

DWN	S.WILLIS	9-09-96	<b>MANUAL - MAINTENANCE</b> <b>BV1 TANK BLANKETING VALVE</b>		
CHK	C.PORTER	10-31-96			
APPR	D.MCGEE	10-31-96			
APPR	G.FEHLER	10-31-96	SIZE	REPORT NUMBER	REV
APPR			A	05.9040.252	E
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REVISIONS		
REV.	DESCRIPTION	APPROVALS/DATE
A	ECR #96-318-10 Revised entire report.	S.WILLIS 12-02-96 C.PORTER 12-03-96 D.MCGEE 12-03-96
B	ECR #97-227-03	S.WILLIS 8-22-97 C.PORTER 8-23-97 D.MCGEE 8-25-97
C	ECR #97-283-06	S.WILLIS 10-14-97 C.TURNER 11-20-97 D.MCGEE 11-20-97
D	ECN #00-0804 Revised entire report.	S.WILLIS 6-05-00 D.WYANT 6-07-00 E.TEZZO 6-08-00
E	ECN #01-1070	S.WILLIS 7-30-01 S.CONNALLY 7-30-01 E.TEZZO 7-31-01

## **INSTRUCTIONS – MAINTENANCE FOR BV-1 TANK BLANKETING VALVE**

The intent of these instructions is to acquaint the user with the storage, installation and operation of this product. **Please read these instructions carefully before installation.**

### **WARNING**

Removal of the seal wires in an attempt to adjust and/or repair this product by unauthorized or unqualified persons voids the product warranty and may cause damage to equipment and serious injury or death to persons.

The product is a safety related component intended for use in critical applications. The improper application, installation or maintenance of the product or the use of parts or components not manufactured by Anderson Greenwood Crosby may result in a failure of the product.

Any installation, maintenance, adjustment, test, etc. performed on the Product must be done in accordance with the requirements of all applicable Anderson Greenwood Crosby Procedures and Instructions as well as applicable National and International Codes and Standards.

### **SAFETY PRECAUTIONS**

When the pressure relief valve is under pressure never place any part of your body near the pilot exhaust nor the outlet of the main valve.

The main valve outlet should be piped or vented to a safe location.

Always wear proper safety gear to protect head, eyes, ears, etc. anytime you are near pressurized valves.

Never attempt to remove the pressure relief valve from a system that is pressurized.

Never make adjustments to or perform maintenance on the pressure relief valve while in service unless the valve is isolated from the system pressure. If not properly isolated from the system pressure, the pressure relief valve may inadvertently open resulting in serious injury.

Remove the pressure relief valve prior to performing any pressure testing of the system.

The safety of lives and property often depends on the proper operation of the pressure relief valve. The valve must be maintained according to appropriate instructions and must be periodically tested and reconditioned to ensure correct function.

### **STORAGE AND HANDLING**

Pressure relief valve performance may be adversely affected if the valve is stored for an extended period without proper protection. Rough handling and dirt may damage, deform, or cause misalignment of valve parts and may alter the pressure setting and adversely affect valve performance and seat tightness. It is recommended that the valve be stored in the original shipping container in a warehouse or as a minimum on a dry surface with a protective covering until installation. Inlet and outlet protectors should remain in place until the valve is ready to be installed in the system.

## 1.0 GENERAL VALVE DESCRIPTION

The AGCO tank blanketing valve is a pilot operated piston type valve and uses only system pressure for operation and control. It consists of a main valve with an integral pilot.

The BV1 tank blanketing valve is designed to reduce inlet pressures of 15 psi to 200 psi to regulated tank pressures from 0.5" WC to 6.0 psig.

## 2.0 BV1 PILOT (Reference Figures 1 and 2)

The BV1 pilot may be maintained without removing the valve from the piping if desired.

### 2.1 Disassembly

2.1.1 Depressurize the unit and back off the adjusting screw (490) on the spring bonnet (450) to relieve spring compression. Remove the case bolts (270 & 300) to access the sense diaphragm (360).

2.1.2 Loosen the plug (120) from the bottom of the body (10) and slowly remove it. There is a spring (140) pushing against it. The remainder of the pilot internal parts should be free to fall out once the spring is removed.

To disassemble the sleeve (150) from the nozzle (130), remove the spindle (180) and crossbar (210).

To remove the o-ring seat (220), push the nozzle retainer (230) toward the small end of the nozzle (130) to expose the o-ring for removal.

- 2.1.3 If there is tubing on the side of the valve opposite the port identification, the BV1 has the internal purge option. The purge orifice may be inspected by removing the tube fitting (510) at the pilot end of the valve body. The orifice is in the 1/8 NPT socket head pipe plug (590) behind the tube fitting. An additional orifice is located inside the sense port at the back. (Refer to Figure 4)

**WARNING:** These orifices must be in place or replaced by plugs for the BV1 to operate properly. If they are omitted, the valve will flow full open.

## 2.2 Assembly

Assemble in the reverse order of disassembly. All static o-ring seals, screw threads, and spring washer pivot points should be lightly greased with Dow Corning No. 33 Silicone grease or its equivalent. Pipe threads should be wrapped with Teflon tape or sparingly coated with an appropriate thread sealing compound. Observe the following when assembling the BV1 pilot.

- 2.2.1 The nozzle retainer (230), seat o-ring (220), nozzle (130), sleeve (150), cross bar (210), and spindle (180) must be preassembled before installation into the body. Refer to Figure 2.
- 2.2.2 Place the pilot nozzle seal o-ring (240) into the base of the pilot cavity in the body (10). Put the pilot sleeve spring (140), pilot o-ring retainer (160), sleeve seal o-ring (170), nozzle retainer spring (200), and the nozzle/sleeve subassembly into the body plug (120).

Insert this assembly carefully into the pilot cavity, taking care to put the spindle (180) through the hole in the body before tightening the plug into place.

2.2.3 Insert the diaphragm case seal o-ring (260) into the groove in the body flange before replacing the lower diaphragm case (350). Check that the o-rings (380) are in place on the seal bolts (390) before fastening the diaphragm case to the body flange.

2.2.4 Preassemble the diaphragm (360) between the diaphragm plates (370) with the bolt (430), lock washer (320), spring washer (410), actuator seal (610), and actuator (250), and place it into the lower case.

2.2.5 Install the teflon strip gasket (340) in position on the lower diaphragm case (350), placing adhesive side against the lower diaphragm case. Begin at the large bolt hole in the case and work around the case keeping the gasket inside the bolt holes, approximately 1/8", and end by crossing the gasket over its own start point with approximately 1/2" overlap.

### 3.0 BV1 MAIN VALVE

#### 3.1 Disassembly

The inlet piping must be removed to disassemble the main valve in the field, otherwise remove the valve and disassemble it in the shop.

3.1.1 Place the body in a vise and loosen the nozzle bushing (40). If the nozzle bushing has an inlet flange (110) installed, it does not need to be removed to maintain the main valve. Unscrew the bushing slowly as the piston spring (60) is pushing the piston (20) against it. Inspect the inside corner of the nozzle face. It is a sealing face and nicks or scratches may cause leaks from the main valve seal.

- 3.1.2 Remove the piston seal o-ring (100). Unscrew the seat retainer/flow cage (30) from the piston (20). The seat o-ring (90) can then be removed.

**WARNING:** Clamp the piston only on the larger outside diameter adjacent to the seat retainer/flow cage. Avoid clamping or scratches anywhere along the piston's outside diameter surfaces either side of the o-ring groove. Scratches anywhere on these surfaces may create gall points on the sliding surface.

- 3.1.3 The screen filter (50) is permanently swaged into the seat retainer/flow cage and cannot be removed without destroying it. This stainless steel mesh screen protects the pilot orifice in the piston. If the screen is so clogged that it affects the operation of the blanketing valve and cannot be adequately cleaned with solvent or by other means, it may be pried out and replaced.

After the screen is removed from the seat retainer/flow cage, the swaged in dents around the recess must be removed to accept a new screen. This may be done by placing the seat retainer/flow cage on a cushioned surface and tapping a rod sideways to bend them out or cutting them out in a lathe. Take care not to enlarge the recess or the new screen may not be properly retained. After seating a new filter in place, hold it permanently against closing impacts by swaging at least 4 dimples around the edge with a center punch. To prevent reoccurrence of this problem, an after market in-line filter in the supply line just before the valve will keep the piston filter from becoming clogged.

### 3.2 Assembly

Assemble in reverse order of disassembly. Lightly lubricate o-rings, screw threads (except for the threads on the seat retainer/flow cage), and the coated body bore with Dow Corning No. 33 Silicone grease or its equivalent.

Pipe threads should be wrapped with Teflon tape or coated sparingly with an appropriate thread sealing compound.

Observe the following when assembling the main valve.

3.2.1 Place the o-ring seat (90) into the end of the piston (20). Thread the seat retainer/flow cage (30) into the piston, while observing the clamping WARNING from paragraph 3.1.2. Install the piston seal (100) into the o-ring groove.

3.2.2 Insert the seat retainer/flow cage (with the holes) of the piston/seal assembly into the nozzle bushing (40), place the piston spring (60) into rear skirt of the piston and guide the combination into the valve body compressing the spring. Screw the bushing tightly into the body to prevent its loosening.

**NOTE:** If a scratch is detected anywhere on the outside diameter surfaces along the piston on either side of the o-ring (see WARNING in paragraph 3.1.2) orient the scratch so that it is up (opposite of the outlet). This position can be maintained during bushing installation by pushing the piston while screwing the bushing.

#### 4.0 ADJUSTMENTS

There are no adjustments required on the BV1 main valve. Only one adjustment is required on the BV1 pilot.

##### 4.1 Set Pressure Adjustment

The set pressure adjustment screw (490) is accessible when the protective cap (500) is removed. Clockwise rotation of the screw increases the set pressure. All pressure adjustments should be made slowly to prevent overshooting the desired pressure.

The Tank Blanketing Valve can be closed by turning the adjustment screw counterclockwise until pressure set spring (440) is fully relaxed.

**CAUTION:** The recommended set pressure range of the spring is stamped on the pilot nameplate (550) adjustment below the lower limit will result in poor performance. Adjustment above the upper limit may compress the spring to solid height, forcing the pilot open, resulting in uncontrolled flow from the main valve.

## 5.0 BV1 PERFORMANCE TEST PROCEDURE

Connect the valve to a test drum as shown in Figure 3 and test for the following:

### 5.1 Tight Shutoff

Back the set pressure adjusting screw out until the spring is relaxed. Apply approximately 30 psig to the inlet port. There should be no leaking at the sense or outlet ports as determined by a zero reading on the sense pressure gage when the vent is closed.

**NOTE:** If the BV1 has the optional purge installed, there will be leakage unless the purge orifices are temporarily replaced with pipe plugs to prevent all flow.

Repeat the test with 100 psig applied to the inlet port. There should be no leakage at the sense or outlet ports or any gasketed joint as determined using leak test solution.

### 5.2 Performance Test

With 100 psig still on the inlet, raise the pressure in the sense drum to approximately the middle of the spring range.

5.2.1 Turn the adjusting screw in until audible flow is detected. Turn the screw in further until the main valve opens. Then back the screw out to close the valve.

5.2.2 With the pilot and main valve closed, recheck for seat leakage at the valve outlet and for external leakage. No observable seat leakage shall occur for a minimum of 10 seconds and there shall be no external leakage.

**WARNING:** If the purge orifices have been replaced by plugs to check leakage, replace them before putting the valve in service. The valve will not be internally protected from corrosive tank vapors.

## 6.0 SOFT GOODS REPAIR KIT & CONVERSION KIT

The kits listed below are available from stock. To order, specify the part number for the appropriate kit.

BV-1 SOFT GOODS .5"WC TO 6 PSIG	
FLUROSILICONE/VITON (STD)	06.2991.001
BUNA-N	06.2991.002
EPR/EPDM	06.2991.003

ALL BV-1 TANK VALVES FIELD ADDITION OF PURGE OPTION	06.2991.010
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**7.0 SPRING RANGE**

Part Number (1)	Pressure Range	Material	Rate (#/in)
03.1841.002	0.5" - 1.4"WC	316 Stainless Steel	5
03.1842.002	1.2" - 4.0"WC	316 Stainless Steel	9
03.1843.002	3.5" - 10"WC	316 Stainless Steel	19
03.1844.002	8" - 18"WC	316 Stainless Steel	32
03.1845.002	15" - 29"WC	316 Stainless Steel	63
03.1846.002	0.6 - 1.4 PSIG	316 Stainless Steel	125
03.1847.002	1.3 - 3.1 PSIG	316 Stainless Steel	275
03.1848.002	2.3 - 3.5 PSIG	316 Stainless Steel	550
03.1849.002	3.0 - 6.0 PSIG	316 Stainless Steel	1000

- (1) Part no. also denotes material: .001=CS, .002=SST, .003=INCONEL  
(when available)

**8.0 MAIN VALVE PISTON ASSEMBLIES**

Main valve pistons and seat retainer/flow cages are available in the sizes shown. The number and size of the holes in the seat retainer/flow cage skirt determines the percent of maximum flow each will permit.

Part Description	Part Number	Number of Holes
10% Cage	06.3769.010	1
30% Cage	06.3769.030	2
50% Cage	06.3769.050	3
70% Cage	06.3769.070	4
100% Cage	06.3769.100	6
110% Cage	06.3769.110	6
Piston	06.3679.003	N/A

## BV1 TANK BLANKETING VALVE MATERIALS

ITEM NO.	DESCRIPTION	CS	SST & NACE
10	BODY (FLANGED) (1)	SST SA351-CF8M/STL SA105	SST SA351-CF8M/SA182-F316
20	PISTON	SST SA479-316/316L	SST SA479-316/316L
30	RETAINER-SEAT/FLOW CAGE	SST A479-316/316L	SST A479-316/316L
40	BUSHING-NOZZLE	SST SA479-316/316L	SST SA479-316/316L
50	SCREEN-FILTER	SST-316	SST-316
60	SPRING-PISTON	SST-316	SST-316
80	SEAL-NOZZLE BUSHING (126)	VITON (2)	VITON (2)
90	SEAT-MAIN VALVE (213)	VITON (2)	VITON (2)
100	SEAL-PISTON (120)	FLUOROSILICONE (2)	FLUOROSILICONE (2)
110	FLANGE-INLET	STL SA-105	SST SA182-F316
120	PLUG-BODY	STL A108-1018	SST A479-316/316L
130	NOZZLE-PILOT	SST A479-316/316L	SST A479-316/316L
140	SPRING-PILOT SLEEVE	SST-302	SST-302
150	SLEEVE-PILOT	SST A479-316/316L	SST A479-316/316L
160	RETAINER-O-RING PILOT	SST A276-316/316L	SST A276-316/316L
170	SEAL-PILOT SLEEVE (014)	FLUOROSILICONE (2)	FLUOROSILICONE (2)
180	SPINDLE-PILOT	SST A276-316/316L	SST A276-316/316L
190	SEAL-BODY PLUG (122)	VITON (2)	VITON (2)
200	SPRING-NOZZLE RETAINER	SST-316	SST-316
210	BAR-CROSS	SST A276-304	SST A276-304
220	SEAT-PILOT (013)	FLUOROSILICONE (2)	FLUOROSILICONE (2)
230	RETAINER-PILOT NOZZLE	SST A479-316/316L	SST A479-316/316L
240	SEAL-PILOT NOZZLE (019)	FLUOROSILICONE (2)	FLUOROSILICONE (2)
250	ACTUATOR-PILOT	STL-12L14	SST A479-316/316L
260	SEAL-DIAPHRAGM CASE (228)	VITON (2)	VITON (2)
270	BOLT	SST-18-8	SST-18-8
280	NUT	SST-18-8	SST-18-8
290	WASHER-LOCK	SST-18-8	SST-18-8
300	BOLT	SST-18-8	SST-18-8
310	NUT	SST-18-8	SST-18-8
320	WASHER-LOCK	SST-18-8	SST-18-8
340	GASKET-DIAPHRAGM CASE	TEFLON STRIP	TEFLON STRIP
350	CASE-DIAPHRAGM	STL A36	SST A240-304
360	DIAPHRAGM	TEFLON	TEFLON
370	PLATE-PRESSURE SENSE	STL-1010	SST 302/304
380	SEAL-BODY BOLT (010)	VITON (2)	VITON (2)
390	BOLT-SEAL	SST-18-8	SST-18-8
400	NUT-SWAGE	SST	SST
410	WASHER-SPRING	STL LEADED AX	SST A276-316/316L
420	BOLT	SST-18-8	SST-18-8
430	BOLT	SST-18-8	SST-18-8
440	SPRING	SST-316	SST-316
450	BONNET ASSY.	SST SA351-CF8M	SST SA351-CF8M
460	WASHER-SPRING	STL A108-1213	SST A479-316/316L
470	VENT	ZYTEL	ZYTEL
480	NUT-LOCK	SST A479-316/316L	SST A479-316/316L
490	SCREW-PRESS ADJUST	SST-304	SST-304
500	CAP-PILOT BONNET	STL-LEADED	A582-303
510	FITTING-1/4 NPT	SST-316	SST-316
520	TUBING-3/8" OD	SST A269-TP316	SST A269-TP316
530	NAMEPLATE-MAIN VALVE	SST-304	SST-304
540	SCREW-DRIVE	SST-18-8	SST-18-8
550	NAMEPLATE-PILOT	SST-304	SST-304
560	NUT	SST-18-8	SST-18-8
570	WASHER-LOCK	SST-316	SST-316
580	TAG-WARNING	PAPER W/WIRE	PAPER W/WIRE
590	ORIFICE-PURGE	SST-316	SST-316
600	GASKET-BONNET	VITON (2)	VITON (2)
610	SEAL-ACTUATOR	TEFLON	TEFLON
620	PLUG 1/8" NPT	SST-A479-316/316L	SST-A479-316/316L
630	PLUG 1/4" NPT	SST-A479-316/316L	SST-A479-316/316L

## NOTES:

- (1) THREADED BODIES ARE SA351-CF8M AS STANDARD.  
(2) STANDARD FLUOROSILICONE/VITON SOFT GOODS.

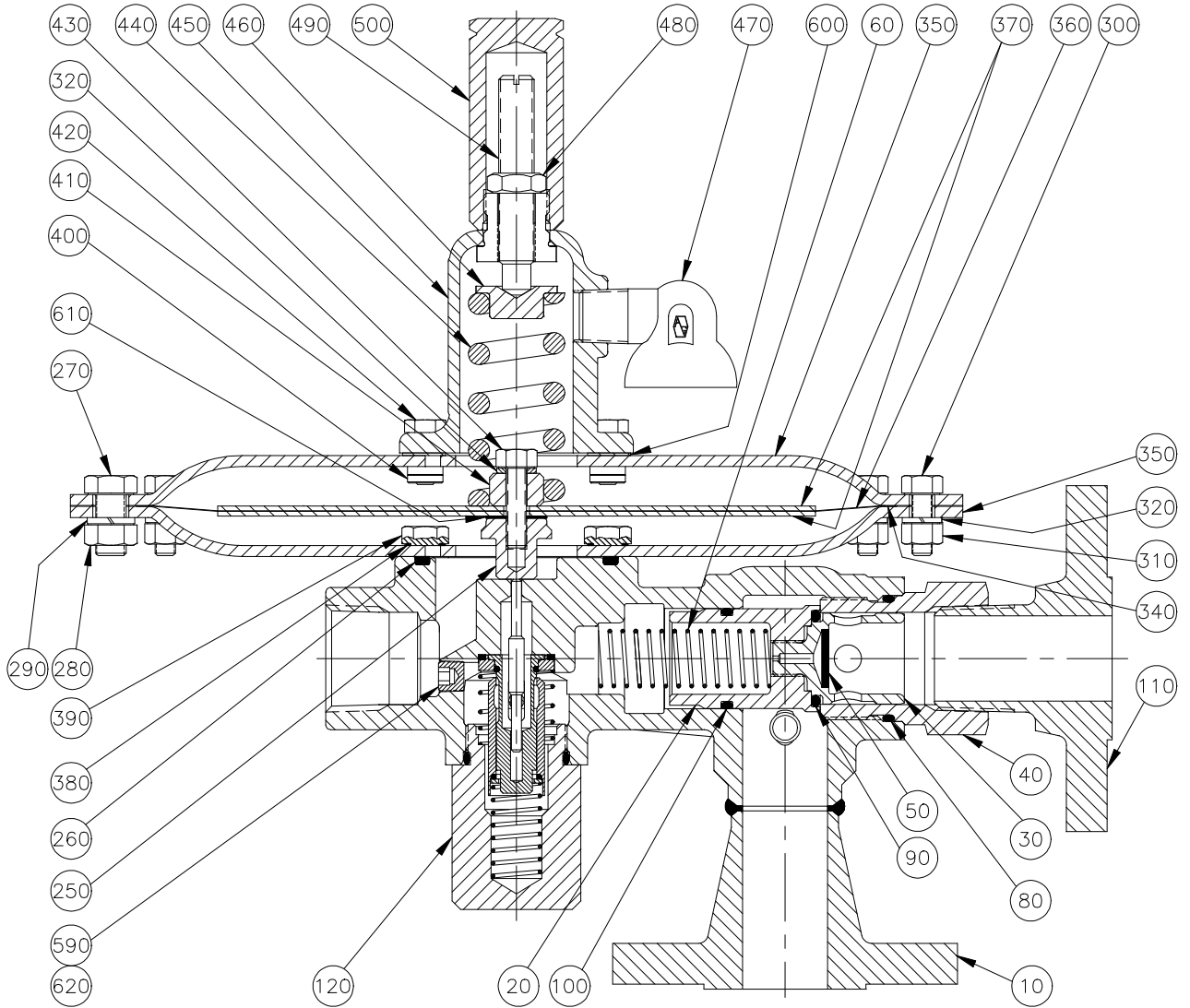


FIGURE 1 - LOW PRESSURE TANK BLANKETING VALVE

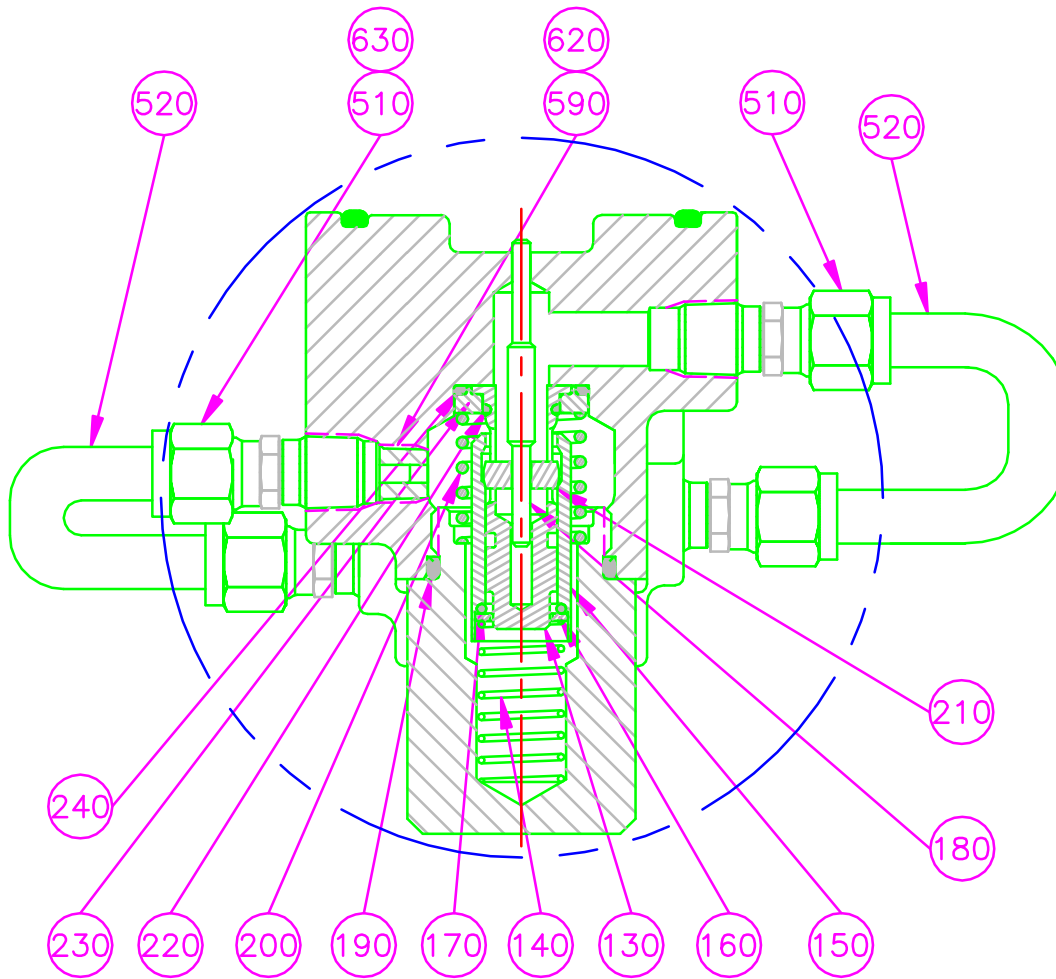


FIGURE 2 TANK BLANKETING VALVE PILOT INTERNALS

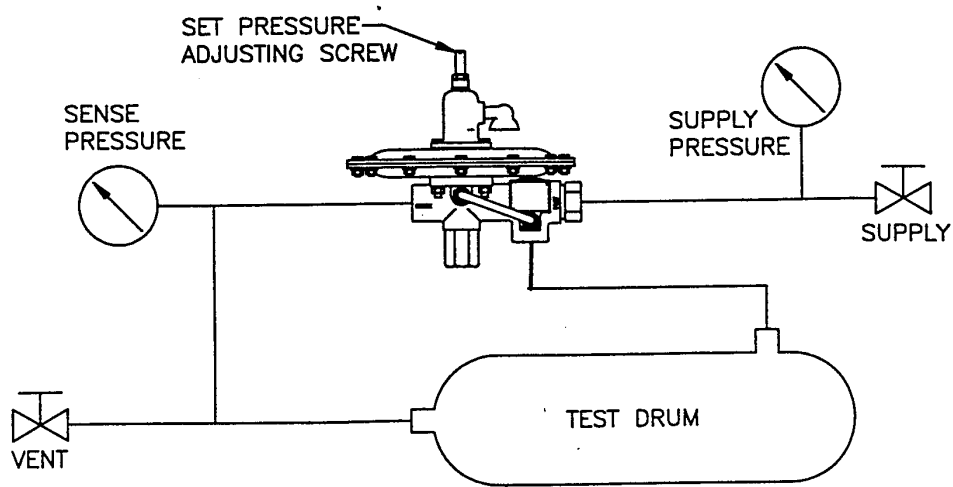


FIGURE 3 TEST SETUP FOR TANK BLANKETING VALVE

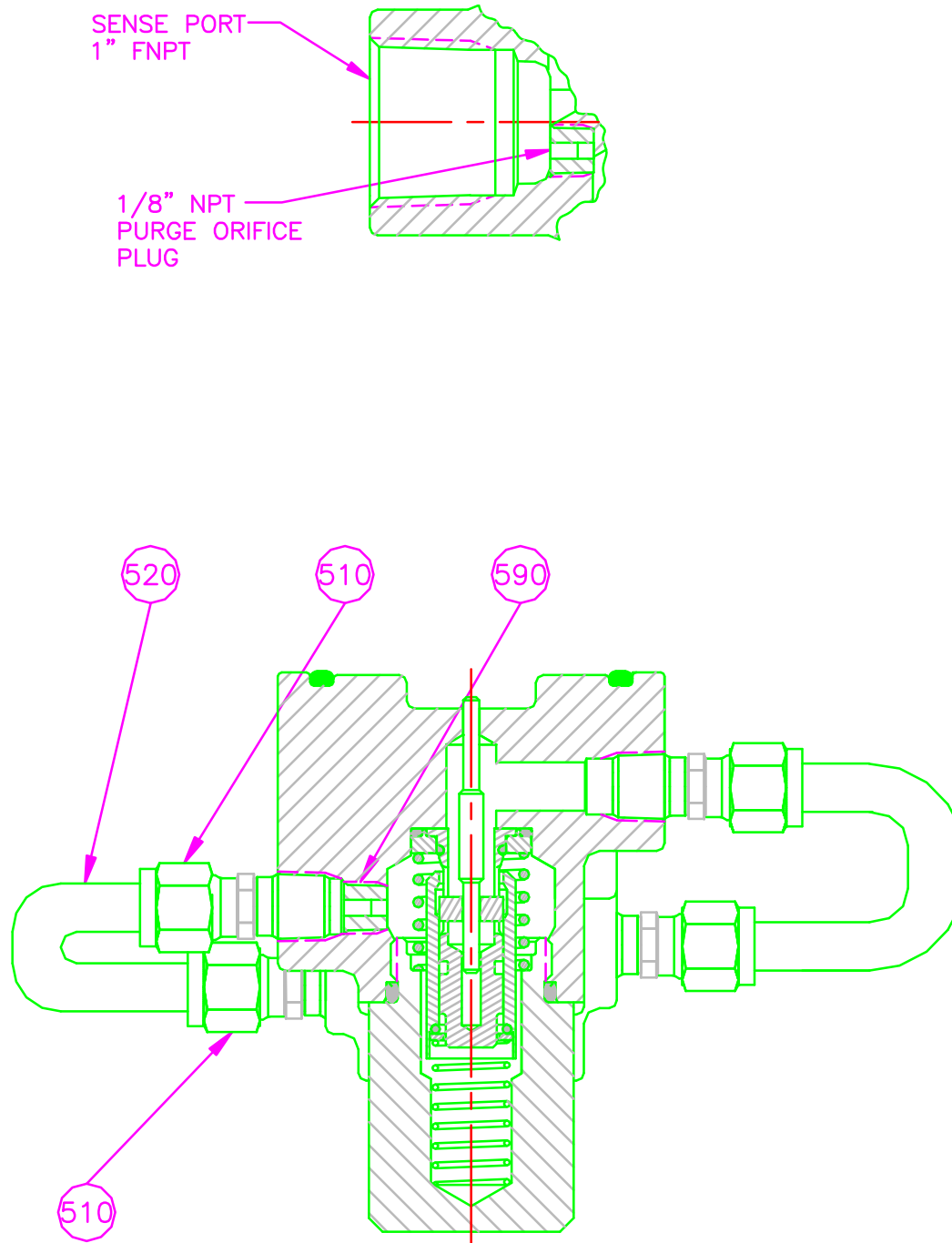


FIGURE 4 PURGE OPTION DETAILS