

installation, operating, and maintenance instructions

tank safety valve

model 66TS

GENERAL DESCRIPTION

In most refinery applications, product storage tanks are located at a remote distance from the loading facilities. This practice is, of course, very wise from a safety standpoint. In order to maximize the safety of such a system, the tank should also be isolated from the loading facilities at all times that a loading operation is not taking place. In this way the tank can be protected in case of a fire or in case of rupture of the delivery piping.

Such an arrangement requires a valve. The simplest approach would be to provide a manual on-off valve at the tank. However, this would require a second person, in addition to the loading man, to insure that the valve was open at the start of the loading operation and closed when loading was completed. This system would be inconvenient and, if mistakes were made, extremely costly. Forgetting to open the valve to start loading could result in damage to the delivery pump. Forgetting to close the valve after loading would compromise the safety of the entire system.

A far better approach is an automatic valve located at the tank. This valve would open quickly and fully when the delivery pump was started and close immediately and tightly on pump shutdown. It would remain closed at all times the pump was not running. For the utmost in safety and reliability it should be completely hydraulic in operation—i.e., no electrical power required, yet it should be completely operable even when it is at a remote distance from the delivery pump.

The OCV Model 66TS Tank Safety Valve is specifically designed to meet all of the requirements outlined above. Physically, the 66TS is a single-seated, hydraulically-operated, diaphragm-actuated globe valve designed to operate from the pressure differential created by the delivery pump. It is a power-actuated type valve with isolated upper and lower diaphragm chambers. Thus the actuating pressure differential is completely independent of the flow loss through the valve, enabling the total pressure drop in the pump suction line to be kept to a minimum.

The 66TS will start to open when the pump differential reaches 5 psi. Specially designed valve internals allow sufficient flow to the pump after only a small degree of opening. The valve will be fully open when the pump differential reaches 15 psi. With a properly sized sense line and a minimum of 30 psid available from the pump, the total opening cycle will take no more than 10 seconds. On pump shutdown, the valve will immediately start closed. With a properly-sized sense line the closing cycle will take no more than 15 seconds.

Once closed, the 66TS will remain closed until the pump is once again started. The valve is fail-safe—i.e., if its diaphragm should fail, the valve will close whether or not the pump is running. The valve also contains a built-in thermal relief feature: if the downstream pressure should building to approximately 6-10 psi above tank head, the valve will open slightly to relieve excess pressure back to the tank.

MANUAL OPENING (OPTIONAL)

The 66TS can be fitted with a manual opening feature which enables the valve to be pumped open with a hand pump to gravity-feed the system in case of delivery pump malfunction.

INSTALLATION

Proper installation of the 66TS is essential to its correct operation in the system. The recommended installation is shown schematically on drawing 66TS-XXX.

The tank safety valve itself should be installed as close as possible to the tank in order to maximize its objective of tank isolation.

The manual isolation valves shown are not essential to system operation but are extremely desirable should internal maintenance have to be performed on the tank safety valve.

The pump must be capable of developing a pressure differential of at least 15 psi above tank head at full flow in order to fully open the tank safety valve.

Proper sizing of the sense line between the pump discharge and tank safety valve is extremely important, especially when the valve and pump are an appreciable distance apart. Undersizing of this line will result in slower opening and closing of the valve. Notice that the recommendations shown are based on a 10-second opening with a 30-psi pump and a 15-second closing. If faster operation is desired, or a weaker pump is employed, the sense line should be increased proportionately.

In many systems, the line downstream of the pump is essentially "open" when the pump is started. Starting the pump under such low head conditions will result in insufficient differential to open the tank safety valve. The combination of low head and no suction supply can bring about immediate and extreme cavitation of the pump. In order to prevent this occurrence, it is highly recommended that a **slow-opening** check valve be installed on the pump discharge. In this way the pump starts against a closed valve, the discharge head is immediately high, the tank safety valve opens readily, and, as the check valve slowly opens, there is a smooth transition from no flow to full flow, with no risk of pump cavitation.

The check valve also serves to prevent backflow of product into the storage tank when the pump is off. Note that the tank safety valve itself provides limited backflow

protection, but only to 6-10 psi back pressure. If the backflow potential is greater than this, the check valve is a necessity.

In short, the slow-opening check valve can safely be omitted only if both the following conditions exist: (1) the discharge piping is "closed" on pump start-up and is full of fluid at all times, and (2) backflow protection above 6-10 psi is not necessary.

Three other features, not shown on the installation diagram, are desirable:

1. The sense line between the valve and pump discharge should be kept clear and free of buildup of particulate matter. To insure this, install a strainer in the sense line at the pump discharge. The strainer should, of course, be of at least the same nominal size as the sense line.
2. If the slow-opening check valve is used, and thermal pressure buildup in the piping downstream of the check valve is a possibility, a thermal relief valve should be installed on the check valve to relieve this pressure back to the pump side. It will then be led back to the tank by the built-in thermal relief feature of the tank safety valve.
3. If the tank safety valve is equipped with the manual feature, a manual on-off valve should be a low-loss type such as a gate or ball valve.

THEORY OF OPERATION

The 66TS is actuated by a differential pressure acting across its diaphragm. The lower diaphragm chamber receives pressure from the pump discharge. This pressure acts in the direction to open the valve. The upper diaphragm chamber senses pump suction pressure and also contains the valve spring. These forces act in the direction to close the valve.

There is also a net closing force across the valve seat caused by the differential of tank head acting over the seat and pump suction pressure acting under the seat.

OPENING CYCLE: When the pump is started, its discharge pressure starts to rise. When this pressure rises to 5 psi over tank head, the closing forces acting on the valve are overcome and the valve starts open. The discharge pressure continues to increase. When it reaches 15 psi over tank head, the valve will be fully open.

CLOSING PRESSURE: When the pump is stopped, the discharge and suction pressures become equal to tank

head. There are now no differential pressures acting on the valve, only the closing force created by the spring. Therefore the valve closes readily.

THERMAL RELIEF: With the valve closed and the pump off, there are normally no differential forces on the valve except for the spring. However, if there is a thermal pressure buildup in the downstream piping, an opening force will be applied under the valve seat. When this pressure is sufficient to overcome the spring (6-10 psi over tank head), the valve will open a small amount and relieve the excess pressure back to the tank.

MAINTENANCE

Visual inspection at periodic intervals is required to determine the general physical condition of the equipment. This inspection should be conducted at no more than 30 day intervals. The following is a list of "check points" to assist maintenance personnel in this task.

- a. Check for chipped or peeling paint.
- b. Check that all tube fittings on the valve are secure.
- c. Check for damaged tubing.
- d. Check for leaks at fittings and around bonnets and flanges.
- e. Check for loose bolts on bonnets and flanges.

TROUBLESHOOTING

The 66TS, due to its rather simple construction and positive action, should provide virtually trouble-free operation. If problems should occur, the following outline should enable maintenance personnel to isolate the specific malfunction and take the appropriate remedial action.

A. VALVE FAILS TO OPEN OR OPENS TOO SLOWLY

1. Sense line too small—See chart on drawing 66TS-XXX.
2. Sense line clogged—Clean strainer if one is installed. If not, clean sense line as required and install strainer in sense line where it joins the pump discharge line.

3. Main valve diaphragm ruptured—replace diaphragm.

NOTE: Any time maintenance is required inside the valve, close the manual isolation valves located on either side of the valve. Due to the heavy spring employed in the 66TS, use extreme caution in removing the bonnet. Remove all bonnet nuts except two located at opposite sides of the bonnet. Loosen these two nuts slowly and evenly until the spring tension is relieved. When reassembling the valve, "jack" the bonnet down against the spring with two nuts at 180°, tightened evenly.

4. Valve stem binding—Disassemble valve as noted above and check the stem and upper and lower bearing areas for burrs, deep scratches, or buildup of foreign material. Clean and polish as required.

B. VALVE FAILS TO CLOSE OR CLOSES TOO SLOWLY

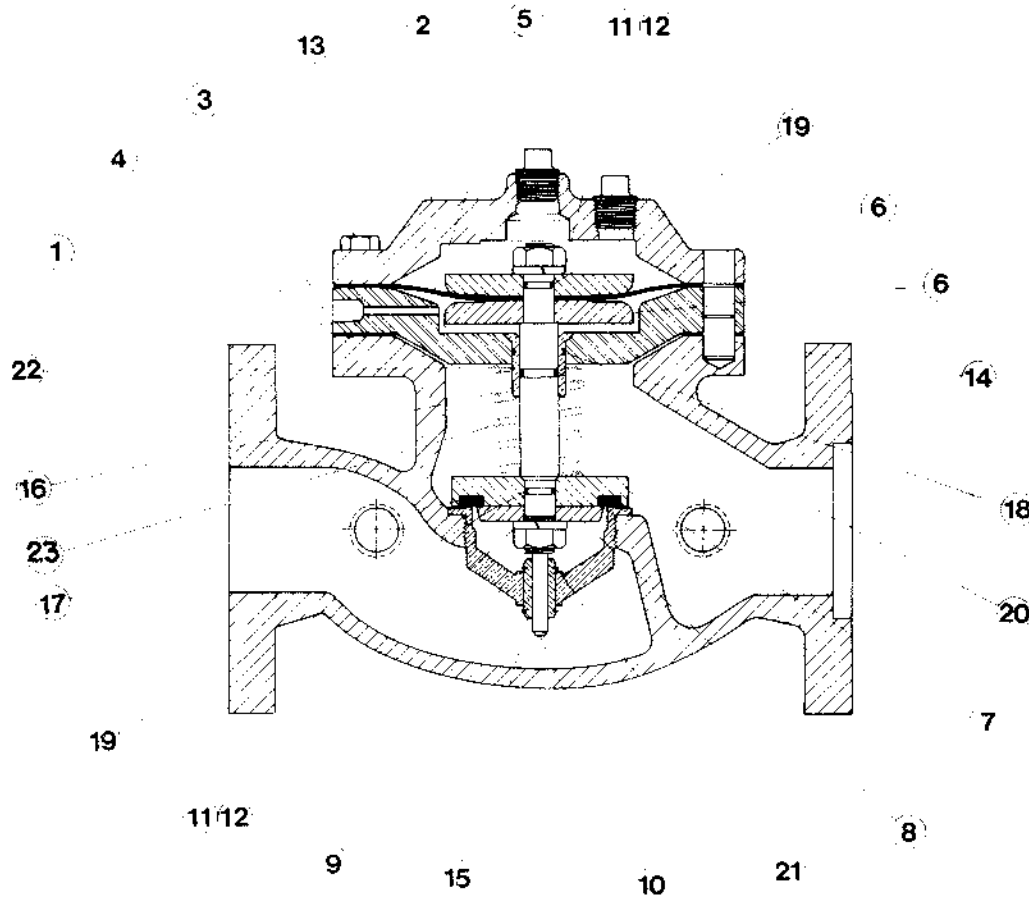
1. Sense line too small—See A1 above.
2. Sense line clogged—See A2 above.
3. Valve stem binding—See A4 above.

MANUAL OPENING OPTION

The manual opening feature is provided by means of a Schrader valve which is installed at the inlet port of the 66TS intermediate plate. To complete the requirements for this option, a manual on-off valve must be installed in the sense line leading from the pump discharge. For convenience, the valve should be installed near the point where the sense line connects to the body. The on-off valve should be of a low-loss type such as a ball valve or gate valve.

To manually open the 66TS, first close the on-off valve. Connect the pressure source (hand pump, low pressure air bottle, etc.) to the Schrader valve. The 66TS can then be opened fully by applying pressure equal to 15 psi over tank head.

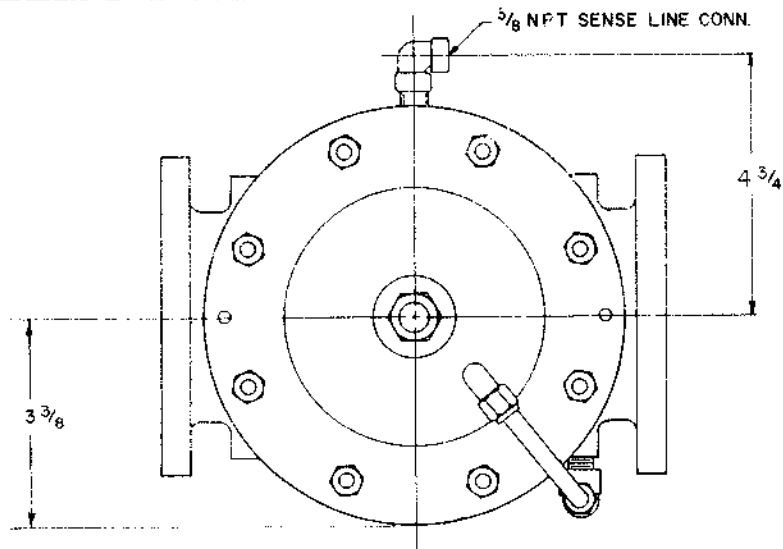
To return the 66TS to the closed position, simply remove the pressure source and open the on-off valve.



NOTE
 1 WHEN ORDERING PARTS PLEASE SPECIFY DESCRIPTION PART NUMBER AND MATERIAL
 2 Δ - RECOMMENDED SPARE PARTS
 3 ○ - PARTS USED WHEN STAINLESS STEEL SEAT RING IS FURNISHED

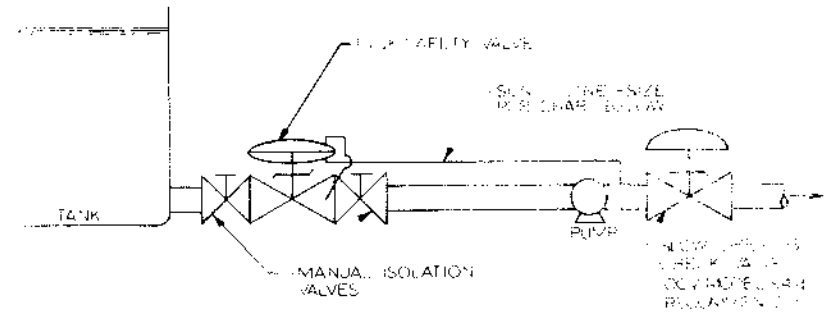
| ITEM | QTY | NO. | DESCRIPTION | MATERIAL |
|------|-----|------------------|--------------------------------------|-------------------------|
| 23 | 1 | 650721 | SPRING | STN STEEL |
| ○ | 1 | 630711 | RETAINING RING | STN STEEL |
| ○ | 2 | 630705 | RETAINING RING | STN STEEL |
| Δ | 1 | 611111 | O-RING | VITON |
| Δ | 2 | 611012 | O-RING | VITON |
| Δ | 1 | 610018 | O-RING | BUNA-N |
| Δ | 1 | 691500 690500 | SEAT DISC | VITON BUNA-N |
| ○ | 1 | 300165 | GUIDE BUSHING | BRASS |
| ○ | 1 | 300037 | SEAT RING BUSHING | DEL-RIM |
| 14 | 2 | 620701 | DOWEL PIN | STN STEEL |
| 13 | 8 | 531012 | CAPSCREW | CAD. PL. STL |
| 12 | 2 | 685703 | LOCKWASHER | STN STEEL |
| 11 | 2 | 590709 | STEM NUT | STN STEEL |
| 10 | 1 | 313719 | STEM | STN STEEL |
| ○ | 1 | 311700 311100 | SEAT RING | STN STEEL BRONZE |
| 8 | 1 | 309000 | SEAT RETAINER | CAST IRON |
| 7 | 1 | 306440 | SEAT PLATE | STEEL |
| 6 | 2 | 307430 | DIAPHRAGM PLATE | STEEL |
| Δ | 1 | 690111 690011 | DIAPHRAGM | VITON BUNA-N |
| Δ | 1 | 693108 693008 | GASKET | VITON BUNA-N |
| 3 | 1 | 306430 306030 | INTERMEDIATE PLATE | CAST STEEL CAST IRON |
| 2 | 1 | 303330 303030 | BONNET | CAST STEEL CAST IRON |
| 1 | 1 | 301300 301000 | BODY ANSI 150 LB BODY ANSI 125 LB | CAST STEEL CAST IRON |

| | | | |
|-------------|-----------------|-------------|-----------------------------|
| REVISED BY | DATE | DESCRIPTION | |
| | | | |
| DESIGNED BY | DATE | DESCRIPTION | 2" TANK SAFETY VALVE |
| | | | |
| APPROVED BY | DATE | DESCRIPTION | |
| | | | |
| REVISIONS | REF. ENG. NO.'S | | |



MODEL 66TS

RECOMMENDED INSTALLATION



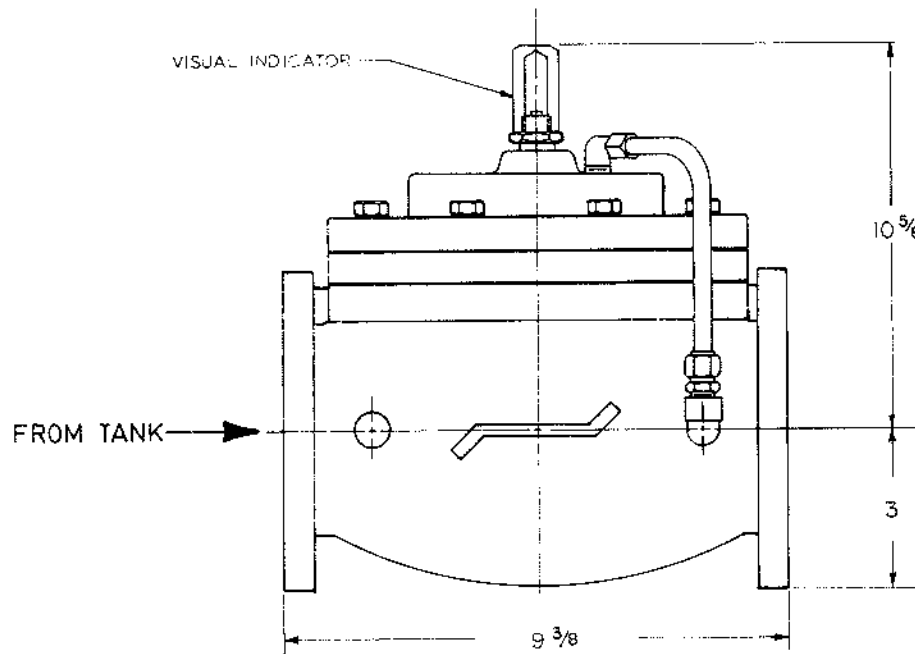
SPECIFICATIONS

- PRESSURE REQ'D TO START VALVE OPEN..... 5 PSIG*
- PRESSURE REQ'D TO FULLY OPEN VALVE..... 15 PSIG*
- VALVE OPENING TIME 10 SECONDS (LESS AT 40 PSI) AT MIN. OPERATING PRESSURE (SEE SENSE LINE SIZED PER CHART BELOW)
- VALVE CLOSING TIME 15 SECONDS (LESS WITH SENSE LINE SIZED PER CHART BELOW)
- VALVE C_v (FULL OPEN)..... 47
- VALVE WILL AUTOMATICALLY CLOSE IF DIAPHRAGM FAILS

*PUMP DISCHARGE HEAD MINUS FRICTION HEAD

SENSE LINE REQUIREMENTS

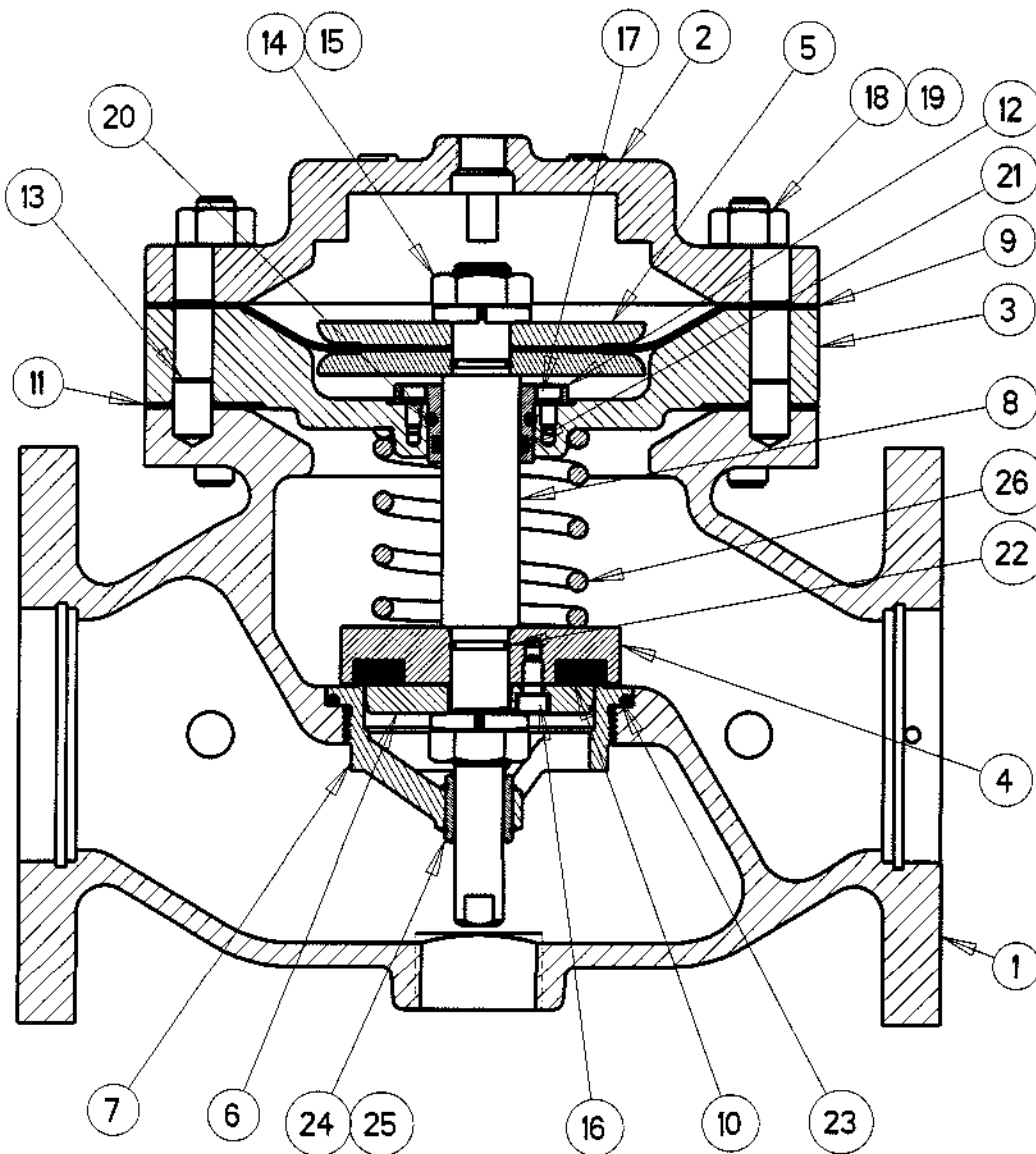
| DISTANCE, FT FROM PUMP | MIN. SENSE LINE PIPE SIZE |
|---------------------------|------------------------------|
| 0-200 | 1/4" |
| 201-900 | 3/8" |
| 901-3000 | 1/2" |



| REVISIONS | | | | REF DWG NO'S | | | |
|-----------|-----------|------|----|--------------|---------|------|--|
| E | | | | | | | |
| D | | | | | | | |
| C | | | | | | | |
| B | | | | | | | |
| A | | | | | | | |
| CHG | E. C. NO. | DATE | BY | SCALE | CHKD BY | DATE | |

| MATERIAL | TOLERANCES |
|----------|-------------------|
| | UNLESS NOTED |
| | FRACTIONAL ± 1/64 |
| | DECIMAL ± .009 |
| | RACH FINISH 125 |
| | ANGULAR ± 1/2° |

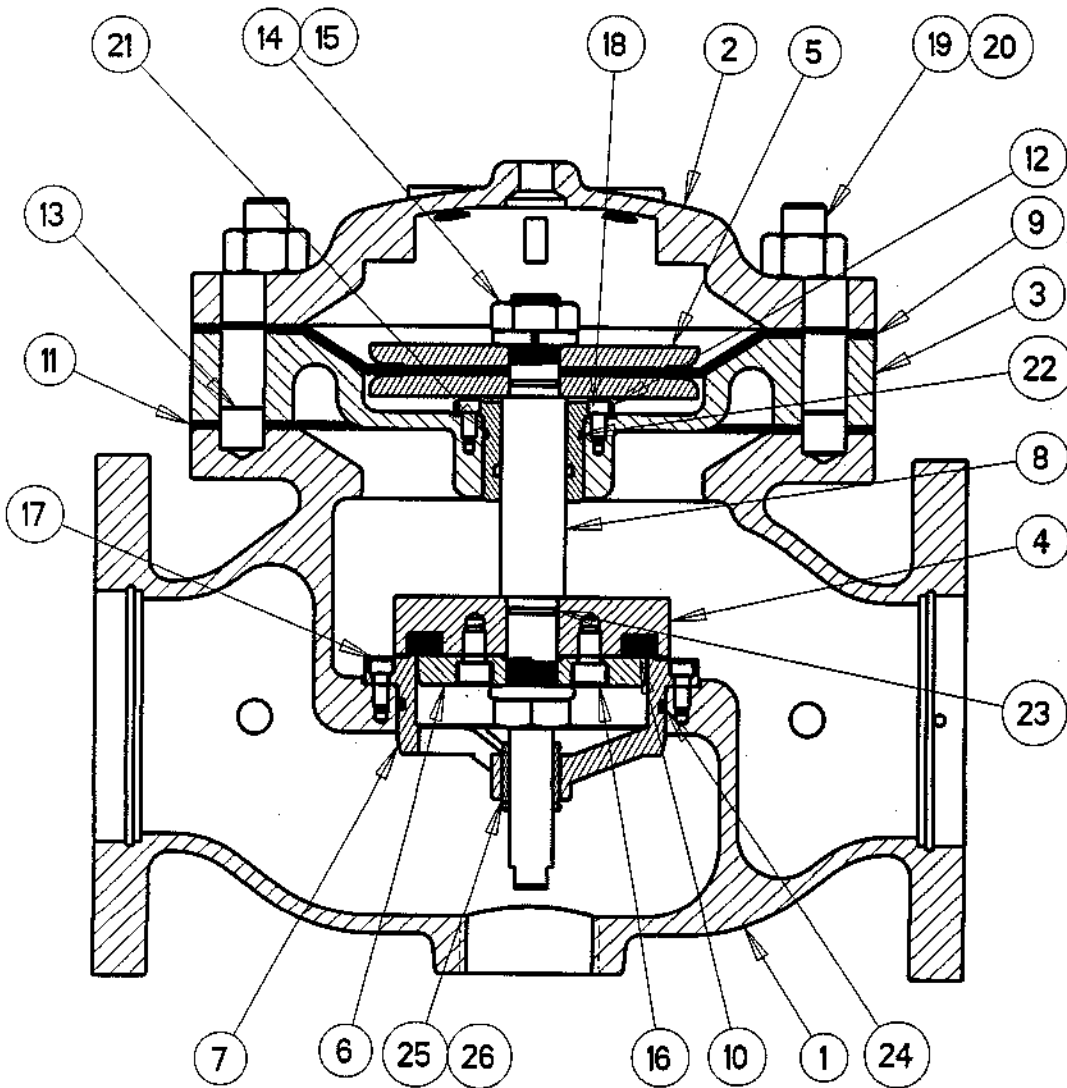
| | |
|---------------------------|----------|
| OCV Control Valves | |
| 2" TANK SAFETY VALVE | |
| C | 66TS-02A |



| ITEM | PART NO | QTY | DESCRIPTION | MAT'L |
|------|---------|-----|--------------------|------------|
| 1 | 301091 | 1 | BODY | DUCT. IRON |
| 2 | 303092 | 1 | BONNET | DUCT. IRON |
| 3 | 306091 | 1 | INTERMEDIATE PLATE | DUCT. IRON |
| 4 | 306491 | 1 | SEAT PLATE | STN. STL. |
| 5 | 307092 | 2 | DIAPHRAGM PLATE | STN. STL. |
| 6 | 309092 | 1 | SEAT RETAINER | STN. STL. |
| 7 | 311791 | 1 | SEAT RING | STN. STL. |
| 8 | 313792 | 1 | STEM | STN. STL. |
| 9 | 690093 | 1 | DIAPHRAGM | BUNA-N |
| 10 | 690591 | 1 | SEAT DISC | BUNA-N |
| 11 | 693091 | 1 | GASKET | BUNA-N |
| 12 | 320076 | 1 | GUIDE BUSHING | DELRIN |
| 13 | 620701 | 2 | DOWEL PIN | STN. STL. |
| 14 | 590747 | 2 | HEX NUT | STN. STL. |
| 15 | 685712 | 2 | LOCK WASHER | STN. STL. |
| 16 | 530700 | 3 | SKT. HD. CAPSCREW | STN. STL. |
| 17 | 530702 | 2 | SKT. HD. CAPSCREW | STN. STL. |
| 18 | 300681 | 8 | STUD | ZN PL STL |
| 19 | 590011 | 8 | HEX NUT | ZN PL STL |
| 20 | 610123 | 1 | O-RING | BUNA-N |
| 21 | 610214 | 1 | O-RING | BUNA-N |
| 22 | 610016 | 2 | O-RING | BUNA-N |
| 23 | 610154 | 1 | O-RING | BUNA-N |
| 24 | 300071 | 1 | LOWER BUSHING | TEFLON |
| 25 | 630711 | 2 | SNAP RING | STN. STL. |
| 26 | 650772 | 1 | SPRING | STN. STL. |

* : RECOMMENDED SPARE PARTS

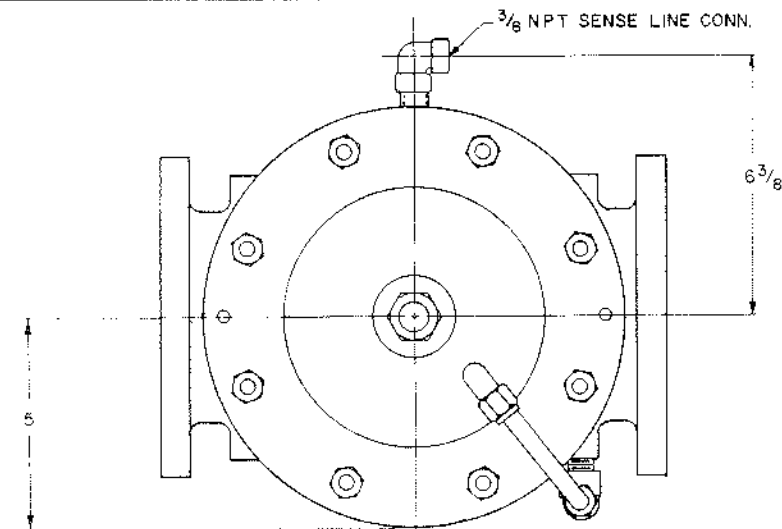
| E | | | | MATERIAL | | TOLERANCES | | OCV Control Valves | | |
|-----------|-----|------|----|--------------|--|------------|---------------------------|--------------------|------|------|
| D | | | | 150# DIST | UNLESS NOTED XX ±.015 XXX ±.005 ANGULAR ±0.5° MACH. FINISH 125 | | TULSA OKLAHOMA USA | | | |
| C | | | | | | | 3" 3100 TANK SAFETY VALVE | | | |
| B | | | | | | | NO. REQ'D | DRAWN BY | DATE | SIZE |
| A | | | | SCALE | CHKD BY | DATE | A | 3150TS | | |
| CHG | ECN | DATE | BY | REF DWG NO'S | | 40% | | | | |
| REVISIONS | | | | REF DWG NO'S | | 40% | | | | |



| ITEM | PART NO | QTY | DESCRIPTION | MAT'L |
|------|---------|-----|--------------------|--------------|
| 1 | 301044 | 1 | BODY | DUCT. IRON |
| 2 | 303045 | 1 | BONNET | DUCT. IRON |
| 3 | 303044 | 1 | INTERMEDIATE PLATE | DUCT. IRON |
| 4 | 306404 | 1 | SEAT PLATE | STN. STL. |
| 5 | 307746 | 2 | DIAPHRAGM PLATE | STN. STL. |
| 6 | 309045 | 1 | SEAT RETAINER | STN. STL. |
| 7 | 311744 | 1 | SEAT RING | STN. STL. |
| 8 | 313742 | 1 | STEM | STN. STL. |
| 9 | 690387 | 1 | DIAPHRAGM | NYLON/BUNA-N |
| 10 | 690544 | 1 | SEAT DISC | BUNA-N |
| 11 | 693044 | 1 | GASKET | BUNA-N |
| 12 | 320046 | 1 | GUIDE BUSHING | DELRIIN |
| 13 | 300708 | 2 | DOWEL PIN | STN. STL. |
| 14 | 590733 | 2 | HEX NUT | STN. STL. |
| 15 | 685708 | 2 | LOCK WASHER | STN. STL. |
| 16 | 530719 | 4 | SKT. HD. CAPSCREW | STN. STL. |
| 17 | 530701 | 6 | SKT. HD. CAPSCREW | STN. STL. |
| 18 | 530707 | 4 | SKT. HD. CAPSCREW | STN. STL. |
| 19 | 300094 | 8 | STUD | ZN PL STL |
| 20 | 590005 | 8 | HEX NUT | ZN PL STL |
| 21 | 610129 | 1 | O-RING | BUNA-N |
| 22 | 610216 | 1 | O-RING | BUNA-N |
| 23 | 610018 | 2 | O-RING | BUNA-N |
| 24 | 610245 | 1 | O-RING | BUNA-N |
| 25 | 300645 | 1 | LOWER BUSHING | TEFLON |
| 26 | 630707 | 2 | SNAP RING | STN. STL. |

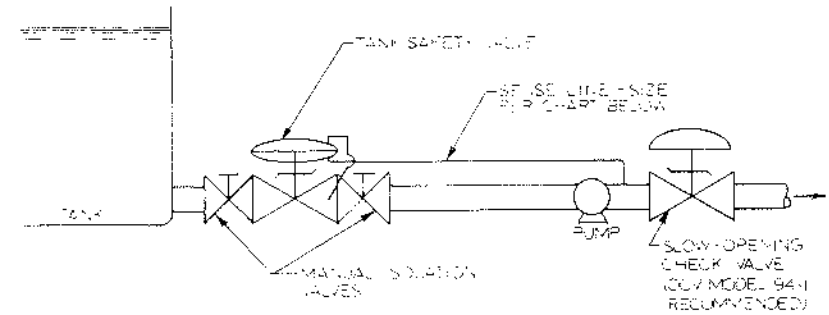
* : RECOMMENDED SPARE PARTS
 SPARE PARTS KIT P/N 906044

| | | | | MATERIAL | TOLERANCES | OCV Control Valves | | | | | |
|-----------|-----|------|--------------|-----------|--|------------------------------|----------|----------|------|----------------|-----|
| E | | | | 150° DIST | UNLESS NOTED .XX ±.015 .XXX ±.005 ANGULAR ±0.5° MACH. FINISH 125 | TULSA OKLAHOMA USA | | | | | |
| D | | | | | | 4" 4400 POWER-ACTUATED VALVE | | | | | |
| C | | | | | | NO. REQ'D | DRAWN BY | DATE | SIZE | DRAWING NUMBER | REV |
| B | | | | | | | SDJ | 10-04-04 | | | |
| A | | | | | | SCALE | CHKD BY | DATE | | | |
| CHG | ECN | DATE | BY | 30% | | | | A | 4450 | | |
| REVISIONS | | | REF DWG NO'S | | | | | | | | |



MODEL 66TS

RECOMMENDED INSTALLATION



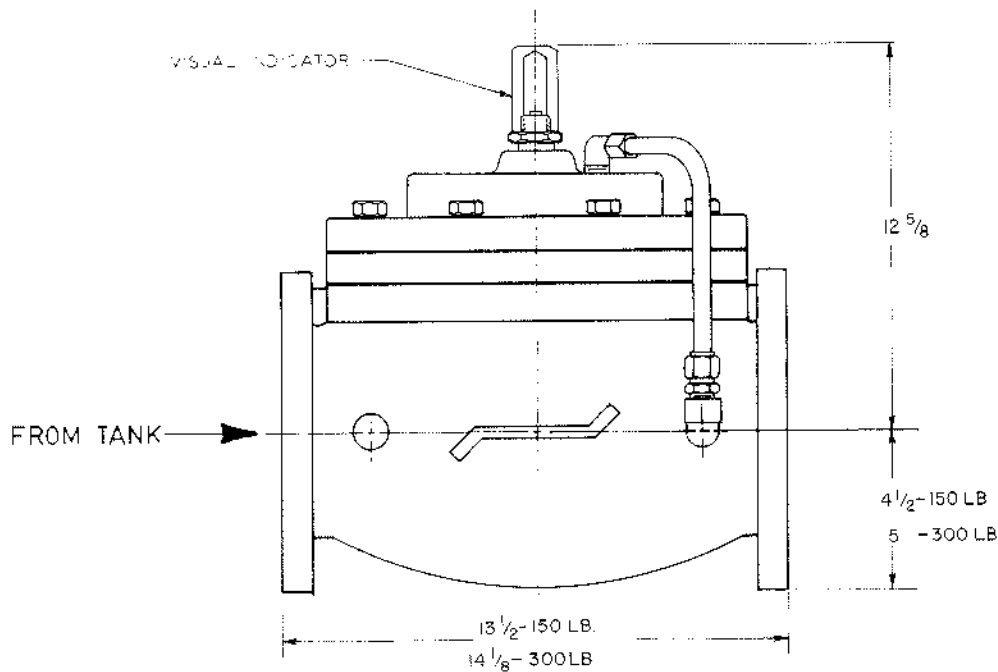
SPECIFICATIONS

- PRESSURE REQ'D TO START VALVE OPEN: 15-20 PSID*
- PRESSURE REQ'D TO FULLY OPEN VALVE: 15 PSID*
- VALVE OPENING TIME: 10 SECONDS OR LESS WITH 30 PSID*
MIN. OPERATING PRESSURE & SENSE LINE SIZED PER CHART BELOW.
- VALVE CLOSING TIME: 15 SECONDS OR LESS WITH SENSE LINE SIZED PER CHART BELOW
- VALVE C_v FULL BOWL: 1.0 @ 150 LB
- VALVE WILL AUTOMATICALLY CLOSE IF DIAPHRAGM FAILS

*PUMP DISCHARGE HEAD MINUS TANK HEAD

SENSE LINE REQUIREMENTS

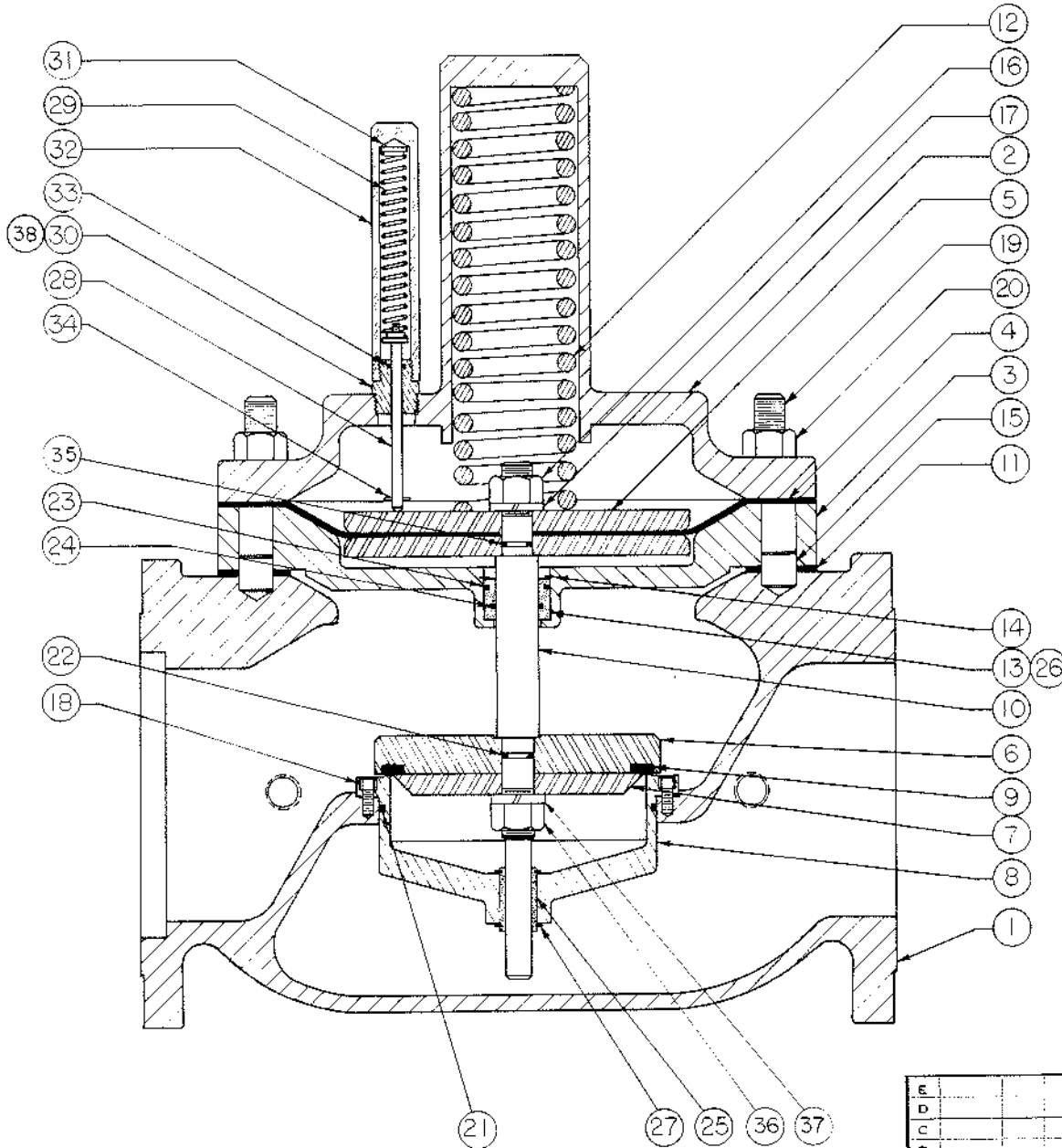
| DISTANCE FT VALVE TO PUMP | MIN SCHED 40 PIPE SIZE |
|------------------------------|---------------------------|
| 0-150 | 1/4 |
| 151-650 | 3/8 |
| 651-2000 | 1/2 |



| REVISIONS | | | | REF DWG NO'S | | | | MATERIAL | | TOLERANCES | | OCV Control Valves TULSA, OKLAHOMA U.S.A. | | | | | |
|-----------|--|--|--|--------------|--|--|--|----------|--|-------------------|--|--|----------|------|------|----------------|-----|
| E | | | | | | | | | | UNLESS NOTED | | 4" TANK SAFETY VALVE | | | | | |
| D | | | | | | | | | | FRACTIONAL ± 1/64 | | NO. REV'D | DRAWN BY | DATE | SIZE | DRAWING NUMBER | REV |
| C | | | | | | | | | | DECIMAL ± .005 | | SCALE | CHKD. BY | DATE | C | 66TS-04A | |
| B | | | | | | | | | | HACK FINISH 125 | | | | | | | |
| A | | | | | | | | | | ANGULAR ± 1/2° | | | | | | | |

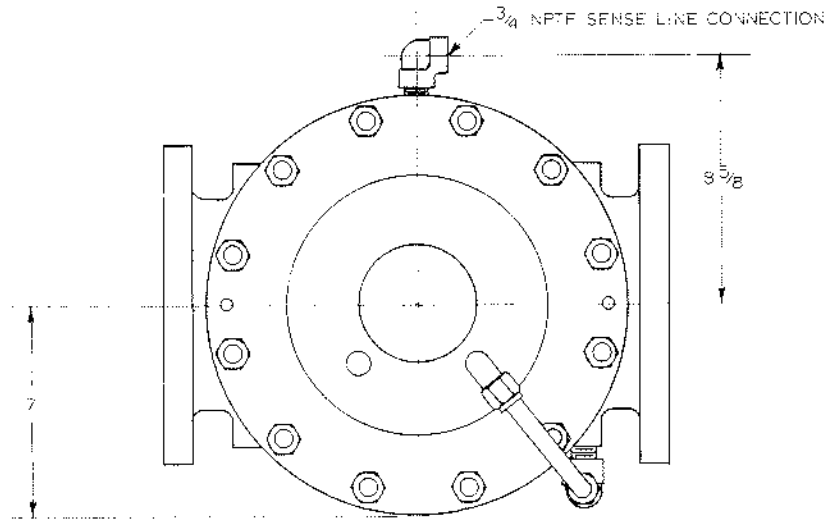
NOTES:

1. WHEN ORDERING PARTS, PLEASE SPECIFY SERIES NUMBER, PART NUMBER AND MATERIAL.
2. Δ = RECOMMENDED SPARE PARTS.
3. \bigcirc = PARTS USED WHEN STAINLESS STEEL SEAT RING IS FURNISHED.



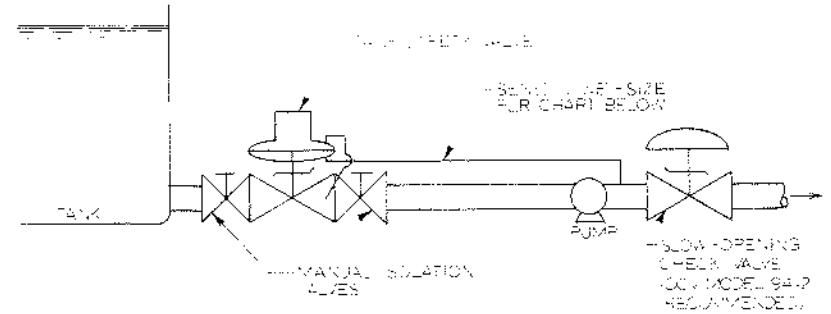
| | | | | | |
|------------|----|------------------|------|--|---------------------|
| | 38 | 300155 | 1 | INDICATOR BUSHING | BRASS |
| | 37 | 685726 | 1 | LOCKWASHER | STN. STEEL |
| | 36 | 590735 | 1 | HEX NUT | STN. STEEL |
| Δ | 35 | 611016 610016 | 1 | O-RING | VITON BUNA-N |
| Δ | 34 | 620700 | 1 | ROLL PIN | STN. STEEL |
| Δ | 33 | 611010 | 1 | O-RING | VITON |
| | 32 | 316001 | 1 | INDICATOR HOUSING | ACRYLIC |
| | 31 | 300182 | 2 | SPRING RETAINER | BRASS |
| | 30 | 300753 300153 | 1 | INDICATOR ADAPTER | STN. STEEL BRASS |
| | 29 | 650435 | 1 | INDICATOR SPRING | STEEL |
| | 28 | 316006 | 1 | INDICATOR STEM | STN. STEEL |
| \bigcirc | 27 | 630723 | 2 | RETAINING RING | STN. STEEL |
| \bigcirc | 26 | 300086 | 1 | GUIDE BUSHING | DELRIN |
| \bigcirc | 25 | 300059 | 1 | LOWER BUSHING | TEFLON |
| Δ | 24 | 611218 610218 | 1 | O-RING | VITON BUNA-N |
| Δ | 23 | 611220 610220 | 1 | O-RING | VITON BUNA-N |
| Δ | 22 | 611020 610020 | 1 | O-RING | VITON BUNA-N |
| Δ | 21 | 611259 610259 | 1 | O-RING | VITON BUNA-N |
| | 20 | 590005 | 12 | HEX NUT | CAD PL. STEEL |
| | 19 | 300094 | 12 | STUD | CAD PL. STEEL |
| | 18 | 530701 | 6 | SOCKET HEAD CAPSCREW | STN. STEEL |
| | 17 | 685712 | 1 | LOCKWASHER | STN. STEEL |
| | 16 | 590721 | 1 | HEX NUT | STN. STEEL |
| | 15 | 300708 | 2 | DOWEL PIN | STN. STEEL |
| | 14 | 630724 | 1 | RETAINING RING | STN. STEEL |
| | 13 | 300186 | 1 | GUIDE BUSHING | BRONZE |
| | 12 | 650002 | 1 | SPRING | STN. STEEL |
| Δ | 11 | 693014 | 1 | GASKET | BUNA-N |
| Δ | 10 | 313743 | 1 | STEM | STN. STEEL |
| Δ | 9 | 691503 690503 | 1 | SEAT DISC | VITON BUNA-N |
| | 8 | 311114 | 1 | SEAT RING | STN. STEEL |
| | 7 | 309417 | 1 | SEAT RETAINER | STEEL |
| | 6 | 308450 | 1 | SEAT PLATE | STEEL |
| | 5 | 307433 | 1 | DIAPHRAGM PLATE | STEEL |
| Δ | 4 | 690143 690043 | 1 | DIAPHRAGM | VITON BUNA-N |
| | 3 | 306339 | 1 | INTERMEDIATE PLATE | CAST STEEL |
| | 2 | 303455 | 1 | BONNET ASSEMBLY | CAST STEEL |
| | 1 | 301703 301303 | 1 | BODY - ANSI 300 LB BODY - ANSI 150 LB | CAST STEEL |
| | | TEMP. DEV. NO. | QTY. | DESCRIPTION | MATERIAL |

| E | | MATERIAL | | TOLERANCES | | DCV Control Valves | | | | |
|-----------|--|-----------|------|-------------------------|--------------|------------------------|------|------|----------------|-----|
| D | | | | UNLESS NOTED | | TULSA, OKLAHOMA U.S.A. | | | | |
| C | | | | FRACTIONAL $\pm 1/64$ | | 6" TANK SAFETY VALVE | | | | |
| B | | | | DECIMAL $\pm .005$ | | NO. REV'D | DATE | SIZE | DRAWING NUMBER | REV |
| A | | | | MACH. FINISH 128 | | DRAWN BY | DATE | C | 6197 | A |
| | | | | ANGULAR $\pm 1/2^\circ$ | | CHKD BY | DATE | | | |
| CHG. | | E. C. NO. | DATE | BY | REF DWG NO'S | | | | | |
| REVISIONS | | | | | | | | | | |



MODEL 66TS

RECOMMENDED INSTALLATION



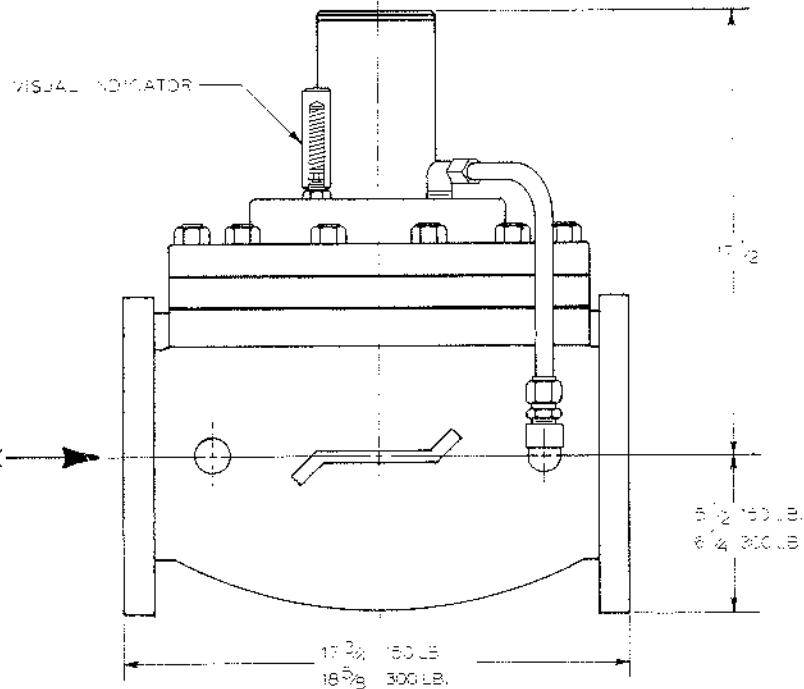
SPECIFICATIONS

- PRESSURE REQ'D TO START VALVE OPENING..... 5 PSID*
- PRESSURE REQ'D TO FULLY OPEN VALVE..... 15 PSID*
- VALVE OPENING TIME..... 15 SECONDS OR LESS WITH 10 PSID*
- VALVE CLOSING TIME..... 15 SECONDS OR LESS WITH SENSE LINE SIZED PER CHART BELOW
- VALVE CLOSURE PREVENTS FLOW..... 450
- VALVE WILL AUTOMATICALLY CLOSE IF 94P-PUMP FAILS.

*PUMP DISCHARGE HEAD PLUS TANK HEAD

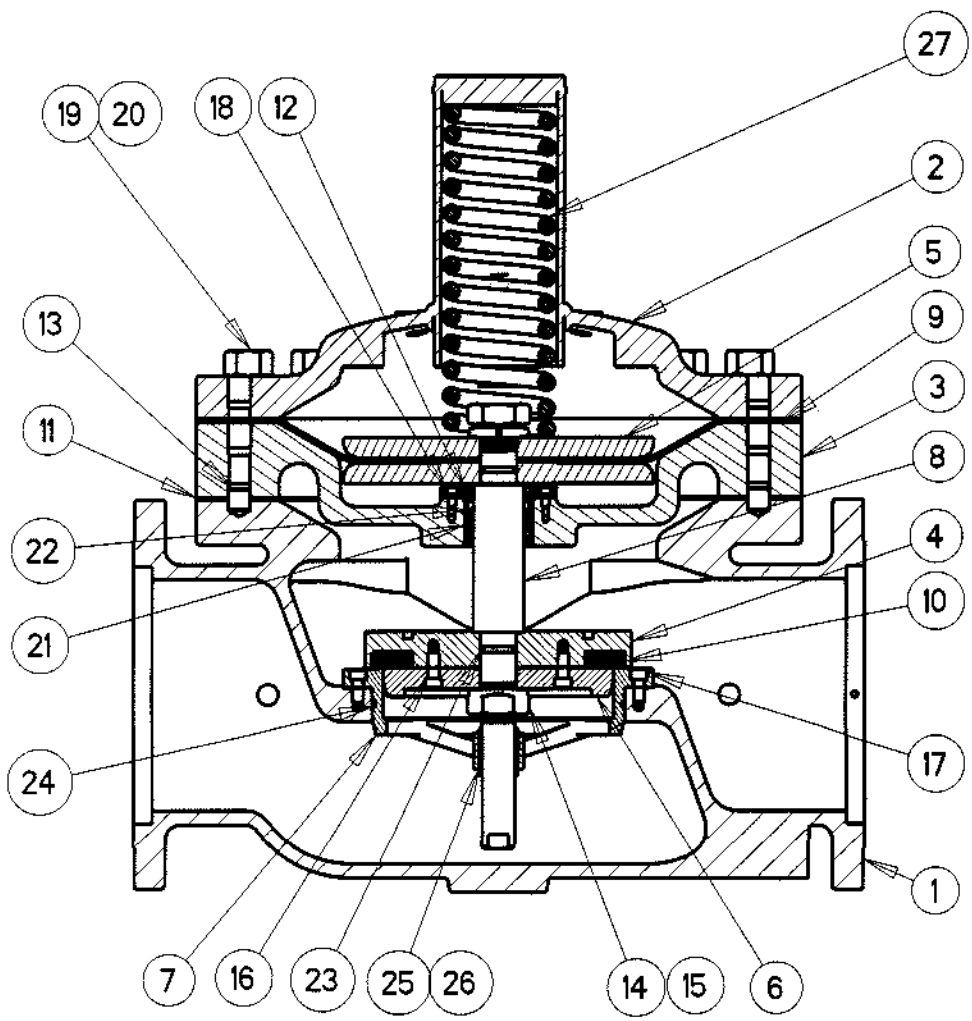
SENSE LINE REQUIREMENTS

| DISTANCE, FT. FROM TANK | MIN. SCHED. 40 PIPE SIZE |
|-------------------------|--------------------------|
| 0 - 35 | 3/8 |
| 36 - 120 | 1/2 |
| 121 - 450 | 3/4 |
| 451 - 1500 | 1 |



FROM TANK →

| REVISIONS | | | | REF DWG NO'S | | MATERIAL | | TOLERANCES UNLESS NOTED FRACTIONAL ± 1/64 DECIMAL ± .005 MACH FINISH 125/ ANGULAR ± 1/2° | | 6" TANK SAFETY VALVE | | |
|-----------|-----|----|------|--------------|-----|----------|-----|---|------|---------------------------------|----------------|-----|
| NO | CHG | BY | DATE | NO | REF | NO | REV | NO | DATE | SIZE | DRAWING NUMBER | REV |
| A | | | | | | NO REQ'D | | DRAWN BY | DATE | C | 66TS-06A | |
| B | | | | | | SCALE | | CHKD. BY | DATE | | | |



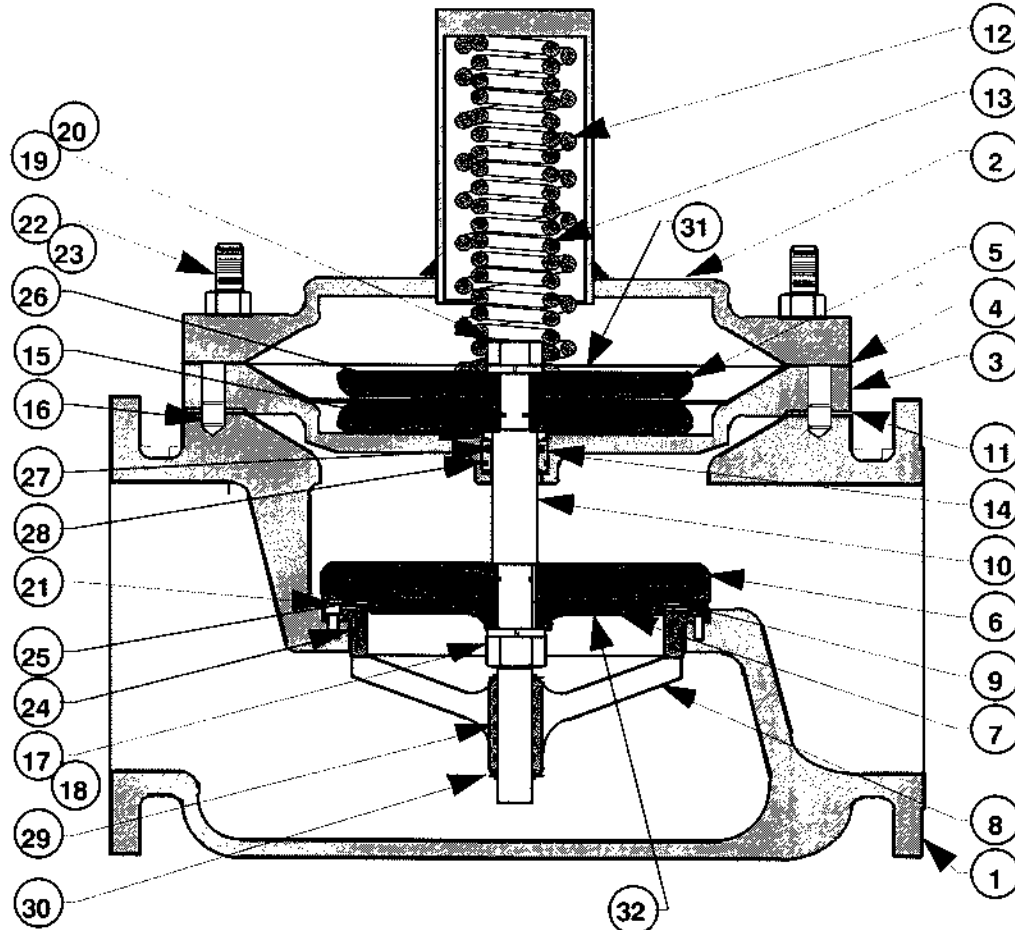
| ITEM | PART NO | QTY | DESCRIPTION | MATERIAL |
|------|-------------------|-----|--------------------|--------------------------|
| 1 | 301084 301384 | 1 | BODY | DUCT. IRON CAST STEEL |
| 2 | 303484 | 1 | BONNET | CAST STEEL |
| 3 | 306084 306384 | 1 | INTERMEDIATE PLATE | DUCT. IRON CAST STEEL |
| 4 | 306484 | 1 | SEAT PLATE | STEEL |
| 5 | 307384 | 2 | DIAPHRAGM PLATE | STEEL |
| 6 | 309085 | 1 | SEAT RETAINER | DUCT. IRON |
| 7 | 311184 311784* | 1 | SEAT RING | BRONZE STN. STL. |
| 8 | 313785 | 1 | STEM | STN. STL. |
| 9* | 690085 690185 | 1 | DIAPHRAGM | BUNA-N VITON |
| 10* | 690584 691584 | 1 | SEAT DISC | BUNA-N VITON |
| 11* | 693084 693184 | 1 | GASKET | BUNA-N VITON |
| 12 | 300287 300288 | 1 | GUIDE BUSHING | BRONZE STN. STL. |
| 13 | 300708 | 2 | DOWEL PIN | STN. STL. |
| 14 | 590724 | 2 | HEX NUT | STN. STL. |
| 15 | 685717 | 2 | LOCK WASHER | STN. STL. |
| 16 | 530718 | 8 | SKT. HD. CAPSCREW | STN. STL. |
| 17 | 530711 | 8 | SKT. HD. CAPSCREW | STN. STL. |
| 18 | 530700 | 4 | SKT. HD. CAPSCREW | STN. STL. |
| 19 | 300684 | 12 | STUD | ZN PL. STL. |
| 20 | 590010 | 12 | HEX NUT | ZN PL. STL. |
| 21* | 610227 611227 | 1 | O-RING | BUNA-N VITON |
| 22* | 610327 611327 | 1 | O-RING | BUNA-N VITON |
| 23* | 610214 611214 | 2 | O-RING | BUNA-N VITON |
| 24* | 610268 611268 | 1 | O-RING | BUNA-N VITON |
| 25* | 300074 | 1 | LOWER BUSHING | TEFLON |
| 26* | 630713 | 2 | SNAP RING | STN. STL. |
| 27 | 650001 | 1 | SPRING | STN. STL. |

* : RECOMMENDED SPARE PARTS
 * : PARTS PROVIDED WITH STAINLESS STEEL SEAT RING


| E | | | | MATERIAL | TOLERANCES | OCV Control Valves | | | |
|-----------|-----|------|----|--------------|--|---------------------------|----------|--------|------|
| D | | | | | UNLESS NOTED .XX ±.015 .XXX ±.005 ANGULAR ±0.5° MACH. FINISH 125 | TULSA OKLAHOMA USA | | | |
| C | | | | | | 8" 3200 TANK SAFETY VALVE | | | |
| B | | | | | | NO. REQ'D | DRAWN BY | DATE | SIZE |
| A | | | | | SDJ | 03-20-06 | A | 3250TS | |
| CHG | ECN | DATE | BY | SCALE | CHKD BY | DATE | | | |
| REVISIONS | | | | REF DWG NO'S | 15% | | | | |

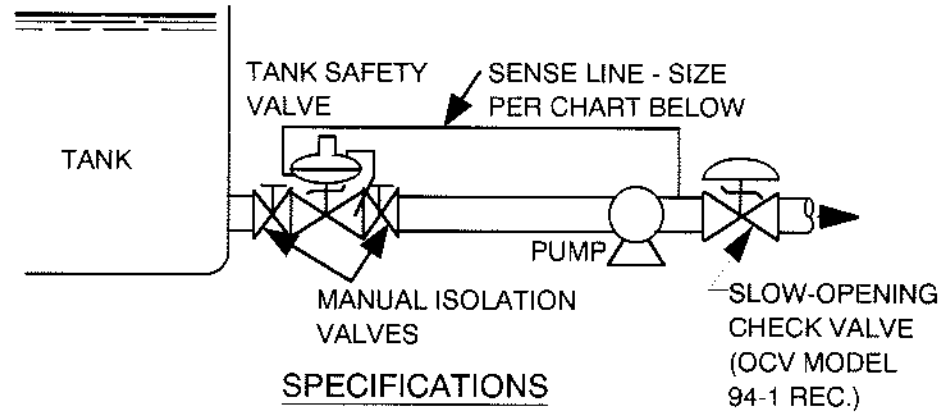
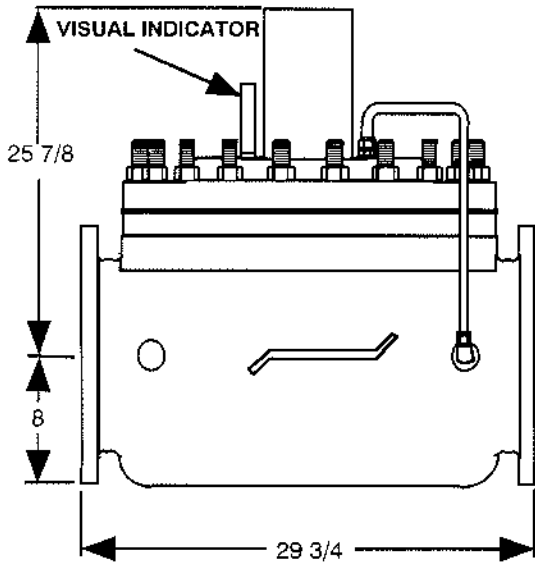
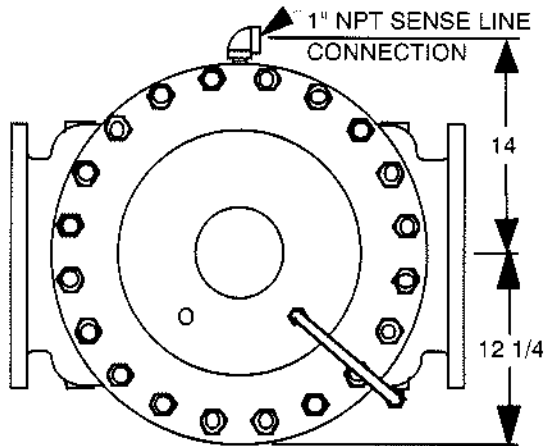
NOTES:

1. ▲ = RECOMMENDED SPARE PARTS
2. ● = PARTS STD. WITH S.S. SEAT RING
3. VITON ELASTOMERS ALSO AVAILABLE



| ITEM | PART NO. | QTY | DESCRIPTION | MATERIAL |
|------|----------|-----|----------------------|---------------|
| 32 | 531725 | 8 | CAPSCREW (NOT SHN) | STN. STL. |
| 31 | 300449 | 1 | SPRING RET (NOT SHN) | STEEL |
| 30 | 630714 | 2 | RETAINING RING | STN. STL. |
| 29 | 300007 | 1 | LOWER BUSHING | TEFLON |
| 28 | 610227 | 1 | O-RING | BUNA-N |
| 27 | 610327 | 1 | O-RING | BUNA-N |
| 26 | 610218 | 1 | O-RING | BUNA-N |
| 25 | 610218 | 1 | O-RING | BUNA-N |
| 24 | 610277 | 1 | O-RING | BUNA-N |
| 23 | 590010 | 16 | HEX NUT | ZINC. PL. ST. |
| 22 | 300488 | 16 | STUD | ZINC. PL. ST. |
| 21 | 530711 | 12 | SKT. HD. CAPSCREW | STN. STL. |
| 20 | 685713 | 1 | LOCKWASHER | STN. STL. |
| 19 | 590738 | 1 | HEX NUT | STN. STL. |
| 18 | 685713 | 1 | LOCKWASHER | STN. STL. |
| 17 | 590738 | 1 | HEX NUT | STN. STL. |
| 16 | 300708 | 2 | DOWEL PIN | STN. STL. |
| 15 | 530711 | 4 | CAPSCREW (NOT SHN) | STN. STL. |
| 14 | 300236 | 1 | GUIDE BUSHING | DELTRIN |
| 14 | 300232 | | | BRASS |
| 13 | 650746 | 1 | INNER SPRING | STN. STL. |
| 12 | 650000 | 1 | OUTER SPRING | NKL. PL. STL. |
| 11 | 693036 | 1 | GASKET | BUNA-N |
| 10 | 313754 | 1 | STEM | STN. STL. |
| 9 | 690505 | 1 | SEAT DISC | BUNA-N |
| | 311705 | 1 | SEAT RING | STN. STL. |
| 8 | 311105 | | | BRONZE |
| 7 | 309035 | 1 | SEAT RETAINER | DUCT. IRON |
| 6 | 306470 | 1 | SEAT PLATE | STEEL |
| 5 | 307440 | 2 | DIAPHRAGM PLATE | STEEL |
| 4 | 690073 | 1 | DIAPHRAGM | BUNA-N |
| 3 | 306325 | 1 | INTERMEDIATE PLATE | CAST STEEL |
| 2 | 303425 | 1 | BONNET | CAST STEEL |
| 1 | 301325 | 1 | BODY | CAST STEEL |

| | | | | MATERIAL | TOLERANCES | |  Control Valves TULSA, OKLAHOMA U.S.A. | | |
|---------------------|----------|------|----|-----------|------------|------|--|----------------|------|
| | | | | | N/A | | 10" TANK SAFETY VALVE ASSEMBLY | | |
| CHG | E.C. NO. | DATE | BY | NO. REQ'D | DRAWN BY | DATE | SIZE | DRAWING NUMBER | REV. |
| REVISIONS | | | | SCALE | CHKD. BY | DATE | A | 3800TS | |
| REF DWG NO'S | | | | NONE | | | | | |



SPECIFICATIONS

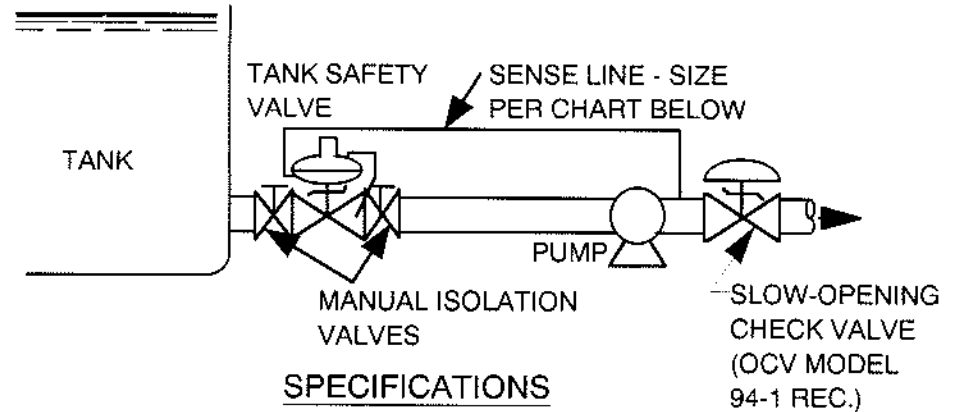
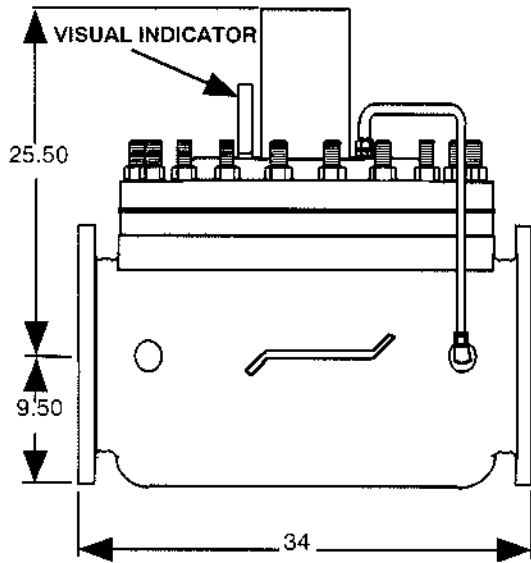
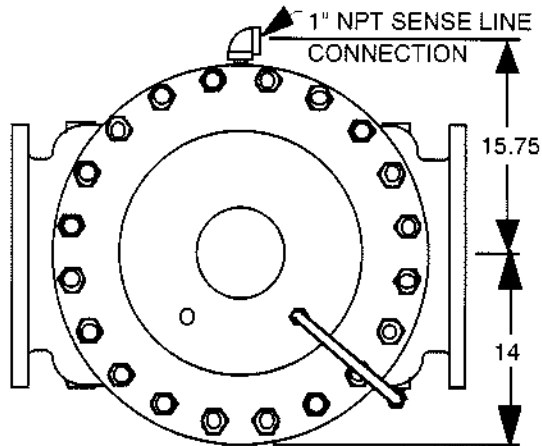
- PRESSURE REQ'D TO START VALVE OPEN — 5 PSID*
- PRESSURE REQ'D TO FULL OPEN VALVE — 15 PSID*
- VALVE OPENING TIME — 10 SECONDS OR LESS WITH 30 PSID* MIN. PRESSURE AND SENSE LINE SIZED PER CHART BELOW.
- VALVE CLOSING TIME — 15 SECONDS OR LESS WITH SENSE LINE SIZED PER CHART BELOW.
- VALVE Cv (FULL OPEN) — 1250
- VALVE WILL AUTOMATICALLY CLOSE IF DIAPHRAGM FAILS.

*PUMP DISCHARGE HEAD MINUS FULL TANK HEAD

SENSE LINE REQUIREMENTS

| DISTANCE, FT. VALVE-TO-PUMP | MIN. SCHED 40 PIPE SIZE |
|--------------------------------|----------------------------|
| 0 - 30 | 3/4" |
| 31 - 150 | 1" |
| 151 - 600 | 1 1/4" |
| 600 - 1 000 | 1 1/2" |

| | | | | | | | | | | |
|------------------|----------|------|----|---------------------|-----------------------------------|-----------------|--|----------|-----------------|------|
| | | | | MATERIAL | TOLERANCES | | Control Valves TULSA, OKLAHOMA U.S.A. | | | |
| | | | | | FACE TO FACE FRACTIONAL ±3/32" | | | | | |
| | | | | | OTHERS GENERAL ENVELOPE | | 10" TANK SAFETY VALVE INSTALLATION | | | |
| | | | | NO. REQ'D | DRAWN BY RON | DATE 6-21-00 | | | | SIZE |
| CHG | E.C. NO. | DATE | BY | SCALE | NONE | CHKD. BY | DATE | A | 66TS-10A | |
| REVISIONS | | | | REF DWG NO'S | | | | | | |



SPECIFICATIONS

- PRESSURE REQ'D TO START VALVE OPEN — 5 PSID*
- PRESSURE REQ'D TO FULL OPEN VALVE — 15 PSID*
- VALVE OPENING TIME — 10 SECONDS OR LESS WITH 30 PSID* MIN. PRESSURE AND SENSE LINE SIZED PER CHART BELOW.
- VALVE CLOSING TIME — 15 SECONDS OR LESS WITH SENSE LINE SIZED PER CHART BELOW.
- VALVE Cv (FULL OPEN) — 1700
- VALVE WILL AUTOMATICALLY CLOSE IF DIAPHRAGM FAILS.

*PUMP DISCHARGE HEAD MINUS FULL TANK HEAD

SENSE LINE REQUIREMENTS

| DISTANCE, FT. VALVE-TO-PUMP | MIN. SCHED 40 PIPE SIZE |
|--------------------------------|----------------------------|
| 0 - 30 | 3/4" |
| 31 - 150 | 1" |
| 151 - 600 | 1 1/4" |
| 600 - 1 000 | 1 1/2" |

| | | | | |
|------------------|----------|------|----|---------------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| CHG | E.C. NO. | DATE | BY | |
| REVISIONS | | | | REF DWG NO'S |

| | | | |
|-----------------|-----------------|----------------------------------|--|
| MATERIAL | | TOLERANCES | |
| | | FACE TO FACE FRACTIONAL ±1/8" | |
| | | OTHERS GENERAL ENVELOPE | |
| NO. REQ'D | DRAWN BY RON | DATE 4-8-99 | |
| SCALE | CHKD. BY | DATE | |

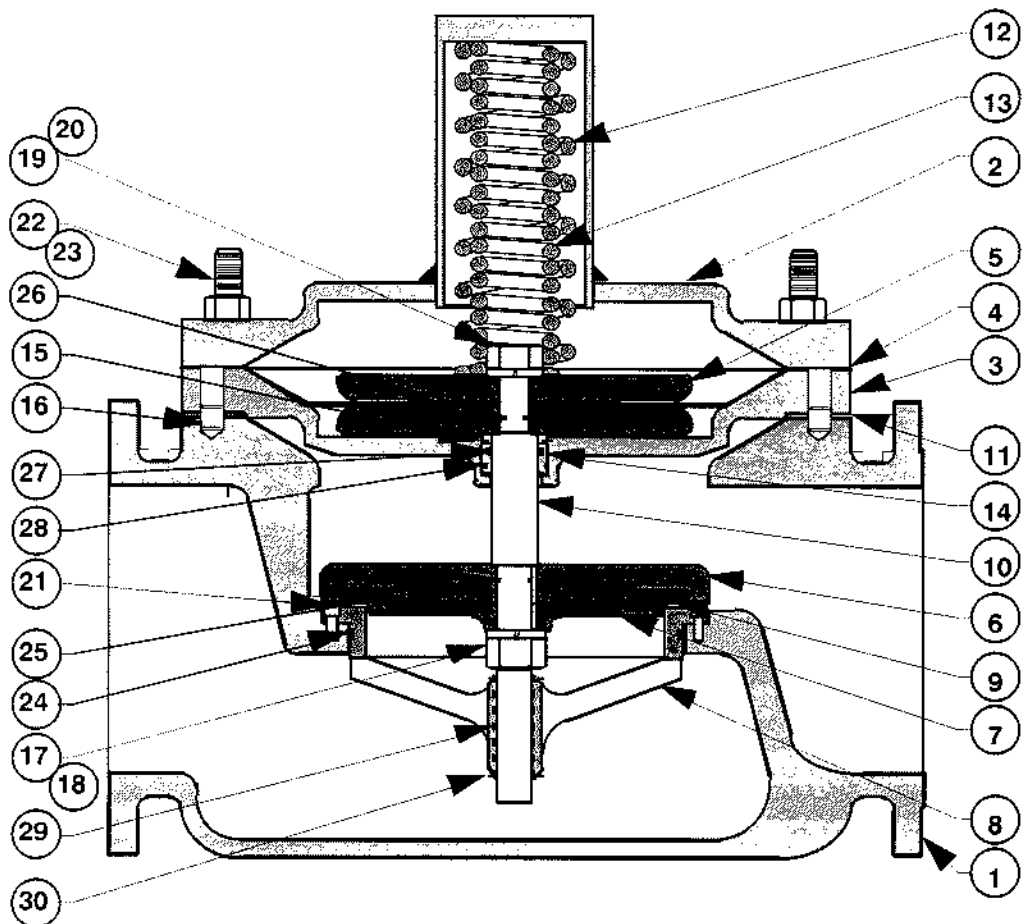
OCV Control Valves TULSA, OKLAHOMA U.S.A.

12" TANK SAFETY VALVE INSTALLATION

| | | |
|----------|-----------------|------|
| SIZE | DRAWING NUMBER | REV. |
| A | 66TS-12A | |

NOTES:

- 1. ▲ = RECOMMENDED SPARE PARTS
- 2. ● = PARTS STD. WITH S.S. SEAT RING
- 3. VITON ELASTOMERS ALSO AVAILABLE



| ITEM | PART NO. | QTY | DESCRIPTION | MATERIAL | |
|------|----------|--------|-------------|--------------------|---------------|
| ● | 30 | 630714 | 2 | RETAINING RING | STN. STL. |
| ● | 29 | 300097 | 1 | LOWER BUSHING | TEFLON |
| ▲ | 28 | 610145 | 1 | O-RING | BUNA-N |
| ▲ | 27 | 610328 | 1 | O-RING | BUNA-N |
| ▲ | 26 | 610121 | 1 | O-RING | BUNA-N |
| ▲ | 25 | 610125 | 1 | O-RING | BUNA-N |
| ▲ | 24 | 610456 | 1 | O-RING | BUNA-N |
| | 23 | 590028 | 20 | HEX NUT | ZINC. PL. ST. |
| | 22 | 300075 | 20 | STUD | ZINC. PL. ST. |
| | 21 | 530711 | 16 | SKT. HD. CAPSCREW | STN. STL. |
| | 20 | 685717 | 1 | LOCKWASHER | STN. STL. |
| | 19 | 590724 | 1 | HEX NUT | STN. STL. |
| | 18 | 685713 | 1 | LOCKWASHER | STN. STL. |
| | 17 | 590723 | 1 | HEX NUT | STN. STL. |
| | 16 | 620012 | 2 | DOWEL PIN | STN. STL. |
| | 15 | 630703 | 1 | RETAINING RING | STN. STL. |
| | | 300602 | 1 | GUIDE BUSHING | TEFLON |
| | 14 | 300118 | | | BRASS |
| | 13 | 650761 | 1 | INNER SPRING | STN. STL. |
| | 12 | 650760 | 1 | OUTER SPRING | STN. STL. |
| ▲ | 11 | 693007 | 1 | GASKET | BUNA-N |
| | 10 | 313716 | 1 | STEM | STN. STL. |
| ▲ | 9 | 690506 | 1 | SEAT DISC | BUNA-N |
| | | 311706 | 1 | SEAT RING | STN. STL. |
| | 8 | 311106 | | | BRONZE |
| | 7 | 309036 | 1 | SEAT RETAINER | DUCT. IRON |
| | 6 | 306446 | 1 | SEAT PLATE | STEEL |
| | 5 | 307436 | 2 | DIAPHRAGM PLATE | STEEL |
| ▲ | 4 | 690017 | 1 | DIAPHRAGM | BUNA-N |
| | 3 | 306436 | 1 | INTERMEDIATE PLATE | CAST STEEL |
| | 2 | 303436 | 1 | BONNET | CAST STEEL |
| | 1 | 301306 | 1 | BODY | CAST STEEL |

| | | | | MATERIAL | TOLERANCES |
|-----------|----------|------|----|--------------|-----------------|
| | | | | | N/A |
| | | | | | |
| | | | | | |
| | | | | | |
| CHG | E.C. NO. | DATE | BY | NO. REQ'D | DRAWN BY RON |
| REVISIONS | | | | SCALE | DATE |
| | | | | REF DWG NO'S | |

Control Valves TULSA, OKLAHOMA U.S.A.

12" TANK SAFETY VALVE ASSEMBLY

| | | |
|----------|----------------|------|
| SIZE | DRAWING NUMBER | REV. |
| A | 1500TS | |