues.
3. Polish the parts with a fine aluminum oxide cloth, where needed, to remove any foreign matter.
4. Inspect cage bore, valve plug O.D., stem, and seating surfaces on valve plug and seat ring for wear or damage. For trim with pilots, the seat in the valve plug and on the pilot/stem assembly should also be inspected. Any significantly worn or damaged parts should be replaced. See Table II for recommended inspection and overhaul parts. For minor imperfections, the seats may be refinished as follows:

LAPPING-IN OF VALVE PLUG, SEAT RING AND PILOTS

NOTE: Do not install seals or piston rings until lapping is completed.

1. Place seat ring in body recess with seating surface upward. Lower cage into body. Make sure cage fits over raised face of seat ring.
2. Use a small amount of Carborundum Grade "CF" lapping compound or equal, evenly spaced around valve plug seating surface. Carefully insert valve plug into cage until plug contacts seat ring. Lower bonnet over valve stem making sure stem threads are not damaged. Place metal packing ring over valve stem and into bottom of stuffing box to act as guide while lapping plug. Lightly lap plug to seat ring using weight of plug only and by rotating the plug in 1/4 turn increments. Lift and rotate plug 90° three or four times during lapping procedure to ensure even distribution of compound. DO NOT OVERLAP - 10 to 12 turns should be sufficient. Remove parts and clean all traces of compound from parts after lapping. Plug and seat ring contact may be checked by bluing method before reassembly.
3. Pilot/stem assembly may be lapped to plug seat in a similar manner, using the pilot retaining plate (without bolts) as guide.
4. Be sure all gasket faces are clean and smooth. If any gasket faces are steam cut or otherwise damaged and remachining is needed, it is recommended that the valve be returned to a Leslie Controls Authorized Service Center for repair as all critical dimensions must be maintained during the remachining process.

VALVE REASSEMBLY

1. Carefully position a new seat ring gasket in the body recess. Install seat ring with seating surface upward.
- 2a. CLASS 150 - 600, 10", 12" & 14" VALVES (See Fig. 10B) Install load ring on top of seat ring.
- 2b. CLASS 150-600, 1" - 8" VALVES (See Fig. 10A) - A seat ring retainer is not required, proceed to step 3.
- 2c. CLASS 900-2500, 1" - 3" VALVES (See Fig. 10A) - A seat ring retainer is not required.
- 2d. CLASS 900-2500, 4" - 14" VALVES (See Fig. 10C) - Install seat ring retainer. Before placing in the valve, lubricate silver plated set screws with a nickel based anti-seize compound (Never-Seez, Jet Lube, Nikal or equivalent) and install into seat ring retainer with cup point end of set screw flush with bottom surface (surface without steps, See Fig. 10c) of retainer. Position seat ring retainer on top of seat ring flange. (Bolts may be used as handles in two set screw holes to aid in installing seat ring retainer.) When retainer is in place, remove bolts and insert set screws. Grip one end of spiral retaining ring, pull through top body diameter and insert one end into body groove. Work ring into groove until the full ring is installed. To compress the seat ring gasket and load seat ring, tighten set screws per the following procedure to ensure that gasket is fully compressed and evenly loaded.
 - a) Initially tighten set screws finger tight (2-3 ft-lbs).
 - b) Develop the required screw torque by moving around the ring in a screw-to-screw sequence to ensure all screws are equally stressed. Apply the torque in three steps per the following table:

TORQUE (FT-LBS)

STEP	4"	6", 8" & 14"
1	10	15
2	20	30
3	25	35

NOTE: On the final step, it will require moving around the ring several times before the seat gasket is fully compressed. When the gasket is not fully compressed, the first screw torqued will lose much of its load when the torque is rechecked after completing one torquing cycle around the ring. The seat ring and gasket can be considered to be fully seated when, after completing a torquing cycle, the first screw is checked and the tightening torque is within approximately 10% of its initial torque.

- 3a. For all cages, except 4", 6" & 8" Les-Cav, lower cage into body and proceed to step 4.
- 3b. (Ref. Fig. 6) For 4" - 8" Les-Cav cages, an Omni seal with a bronze backing ring must be installed. For ease in assembly, the backing ring should be inserted into the cage counter-bore and held in place with lubricant. The bevel side of the ring must be oriented

as shown in Fig. 6. The omni-seal must be installed around the raised face on the seat ring as shown in Fig. 6. Apply lubricant on the seal and the mating part of the cage. Carefully lower the cage (with backing ring) into the body until it stops at the seal. If necessary, lightly tap the top of the cage until it drops to the position where the top of the cage is flush with the top of the body. Proceed to step 4.

- 4a. PILOT BALANCED VALVE PLUG (See Fig. 4B & 7)
 - a) For valves 4" and larger, install new or inspected original piston ring, carefully expanding ring over the main plug and into the ring groove. The 6" - 12" valves use a pressure balanced piston ring which must be oriented as shown in Figure 8A. Install new pilot springs into the spring holes in the main plug. Assemble stem and pilot plug assembly to main plug with retainer plate and socket head capscrews. Compress springs by tightening capscrews to 25 ft-lbs on the 4" and 6" valves and 60 ft-lbs on the 8" - 12" valves. Tie wire capscrews as shown on Fig. 15.

Important: Failure to tie wire capscrews properly may result in valve trim failure.

b) (See Fig. 4A & 7) For valves 3" and smaller, assemble stem and pilot plug assembly to main plug with retainer plate and socket head capscrews. For the 2" valve, tighten capscrews to 15 ft-lbs. For the 3" valve, tighten the capscrews to 25 ft-lbs. Tie wire capscrews as shown in Figure 7. If disassembled, install spring guide, spring and spring adjusting guide in opposite end of plug. Adjust spring compression to give required load. For the 2" valve this is two turns after spring starts to compress. For the 3" valve, this is 3-1/8 turns after initial compression. Tack weld threads to prevent adjusting guide from unthreading.

- 4b. (HI-GAIN) T² VALVE PLUG (See Fig. 4F & 7) - Install piston ring, carefully expanding ring over the main plug and into ring groove. The 4", 6" & 8" valves use a pressure balanced piston ring which must be oriented as shown in Figure 8A. Assemble stem and pilot plug assembly to main plug with retainer plate and socket head capscrews. For the 2" valve, tighten capscrews to 15 ft-lbs. For 3" and larger valves, tighten capscrews to 25 ft-lbs. Tie wire capscrews as shown on Fig. 7.

Important: Failure to tie wire capscrews properly may result in valve trim failure.

- 4c. BALANCED HIGH TEMP VALVE PLUG (See Fig. 4C) Install piston rings, carefully expanding rings over the main plug and into ring grooves. The 6" and 8" valves use pressure balanced piston rings which must be oriented as shown in Figure 8A or B as applicable.
- 4d. BALANCED LOW TEMP VALVE PLUG (See Fig. 4D) Lubricate teflon seal with O-ring lubricant and carefully install teflon seal over the valve plug. Refer to Fig. 4D for orientation of seal. Install seal retainer over the seal and install spiral retaining ring into groove.

- 4e. UNBALANCED VALVE PLUG (See Fig. 4E) Install piston ring, carefully expanding ring over the main plug and into ring groove.
- 4f. PLUG THROTTLING LINEAR, EQUAL PERCENT, MINI-P AND MICRO TAPER PLUGS (See Fig. 5A - 5C) Guide plug into cage until plug rests on seat ring.
5. For all valves, guide plug into cage until plug rests on seat ring. For all valves containing piston rings, compress piston rings into ring grooves and CAREFULLY guide valve plug assembly into cage until the plug rests on the seat ring. For valves with Balanced Low Temp Plugs, using O-ring lubricant on the seal, CAREFULLY guide valve plug assembly into cage until plug rests on seat ring. The seal can be easily damaged unless it is carefully guided into top of cage.
6. Place new spiral wound bonnet gasket on top of cage-body interface. (For some valves, the cage will initially set about 0.050" higher than the body. The cage will move to its correct height when the bonnet is installed and seat ring gasket is compressed.)
7. Place bonnet over stem and lower onto body, guiding on cage I.D., with packing flange studs in line with body inlet and outlet. Lubricate studs with nickel based anti-seize compound (Jet-Lube, Nikal, Never-Seez or equivalent) and install bonnet nuts finger tight. Nuts must seat on flange. If not remove nut and inspect nut and stub for damage, repair or replace as needed. Tighten in stages, evenly and alternately (criss-cross pattern), to torque values specified in Table I.

NOTE: Clearance between body and bonnet should not be used to determine sufficient bolt load. A raised face on the bonnet flange results in approximately .010" clearance at specified nut torque.

8. STEM PACKING INSTALLATION (See Fig. 9) Place stuffing box ring and packing rings over stem and into packing box in order shown on Fig. 9, one at a time, seating each firmly and using care not to tear rings on the stem threads. For standard packing, adjust packing nuts equally – finger tight plus 1/6 turn (one flat of nut). Never overtighten packing nuts.

Standard Packing Adjustment - During start up, some weepage may be observed. Do not readjust packing (unless major leakage occurs) – allow 15 minutes for pressure/temperature stabilization to occur. If leakage continues, adjust a maximum of 1/6 turn at a time. If pressure is raised considerably, the packing may leak slightly. Do not readjust – leakage will stop when new pressure/ temperature stabilization is reached.

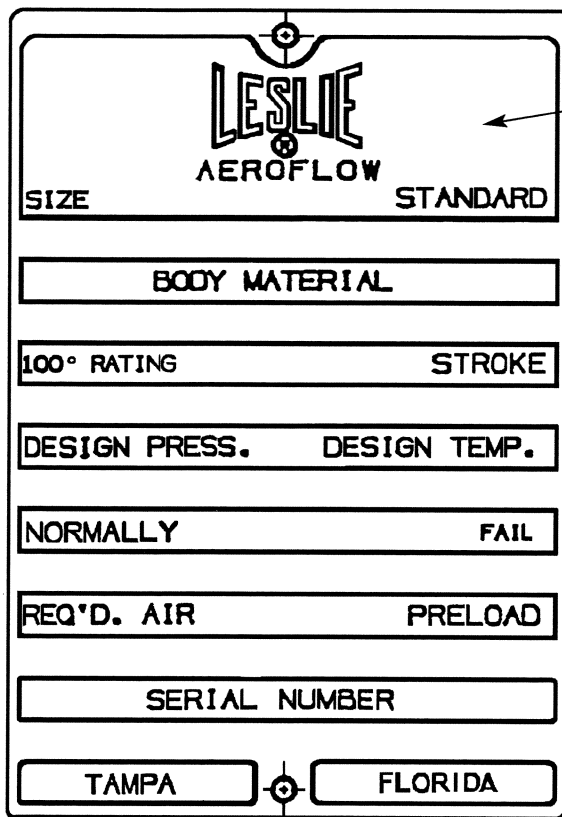
Live Loaded Packing Adjustment - After installing packing as per above, assemble spring packs, follower and packing flange per Fig. 9. Tighten nuts until top washer is flush with spring sleeve per Fig. 9.


Break-In - After packing installation and adjustment the valve must be fully stroked approximately 20 times to break-in (seat) the packing and stabilize stem friction.

TABLE II
PARTS RECOMMENDED FOR INSPECTION AND OVERHAUL

PART	INSPECTION	OVERHAUL
Seat Ring Gasket	X	X
Bonnet Gasket	X	X
Stem/Plug Assembly		X
Stem/Pilot -Pilot Bal & High-Gain Only		X
Main Plug -Plug Bal & High-Gain Only		X
Stem Packing	X	X
Cage		*
Seat Rings		X
Piston Rings	X	X
Springs		X
4" and Larger (900 - 2500)		
Spiral Retaining Ring		X
Seat Ring Retainer		X
Set Screws		X

* If required per inspection.



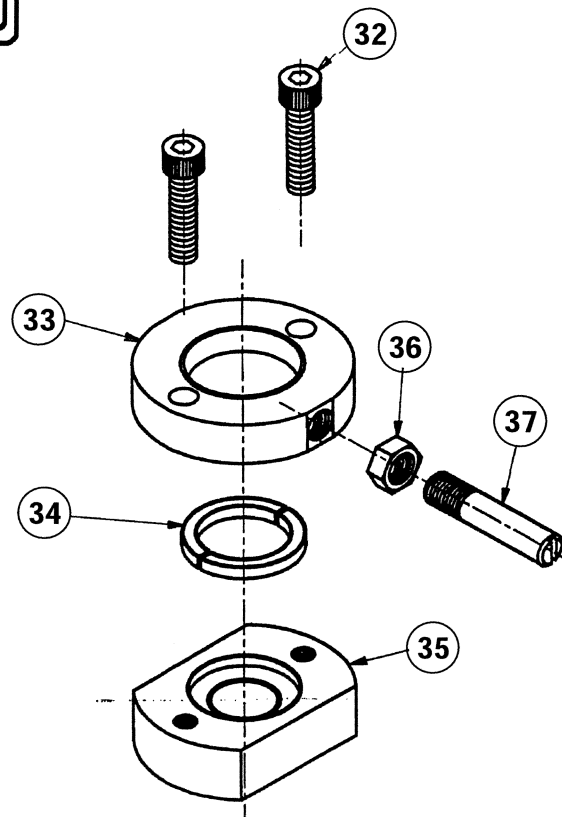

LESLE
 AEROFLOW
 SIZE STANDARD

BODY MATERIAL	
100° RATING	STROKE
DESIGN PRESS.	DESIGN TEMP.
NORMALLY	FAIL
REQ'D. AIR	PRELOAD
SERIAL NUMBER	
TAMPA	FLORIDA

38

See
PARTS LIST
on
Back Cover

FIG. 1
NAME PLATE



32

33

36

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34

35

FIG. 2
ACTUATOR/STEM ADAPTER FOR
13", 16" AND 20" PISTON ACTUATORS

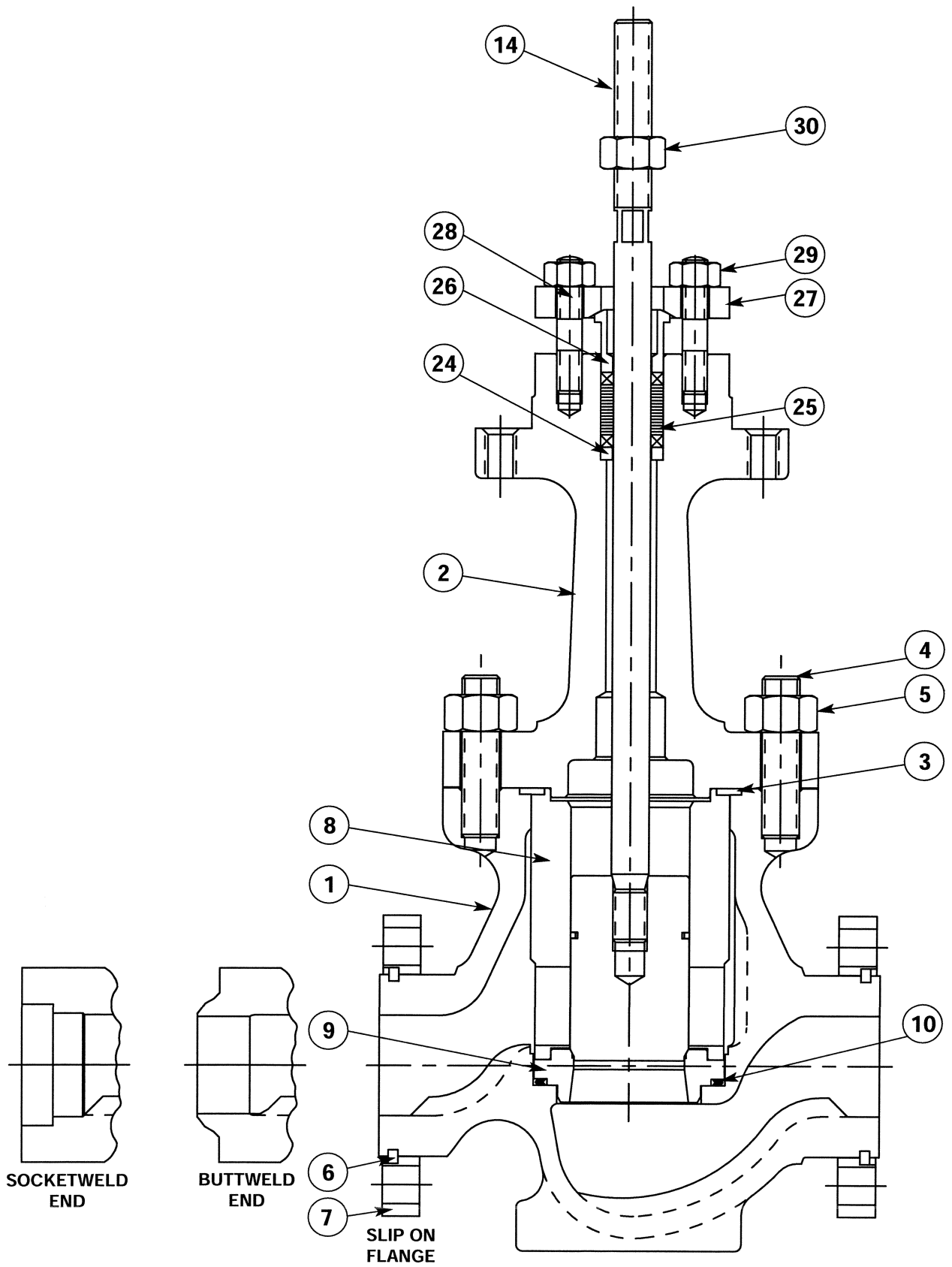


FIG. 3
VALVE BODY

FIG. 4A
PILOT BALANCED TRIM FOR VALVE
SIZES 2" & 3" ALL CLASSES

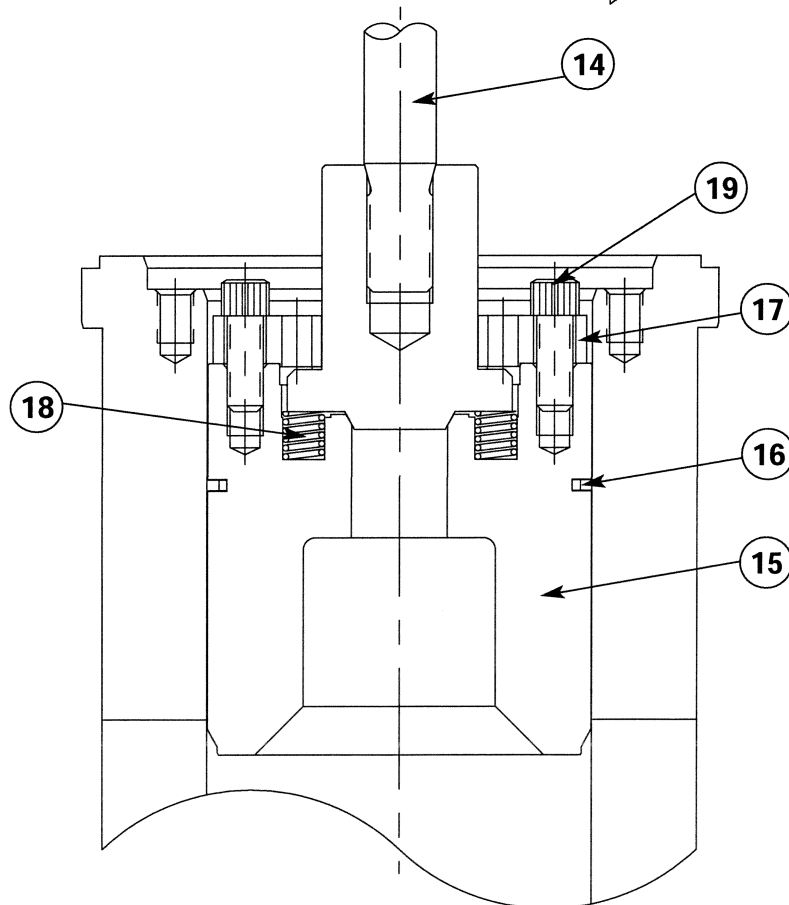
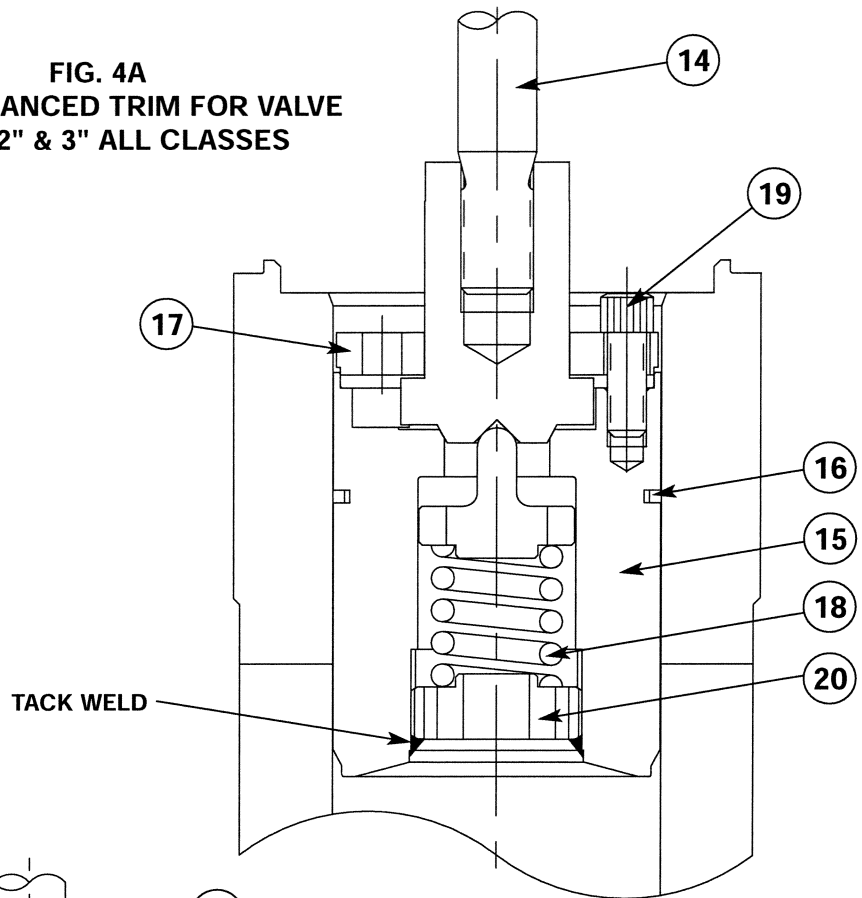


FIG. 4B
PILOT BALANCED TRIM
FOR VALVE SIZES 4" - 14"
ALL CLASSES

FIG. 4C
BALANCED HIGH TEMP TRIM
FOR VALVE SIZES 2" - 14"
ALL CLASSES

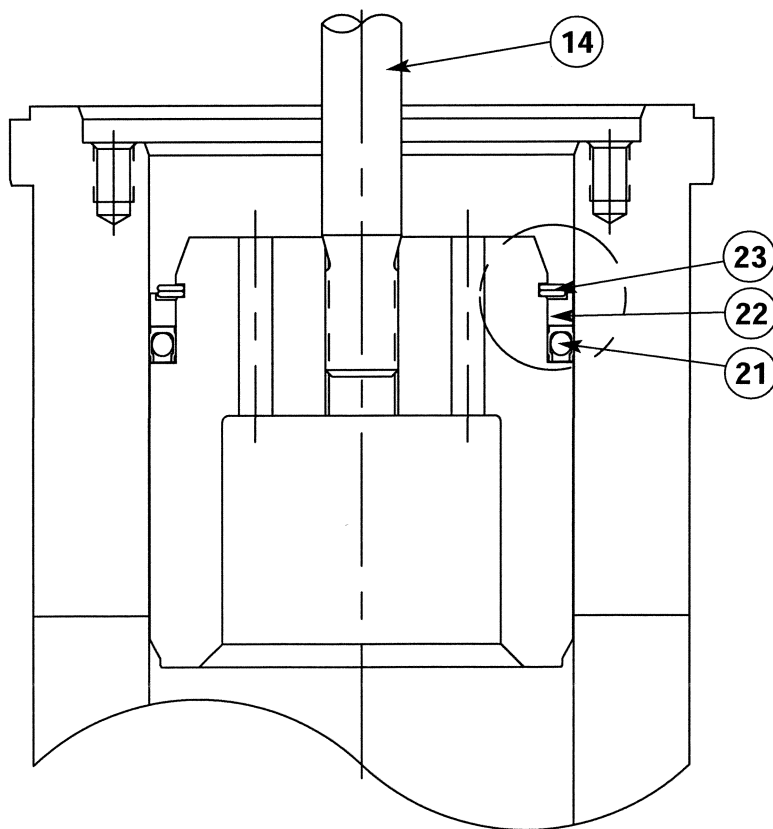
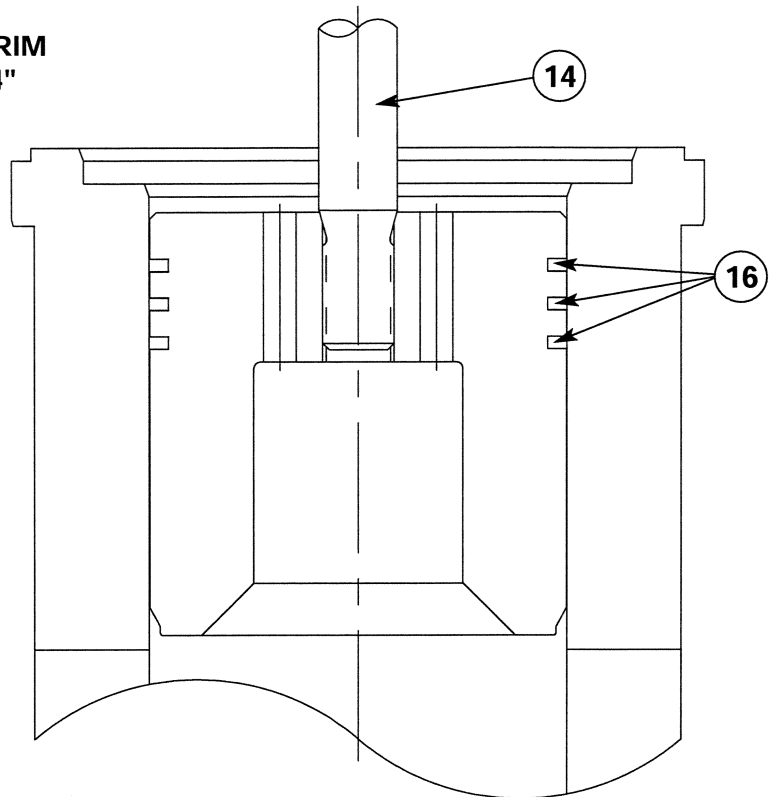
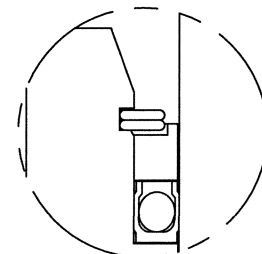
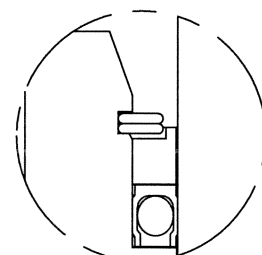


FIG. 4D
BALANCED LOW TEMP TRIM
FOR VALVE SIZES 2" - 14"
ALL CLASSES



FLOW UNDER SEAT



FLOW OVER SEAT

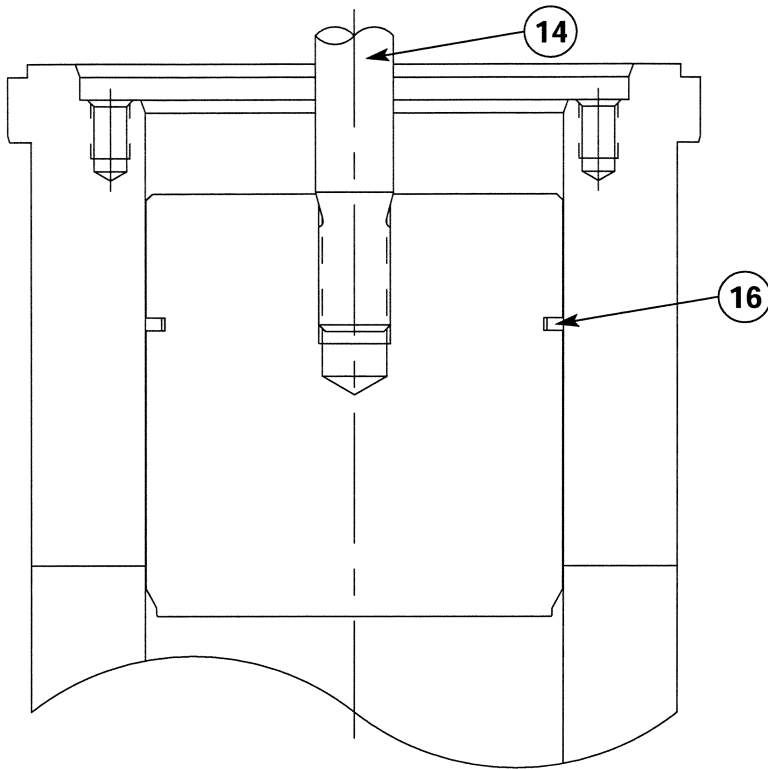
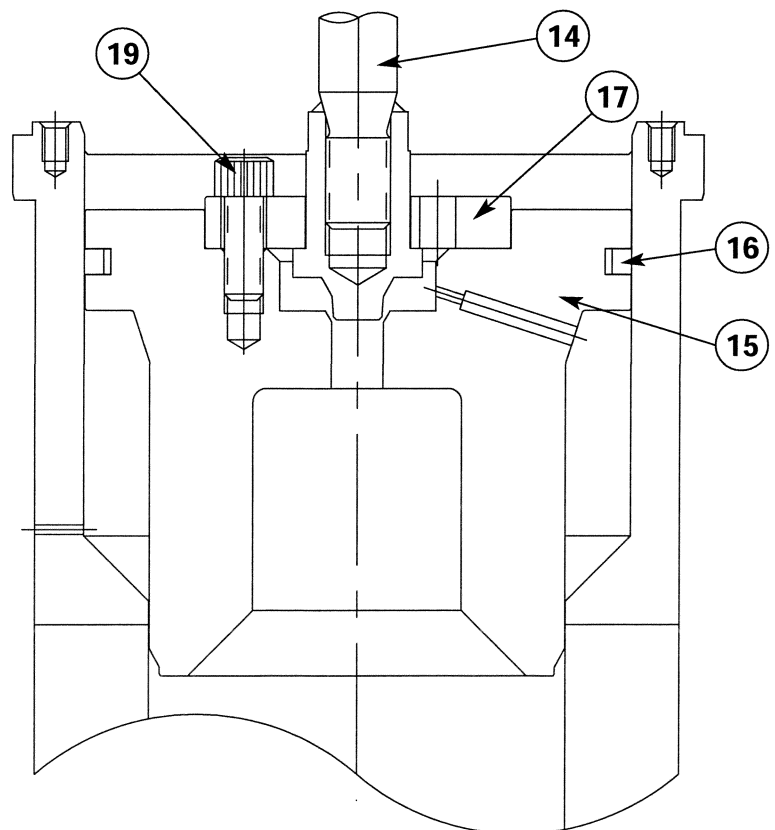


FIG. 4E
UNBALANCED TRIM
FOR VALVE SIZES 2" - 14"
ALL CLASSES

FIG. 4F
T² (HI-GAIN) TRIM
FOR VALVE SIZES 2" - 14"
ALL CLASSES



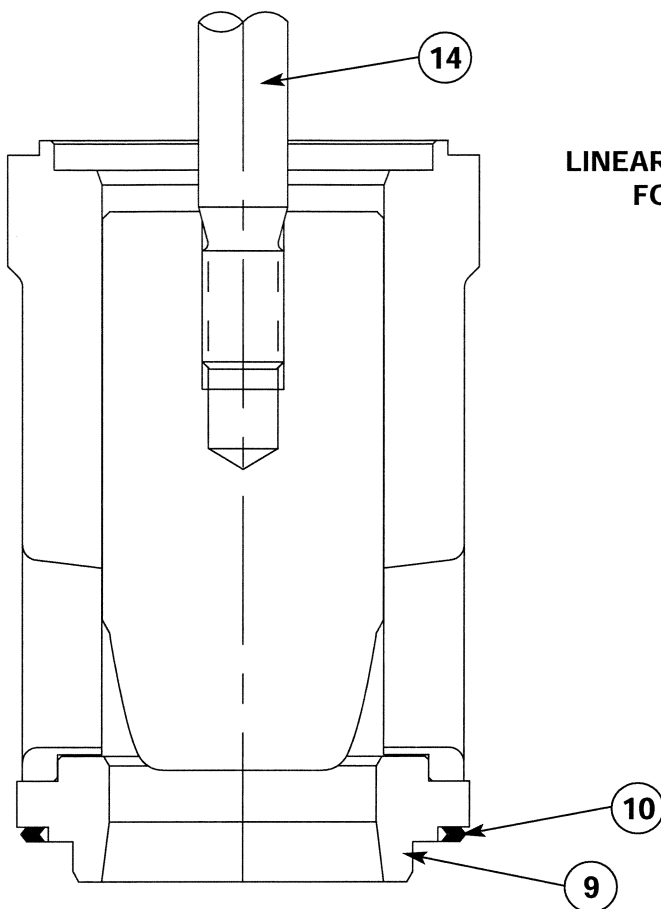
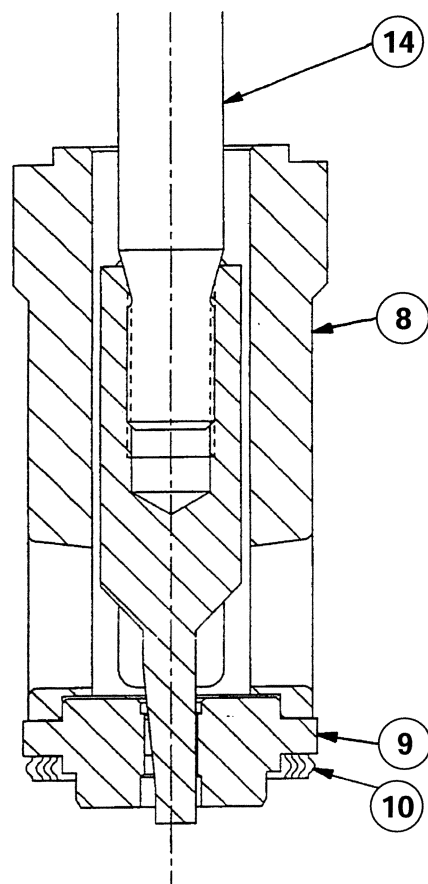


FIG. 5A
PLUG THROTTLING-
LINEAR & EQUAL PERCENT UNBALANCED
FOR VALVE SIZES 1", 1½", 2" & 3"
ALL CLASSES

FIG. 5B
PLUG THROTTLING-MICROTAPER
FOR VALVE SIZES 1", 1½" & 2"
ALL CLASSES



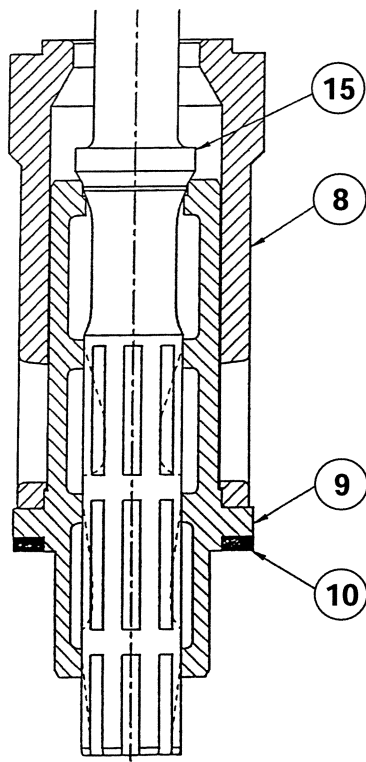


FIG. 5C
PLUG THROTTLING - MINI-P
FOR VALVES SIZES 1", 1½" & 2"
CLASS 150 - 2500

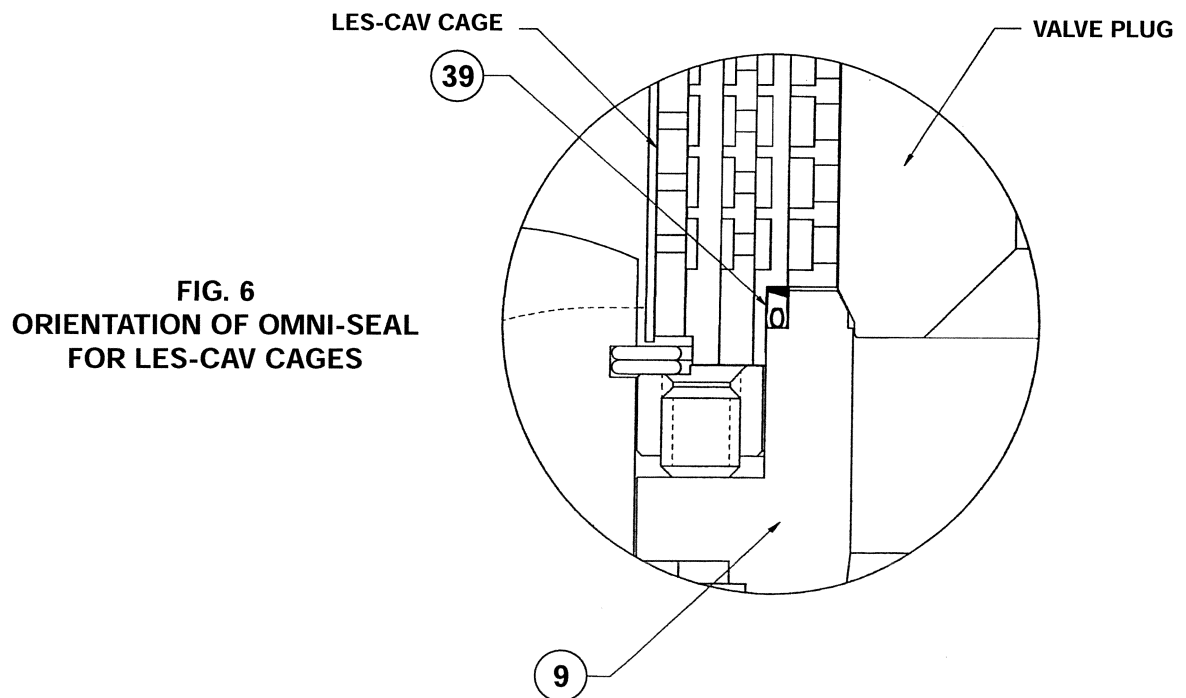


FIG. 6
ORIENTATION OF OMNI-SEAL
FOR LES-CAV CAGES

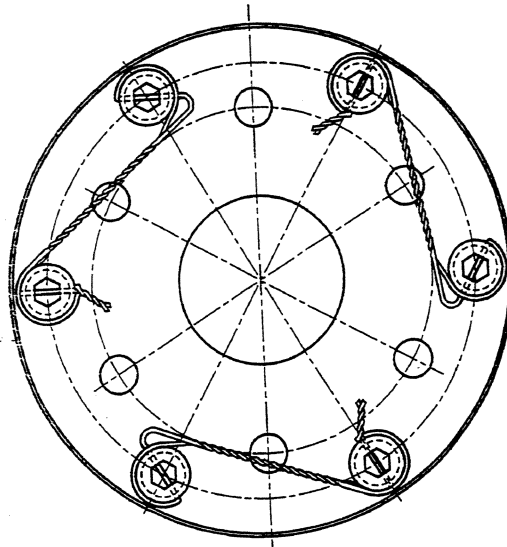


FIG. 7
TYPICAL CAPSCREW TIE WIRE CONFIGURATION

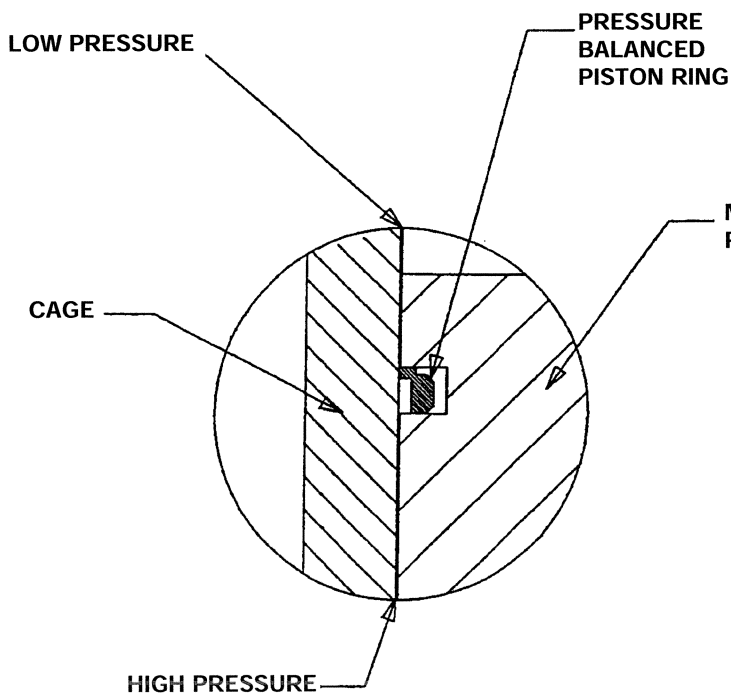


FIG. 8A
PRESSURE ASSISTED PISTON RING
ORIENTATION
4" T² (HI-GAIN) AND ALL 6" - 14" TRIM -
OVER SEAT FLOW

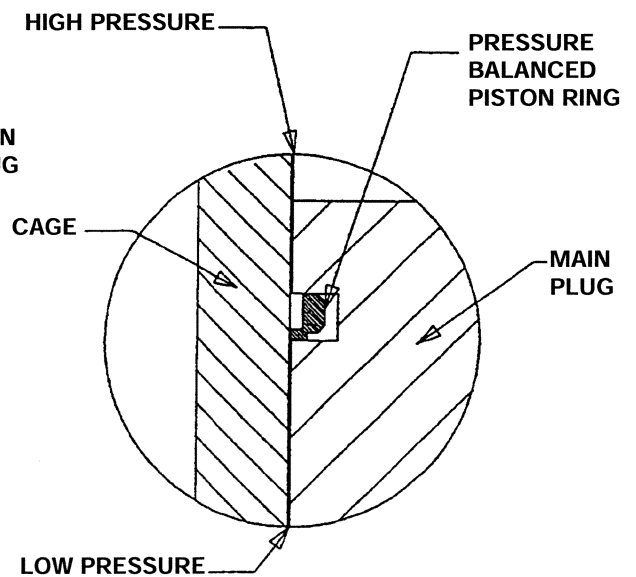
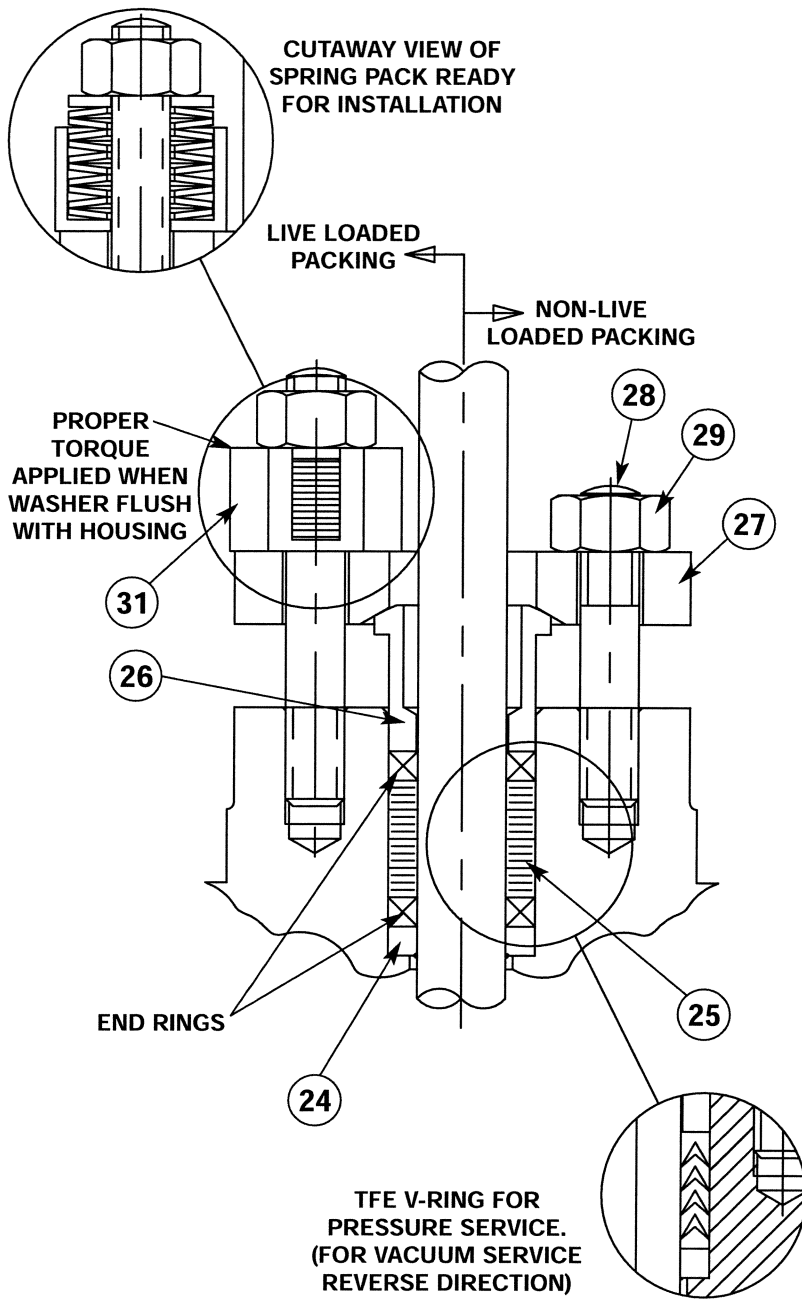
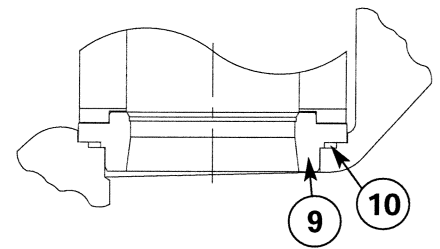


FIG. 8B
PRESSURE ASSISTED PISTON RING
ORIENTATION
ALL 6" - 14" TRIM -
UNDER SEAT FLOW

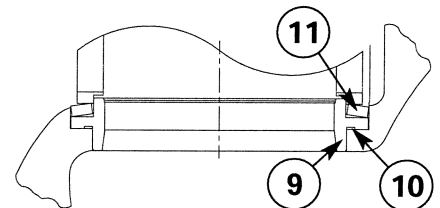


VALVE SIZE	STEM SIZE	NO. OF GRAFOIL RINGS	NO. OF BRAIDED TFE GRAPHITE RINGS	NO. OF END RINGS
1", 1½", 2", 3", 4"	½"	3	4	2
1", 1½", 2", 3", 4"	¾"	4	5	2
6"	½"	3	4	4
6"	1"	3	4	2
8" - 14"	¾"	3	4	2
8" - 14"	1¼"	5	6	2

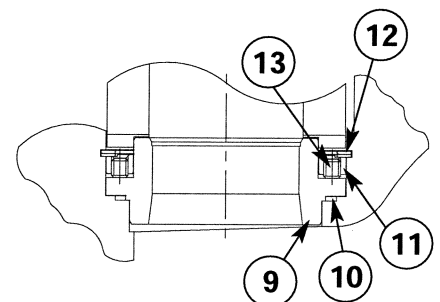
**FIG. 9
PACKING SEQUENCE**



**FIG. 10A
CAGE RETAINED
SIZES 1" - 8", CLASS 150-600 &
SIZES 1" - 3", CLASS 900-2500**



**FIG. 10B
LOAD RING
SIZES 10" - 14"
CLASS 150-600**



**FIG. 10C
SEAT RING RETAINED
SIZES 4" - 14"
CLASS 900-2500**

AEROFLOW PRODUCT PARTS LIST	
1	Valve Body
2	Bonnet
3	Body/Bonnet Gasket
4	Bonnet Stud
5	Bonnet Nut
6	Flange Split Ring
7	Flange
8	Cage
9	Seat Ring
10	Seat Ring Gasket
11	Load Ring
12	Seat Ring Retainer
13	Load Ring Screw
14	Pilot Plug/Stem Assembly
15	Main Plug
16	Piston Ring
17	Pilot Retaining Plate
18	Pilot Spring
19	Socket Head Cap Screw
20	Spring Adjusting Guide
21	Seal
22	Seal Retainer
23	Spiral Retaining Ring
24	Stem Guide/Packing Box Ring
25	Packing
26	Packing Follower
27	Packing Flange
28	Packing Stud
29	Packing Nut
30	Stem Adjusting Nut
31	Live Loaded Packing Spring Assembly
32	Socket Head Cap Screw
33	Clamp Plate
34	Split Ring
35	Stem Adapter
36	Hex Nut
37	Travel Indicator/Anti-Rotation Pin
38	Name Plate
39	Omni-Seal w/Back-Up Ring
40	Nameplate Drive Screw (not shown)

It is solely the responsibility of the system designer and the user to select products and materials suitable for their specific application requirements and to ensure proper installation, operation and maintenance of these products. Assistance shall be afforded with the selection of the materials based on the technical information supplied to Leslie Controls, Inc.; however, the system designer and user retain final responsibility. The designer should consider applicable Codes, material compatibility, product ratings and application details in the selection and application. Improper selection, application or use of the products described herein can cause personal injury or property damage. If the designer or user intends to use the product for an application or use other than originally specified, he must reconfirm that the selection is suitable for the new operating conditions.

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