

**!WARNING!**

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion and/or fire causing property damage and personal injury or death.

MEC equipment must be installed, operated, and maintained in accordance with federal, state, and local codes and manufacturer's instructions. The installation in most states must also comply with NFPA No. 58, and ANSI/CGA G-2.1.

For installation in the European Union, the equipment must also comply with PED/TPED and EN ISO standards. Periodic inspections, intermediate inspections and exceptional checks of transportable pressure equipment should be carried out in accordance with the Annexes of Directive 2008/68/EC and with 2010/35/EU Directive (TPED) to ensure continued compliance with their safety requirements.

Only personnel trained in the proper procedures, codes, standards, and regulations of the LP-Gas industry should install and service this equipment.

The internal valve must be closed except during product transfer. A line break downstream of a pump may not actuate the excess flow valve. If any break occurs in the system or if the excess flow valve closes, the system should be shut down immediately.



**WARNING:** These products contain a chemical known to the state of California to cause cancer and birth defects or other reproductive harm.

**Scope of the Manual**

This manual covers instructions for the ME990-3F "Excelerator" Series 3" Flanged internal valves. Also included in this manual are the instructions for connection from the valve's operating lever to a cable control.

**Introduction**

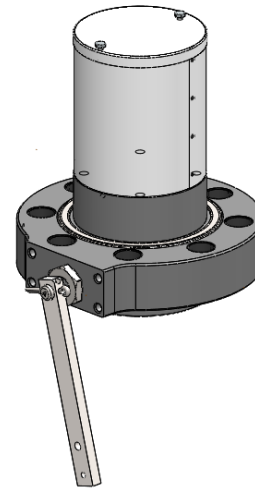
The ME990-3F internal valve is typically used on the inlets and outlets of transport truck tanks and large stationary storage tanks. They can also be installed in-line. Designed for propane or NH<sub>3</sub> (Anhydrous Ammonia) at ambient temperatures, the valves can be used on other compressed gases, but the user should check with the factory to make sure the valve is suitable for the particular service and application.

Actuation of the valve can be achieved manually, by cable, or with a pneumatic actuator.

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**Specifications**

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**Body Size and End Connection Styles:**

**Inlet:** NPS 3 / DN 100, CL300 ASME RF Modified Flange (4.625" / 117mm bore)

**Outlet:** NPS 3 / DN 100, CL300 ASME Flange

**Maximum Allowable Inlet Pressure:**

500 psig / 34.5 bar WOG

**Excess Flow Springs:**

**GPM LPG (vertical down):** 175, 250, 300, 375, 400, 475, and 500

**l/min LPG:** 662, 946, 1136, 1419, 1514, 1798, and 1893

**Temperature Capabilities:** -20° to 150°F / -29° to 66°C

**Approximate weight:** 30 pounds / 14 kg

**Body Material:** Stainless Steel

**DOT Internal Self-Closing Stop Valve Requirement--**

U.S. Department of Transportation (DOT) regulations 49CFR§178.337-8(a)(4) require each liquid or vapor discharge outlet on cargo tanks (except for cargo tanks used to transport chlorine, carbon dioxide, refrigerated liquid, and certain cargo tanks certified prior to January 1, 1995) to be fitted with an internal self-closing stop valve. The ME990 series internal valves comply with the internal self-closing stop valve requirement under the DOT regulations.

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ME990-3F

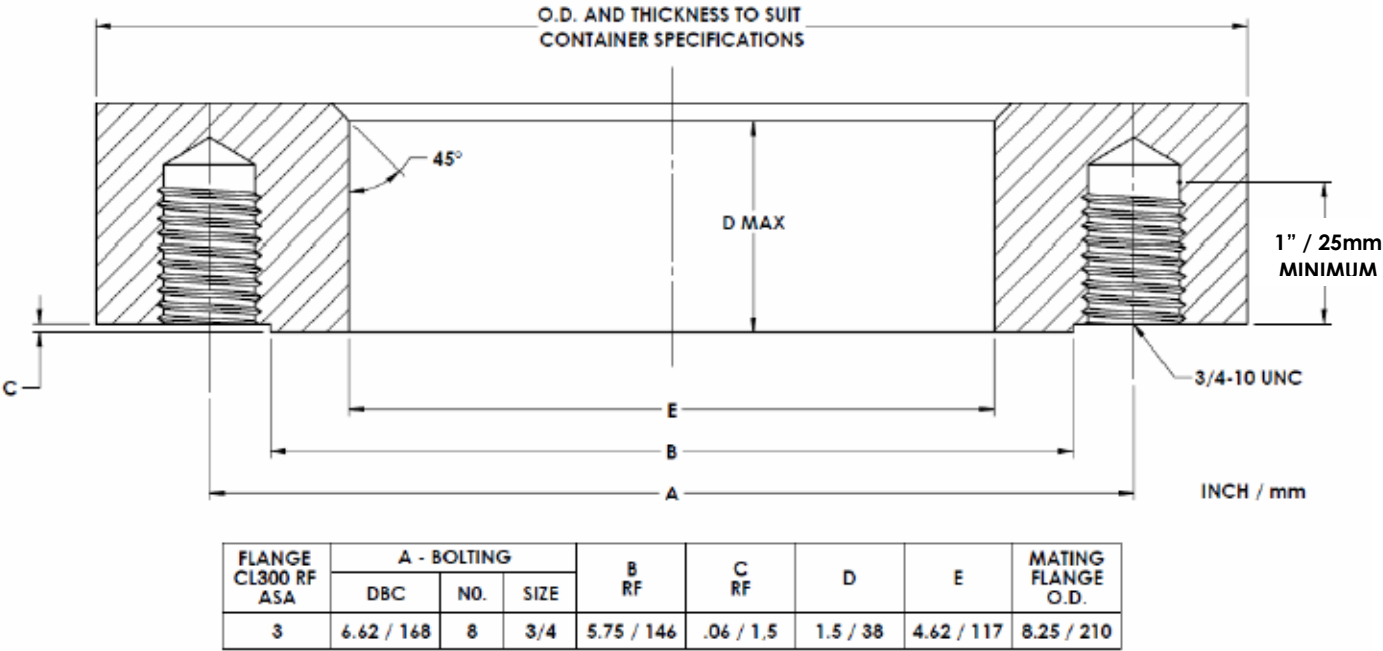


FIGURE 1: TANK FLANGE DIMENSIONS

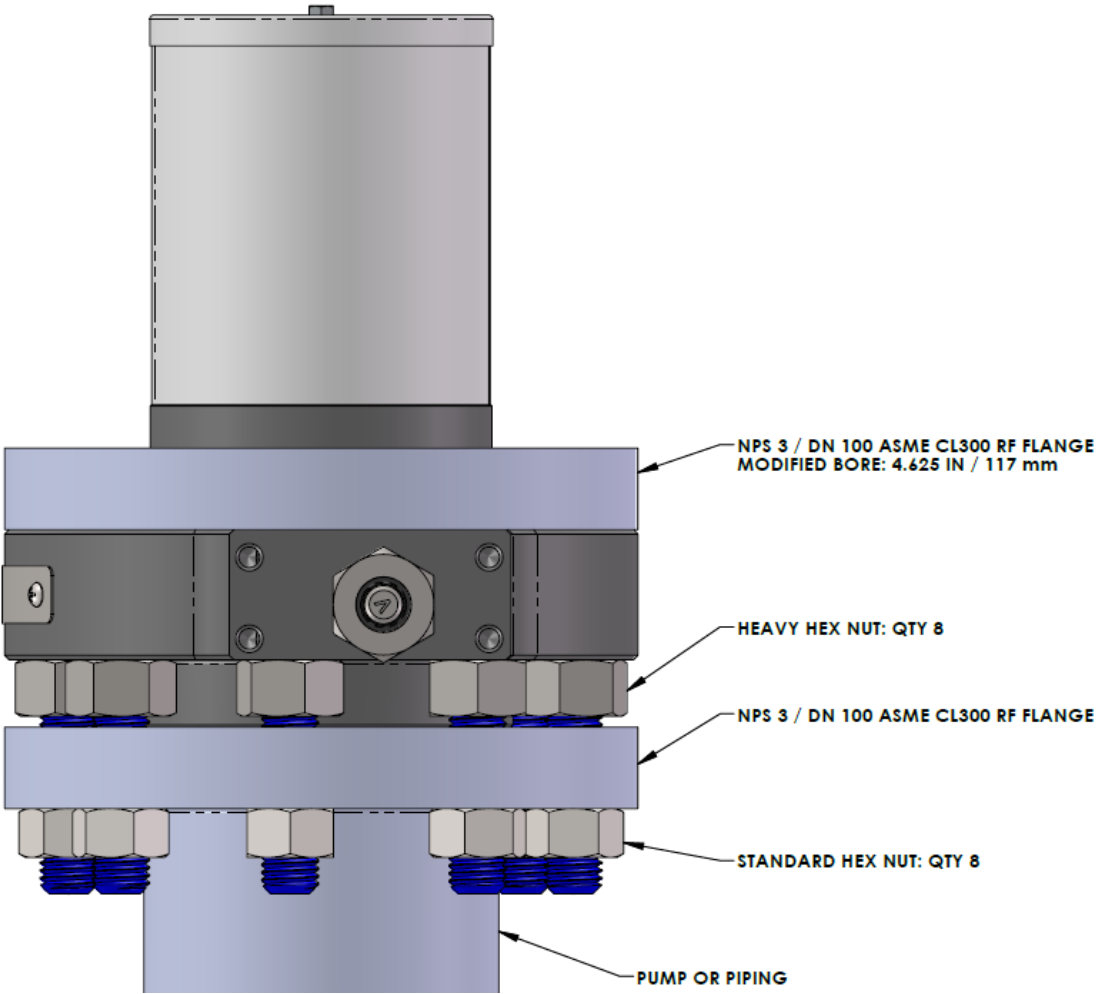


FIGURE 2: ME990-3F INSTALLATION SCHEMATIC

## Installation

### Internal Valve

Coat both sides of the spiral wound gaskets with Dow Corning #111 silicone grease or equivalent. An NPS 4 (DN 100), CL300 ASME RF flange with a modified bore (see Figure 1) must be installed in the tank. Special stud bolts, furnished with the valve, are assembled into this flange. The internal valve and the pump or piping flange can then be installed as shown in Figure 2.

The screen should be removed if the valve is to be used for both filling and withdrawal service or for filling alone. Filling with screen installed is not recommended.

A hydrostatic relief valve does not need to be installed adjacent to the valve since the internal valve automatically relieves excessive line pressure into the tank.

Keep piping from the valve outlet to the pump full size and as short as possible with a minimum of bends. Reduction in pipe size to suit smaller pump inlets should be made as close to the pump as possible using forged reducers (swage nipples) or venturi tapers rather than bushings. This assures minimum flow resistance and efficient pump operation.

The operating linkage must allow the operating lever to move from the fully closed position to within 2° of the full open position. The linkage should not apply strong force to the lever past the full open position or the valve could be damaged.

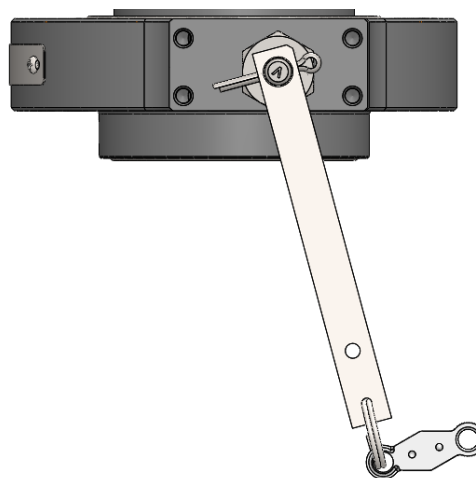
If the valve is also used to provide excess flow protection, the flow rating of the piping, fittings, pump, valves, and hose on both the inlet and outlet of the internal valve must be greater than the flow rating of the integral excess flow valve within the internal valve. If branching or other necessary restrictions are incorporated in the system which reduce the flow rating to less than that of the excess flow valve rating, the internal valve will not give excess flow protection.

After installation check all joints for leaks using a suitable leak detector solution such as Marshall Excelsior low-temp leak detector before putting the valve into service.

### Selectively Filling Manifolded Tanks

MEC internal valves provide positive shutoff only in one direction, from out of the tank to downstream of the valve. The internal valves are designed to allow gas to flow into a tank when the downstream line pressure exceeds tank pressure. If you want to selectively fill one or more of the other tanks in a tank manifold system, you must place a positive shutoff valve downstream of the internal valve, otherwise, all tanks will be filled at the same time and at about the same rate.

## Operation Methods



**Figure 3: Fuse Assembly**

**Pulley Cable Assembly:** On standard configuration ME990-3F valves, insert the provided key ring through one hole in the operating lever. Install the fuse link onto the key ring, and then connect the fuse link to a control cable, see Figure 3.

A remote operating handle is attached to the other end of the cable. Since the remote operating system for the valve is extremely important, it must be installed to conform to applicable codes. DOT MC-331, for example, most generally applies for trucks; refer to the most recent revision of this code. Any control system requires thermal protection (fuse links) at the valve, at the remote control point and if necessary near the hose connections.

Rotate the valve's operating lever by hand to the position shown in Figure 3. In this position the valve's cam is just contacting the valve stem and the cable can be attached to the remote operating handle. Check to see that the valve closes properly and that the operating lever returns to its original position. There should be a little slack in the cable.

### **!WARNING!**

**Since there is strong spring force on the operating lever, avoid getting in the way of lever if it slams to the closed position. The lever should not be allowed to slam to the closed position except in emergency situations, as repeated slamming may damage the valve and operator.**

### Actuators:

### **NOTE**

**The use of non-MEC actuators may result in leakage of the gland packing caused by premature wear. In addition to premature wear, the use of non-MEC actuators may result in lower than expected flow rates and possible leakage across the valve seats.**

## Excess Flow Operation

The internal valve contains an excess flow function, or "integral excess flow valve", which is designed to close when the flow exceeds the flow rating established by MEC. MEC integral excess flow valves installed on a bobtail truck or transport can provide protection against the discharge of hazardous materials during an unloading operation of a bobtail truck or transport in the event that the pump or piping attached directly to the internal valve is sheared off before the first valve, pump, or fitting downstream of the internal valve, provided that the cargo tank pressure produces a flow rate greater than the valve's excess flow rating.

Likewise, if the internal valve is installed on a stationary tank or in the related downstream piping system, the integral excess flow valve can provide protection against an unintentional release of hazardous materials in the event that a pump or piping attached directly to the internal valve is sheared off before the first valve, pump, or fitting downstream of the internal valve, provided that the flow of product through the internal valve reaches the rated flow specified by MEC.

### !EXPLOSION HAZARD!

Restrictions incorporated in the discharge system of a bobtail truck or transport or of a stationary tank (due to pumps, pipe and hose length and dimensions, branching, elbows, reductions in pipe diameter, or a number of other in-line valves or fittings), low operating pressure as a result of ambient temperature, or a partially closed valve downstream from the integral excess flow valve, can restrict the rate of flow through the internal valve below the level necessary to actuate the integral excess flow valve. Therefore, **DO NOT USE** the excess flow function of the internal valve for the purpose of providing protection against the discharge of hazardous materials in the event of a rupture of hose or piping at a point in the discharge system downstream from the first valve, pump, or fitting downstream of the internal valve.

The internal valve is designed with an internal bleed feature for equalization of pressure. After the integral excess flow valve closes, the leakage through the bleed must be controlled or a hazard can be created. For this reason the operator must be familiar with the closure controls for the internal valve and must close the internal valve immediately after the integral excess flow valve closes.

Failure to follow this warning could result in serious or fatal personal injury or property damage from a fire or explosion.

#### DOT Passive Shutdown Equipment Requirement--

DOT regulations 49CFR§173.315(n)(2) require certain cargo tanks transporting propane, anhydrous ammonia and other liquefied compressed gases to be equipped with passive emergency discharge control equipment that will

automatically shut off the flow of product without human intervention within 20 seconds of an unintentional release caused by complete separation of a delivery hose. The design for each passive shutdown system must be certified by a Design Certifying Engineer (DCE) and all components of the discharge system that are integral to the design must be included in the DCE certification. The DCE certification must consider any specifications of the original component manufacturer.

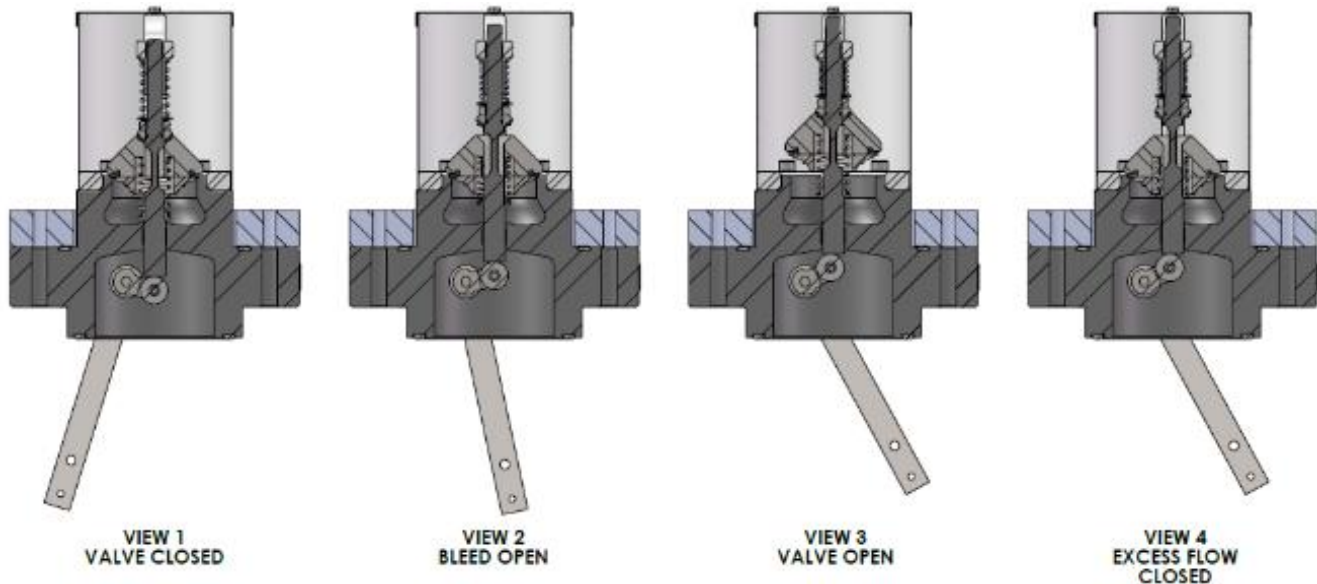
In the case of downstream ruptures in hose or piping, a variety of operating conditions routinely encountered during an unloading operation restrict the rate of flow through the integral excess flow valve and make such a valve unsuitable to serve as the means of passive shutdown required under 49CFR§173.315(n)(2). Such variables include restrictions incorporated in the discharge system (due to pumps, pipe and hose length and dimensions, branching, elbows, reductions in pipe diameter, or a number of other in-line valves or fittings), low operating pressure as a result of ambient temperature, or a partially closed valve downstream from the excess flow valve. Due to the variety of conditions, in the case of a hose separation, that can restrict the rate of flow below the level necessary to activate the excess flow valve, the integral excess flow function of ME990 series internal valves cannot be used to satisfy the passive shutdown equipment requirement under/in 49CFR§173.315(n)(2). Also, a Design Certifying Engineer cannot include the integral excess flow valve of a ME990 series internal valve as a component of the discharge system in any DCE certification under 49CFR§173.315(n)(2).

### !EXPLOSION HAZARD!

**DO NOT USE** the excess flow function incorporated into ME990 series internal valves to satisfy the passive shutdown equipment requirement in 49CFR§173.315(n)(2). **DO NOT** include the excess flow function incorporated into ME990 series internal valves in a DCE certification under 49CFR§173.315(n)(2). The cargo tank manufacturer must install some other equipment that satisfies the requirement for passive shutdown capability under 49CFR§173.315(n)(2).

Failure to follow this warning could result in serious or fatal personal injury or property damage from a fire or explosion in the event of an unintentional release of product during an unloading operation.

## ME990-3F



**FIGURE 4: Operational Schematic**

### Operation

Since the ME990-3F internal valve is most often used on transport trucks, the following procedure applies to that type of application.

1. Always open the internal valve before starting the pump and before opening the valve on the pump outlet.
2. Normally leave the pumping system "wet" to avoid repeated drying of the seals and to reduce time in opening the internal valve. Drain the piping only when codes or safe operating practices require.
3. If piping is dry or at lower pressure than the tank, open the internal valve only about halfway for a few seconds so that line pressure can equalize before fully opening the operating lever. The valve may not equalize if the operating lever is moved to the fully open position.
4. Avoid flow surges which could close the built-in excess flow valve. If the valve should "slug" shut, stop the pump, close the nearest downstream valve, and move the lever to mid-position to speed equalizing until the valve opens. There will be an audible click when the valve opens.
5. Always leave the valve closed except when transferring product.
6. All valves should be completely open when pumping. (Throttling type valves could prevent the excess flow valve from closing when required.)
7. The operator must always be aware of where the remote closure controls are located and know how to operate the controls if any emergency requires valve closure.

### Troubleshooting

**Internal Valve Will Not Open:** This could be due to leakage downstream, engaging the pump too soon or from excessive wear in the internal valve. If excessive volume is in the downstream system, a longer time is required to equalize the pressures (tank and downstream) before the pump can be engaged. To determine if the valve pilot seat is opening, install a gauge downstream of the valve, operate the valve actuator; if pressure does not build-up to the tank pressure, the valve pilot seat is not open. This test should be done with the pump off. If the pilot is not opening, it may be plugged with dirt or some internal part may be broken. If by operating the lever manually it can be rotated past the fully open position, there is something wrong internally and the valve must be disassembled.

**Premature Valve Closure:** This can be caused from engaging the pump too soon, by an underrated excess flow valve spring, or by an improperly connected internal valve operating lever which does not fully open the valve. The trouble could also be from a valve that has its inlet port obstructed or from sudden line surges. In order to check the valve opening travel, operate the lever manually to the full travel, wait until valve opens (usually about 15 seconds), then engage the pump. If the excess flow closes, the points mentioned above should be investigated.

**Internal Valve Will Not Close:** The stub shaft could be binding or the stem could be bent in the valve. Before disassembling the valve, check the actuator mechanism to see that it operates freely by disconnecting it from the valve lever and cycling it several times. Also, operate the valve lever manually. If it sticks in the open position, the packing and bushings should be replaced. This should free the operating mechanism if the valve has not been damaged internally. Refer to the "Maintenance" section.

**Low Flow Capacity:** This could be caused by an undersized internal valve, undersized or long downstream piping, plugged screens, some other restriction in the down-stream system, or by the bypass valve sticking in the open position. The bypass valve could also be set too low and be opening prematurely.

## Principle of Operation

Refer to the schematic drawing, Figure 4 In View 1, the valve is held closed by both tank pressure and the valve's closing spring. There is no leakage past the resilient seats in the poppet to the valve outlet in this position.

The valve is opened by moving the operating lever to approximately mid-point in its travel range (Figure 4 View 2). This allows the roller cam to place the "Excellerator" equalization portion of the valve stem in the pilot opening, permitting a larger amount of product to bleed downstream than if the operating lever was moved to the full open position.

When tank and downstream pressures have equalized in the bleed position, (after a few seconds), the excess flow spring pushes open the main poppet (Figure 4 View 3) and the operating lever can be moved to the full open position.

If tank pressure is greater than the valve's outlet pressure, the main poppet will remain in the closed position. If valve outlet piping is closed off by other valves, however, product bleeding through the pilot will increase until it nearly equals tank pressure and the main poppet opens.

### Note

**The main poppet will not open if valve outlet piping is not closed off so that the outlet pressure can approach tank pressure.**

Once the main poppet opens, a flow greater than the valve's excess flow spring rating or a sufficient surge in flow forces the main poppet closed against the excess flow spring (View 4). The pilot valve allows a small amount of product to bleed, but much less than (View 2) where the rapid equalization portion of the stem is placed in the pilot opening. When the operating lever is moved to the closed position, the valve closes completely and seals tightly (View 1).

## Maintenance

### !CAUTION!

**Do not use these internal valves if they leak, fail to work properly or have been damaged or have missing parts. Prompt repairs should be made by a properly trained serviceman. Continued use without repair can create a hazardous situation which could result in serious or fatal personal injury or property damage.**

A simple preventative maintenance program for the valve and its controls will eliminate a lot of potential problems.

**MEC recommends these steps be conducted once a month. Also refer to the Department of Transportation (DOT) CFR 49 Sections 180.416 and 180 Appendix A and B which specific monthly maintenance and inspection tests for cargo tank service internal valves and their actuation controls.**

1. Inspect the operating lever to see that it moves freely and smoothly. Also examine the stub shaft bonnet nuts for leakage using a soap solution. If there is leakage, the bonnet packing will have to be replaced. A sticking lever indicates mechanism wear or trapped dirt. This could mean the need for new shaft seals, shaft bushings or stem bushings.
2. Check for tight closure of the seat disks. Any detected leakage, which is normally caused by disk wear or dirt, scale or debris embedded in the disk, requires that the internal valve be removed from service and repaired. Repair most often requires the replacement of valve disks. To check for leakage:
  - a. Close the internal valve and exhaust downstream pressure. Close the first valve downstream from the internal valve, and note any pressure buildup, using a pressure gauge, between the closed valve and the internal valve. If piping is cold, allow it to warm to ambient temperature.
  - b. Refer to CFR 49 Section 180 Appendix B for Meter Creep Test Methods.
3. All operating controls should be inspected, cleaned and oiled. The controls should be checked to see that they fully open but not over travel the internal valve operating lever and work freely to close the valve.
4. Standard construction internal valves must be removed if the container is to be steam cleaned. Heat can damage the valve's seats and seals.
5. Standard construction internal valves are not designed for water service. Immediately after a container is hydrostatically tested, remove all water and allow the container to thoroughly dry out.

## Parts Ordering

### Important

**Use only genuine MEC replacement parts. Components that are not supplied by MEC should not, under any circumstances, be used in any MEC valve, because they might adversely affect the performance of the valve, and could give rise to personal injury and property damage.**

When corresponding about this equipment, always reference the equipment model or series number found on the nameplate.

# ME990-3F

Parts List for ME990-3F			ME990-3F-			
Ref. #	Description	Qty.	SRK	VRK	PGA	PRK
1	Body	1				
2	Cage Bushing	1	✓	✓		
3	Stem	1		✓		
4	Stem O-ring	1	✓	✓		
5	Spring Seat	1		✓		
6	Excess Flow Spring, Purple, 175 GPM	1				
	Excess Flow Spring, Black, 250 GPM					
	Excess Flow Spring, Green, 300 GPM					
	Excess Flow Spring, Yellow, 375 GPM					
	Excess Flow Spring, Red, 400 GPM					
	Excess Flow Spring, Plain, 475 GPM					
	Excess Flow Spring, White, 500 GPM					
7	Poppet Screw	6		✓		
8	Lock Washer	6		✓		
9	Seal Retainer	1		✓		
10	Main Valve Seal	1	✓	✓		
11	Valve Poppet	1		✓		
12	Bleed Disc	1	✓	✓		
13	Lock Nut	1		✓		
14	Closing Spring Washer	1		✓		
15	Closing Spring	1		✓		
16	Spring Guide	1		✓		
17	Stem Bushing	1	✓	✓		
18	Valve Cage	1		✓		
19	Cage Screw	4		✓		
20	Stub	1		✓	✓	
21	Gland Bushing	2	✓	✓	✓	✓
22	Thin Washer	1		✓	✓	
23	Gland Spring	1		✓	✓	
24	Thick Washer	1		✓	✓	
25	Male Adapter	1	✓	✓	✓	✓
26	V-Pack	3	✓	✓	✓	✓
27	Female Adapter	1	✓	✓	✓	✓
28	Nylon Washer	1	✓	✓	✓	✓
29	Wiper	1	✓	✓	✓	✓
30	Bonnet	1		✓	✓	
31	Cam	1		✓	✓	
32	Roller	1		✓	✓	
33	Roller Bushing	1		✓	✓	
34	Rivet	1		✓	✓	
35	Spring Pin	1	✓	✓	✓	✓
36	Nameplate Screw	2				
37	Nameplate	1				
38	Strainer	1				
39	Strainer Cap	1				
40	Strainer Screw	1		✓		
41	Cotter Pin	1				
42	Lever	1				
43	Fusible Link	1				
44	Key Ring	1				
45	Lower Gasket	1				
46	Upper Gasket	1				
47	Stud (not shown)	8				
48	Heavy Flange Nut (not shown)	8				
49	Flange Nut (not shown)	8				
50	Flange Bushing (not shown)	8		✓		

✓ - Included in service kit

# ME990-3F

