MAINTENANCE MANUAL

CLA-VAL 352GF HYDRANT PIT VALVE

A member of the Cavotec Group

Revision History

Date of Change	Version
17-12-2014	1.0

TABLE OF CONTENTS

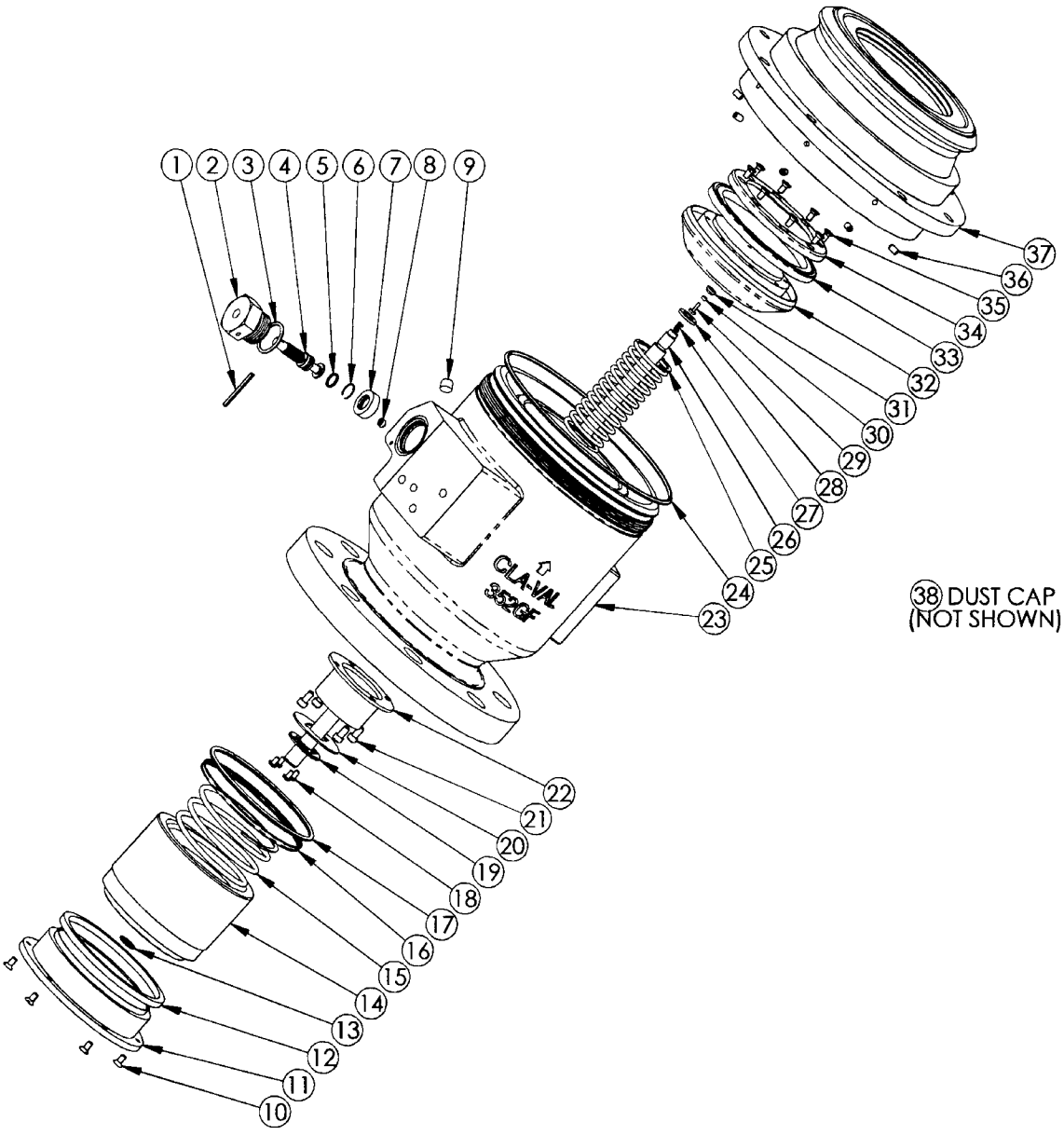
1.0 INTRODUCTION

This Maintenance Manual covers the OPERATION, MAINTENANCE and REPAIR of Cla-Val Model 352GF Hydrant Pit Valves, referred from here on as just Pit Valve. Only the Basic Pit Valve Subassembly is covered by this document. Other items attached to the Pit Valve, such as Manual or Air Pilots and Excess Flow Controls are covered in other specific documents.

The OPERATION section contains information for the installation and use of the Pit Valve.
The MAINTENANCE section contains information for the regular inspection and service.
The REPAIR section contains information on how to disassemble and re-assemble the Pit Valve.
The TROUBLESHOOTING section contains helpful hints for diagnosing problems.

2.0 OPERATION

2.1 Exploded View and Parts List:



Parts

List:

Item	Qty.	Part No.	Description	Material
1	1	DUK6000300	Pin, Groove	Stainless Steel
2	1	DUK6000301	Nut, Servicing Valve	Aluminium
3	1	DUK6000302	O-Ring (per MS29512-12)	Nitrile
4	1	DUK6000303	Stem, Servicing Valve	Stainless Steel
5	1	DUK6000304	O-Ring (Size 2-012)	Nitrile
6	1	DUK6000305	Retaining Ring	Stainless Steel
7	1	DUK6000306	Disc Retainer	Aluminium & Nitrile
8	1	DUK6000307	Orifice, Speed Control	Stainless Steel
9	1	DUK6000308	Pipe Plug	Stainless Steel
10	6	DUK6000309	Flat Head Screw	Stainless Steel
11	1	DUK6000310	Seat Ring	Aluminium
12	1	DUK6000311	Seal, Square Cut	Nitrile
13	1	DUK6000312	O-Ring (Size 2-014)	Nitrile
14	1	DUK6000313	Piston	Stainless Steel
15	1	DUK6000314	Spring, Piston	Stainless Steel
16	1	DUK6000315	Cap Seal	Teflon
17	1	DUK6000316	O-Ring (Size 2-242)	Nitrile
18	4	DUK6000317	Pan Head Screw	Stainless Steel
19	1	DUK6000318	Retainer, Flapper	Aluminium
20	1	DUK6000319	Flapper Seal	Nitrile
21	4	DUK6000320	Socket Head Cap Screw	Stainless Steel
22	1	DUK6900111	Centre Post	Stainless Steel
23	1	----------	Body	Ductile Iron
24	1	DUK6000321	O-Ring (Size 2-261)	Nitrile
25	1	DUK6000322	Spring, Poppet	Stainless Steel
26	1	DUK6000323	Stem	Stainless Steel
27	1	DUK6000324	Spring, Pres. Eq. Valve	Stainless Steel
28	1	DUK6000325	Belleville Washer	Stainless Steel
29	1	DUK6000142	Stem, Pres. Eq. Valve	Stainless Steel
30	1	DUK6000326	Retainer, Disc	Stainless Steel
31	1	DUK6000327	Disc, Pres. Eq. Valve	Nitrile
32	1	DUK6000328	Poppet	Aluminium
33	1	DUK6000329	Disc, Poppet	Nitrile
34	1	DUK6000330	Retainer Ring, Disc	Aluminium
35	8	DUK6000331	Flat Head Screw	Stainless Steel
36	8	DUK6000332	Set Screw	Stainless Steel
37	1	DUK6000333	Ring, Upper Seat	Stainless Steel
38	1	DUK6000137	Dust Cover	Polyurethane

2.2 Installation

These instructions cover the installation of the Pit Valve on to a pipe flange that is the terminus of a pressurised fuel delivery system. The Pit Valve is bolted to the said system flange with bolts and washers supplied by others. The following, simple installation procedure, applies to all such connections.

The inlet of the Pit Valve is supplied with a flat face, not a raised face. This joint is sealed with a common flat face pipe gasket that is supplied by others. Use only a gasket sized correctly for the mating flanges and one that is resistant to jet fuel.

Eight bolts, or studs, and nuts are used to bolt the mating flanges together. Follow published guidelines for the proper torque of these bolts/studs. Install the eyelet/clip at the end of the Dust Cover under the bolt or nut of one of these eight bolts so that the Dust Cover is securely retained to this flange connection.

2.3 Connecting to Hydrant Coupler

The Pit Valve connects to an API style Hydrant Coupler that conforms with API 1584, Second Edition.

For connection without Product Selection equipment, remove the Dust Cover (38) and align the Coupler onto the top of the Pit Valve and push down. If the Collar of the Coupler does not travel downward due to gravity alone, then push the Collar down to cause the Coupler to engage the top of the Pit Valve.

Rotate the Operating Lever of the Coupler until a positive stop is felt. This deploys the Coupler Poppet into the top of the Pit Valve thereby depressing the Pit Valve Poppet and establishing a flow path out of the Pit Valve and into the Coupler. After this, it must not be possible to lift the Collar of the Coupler or to remove the Coupler from the top of the Pit Valve.

If the Pit Valve is fitted with an Air Pilot, connect a compressed air line that is controlled by a Deadman device to the fitting on the top of the Air Pilot. A standard, common size male quick disconnect fitting is supplied with the Pit Valve. NOTE: DO NOT EXCHANGE THIS FITTING. THE FACTORY SUPPLIED FITTING IS DESIGNED TO PREVENT AIR FROM BEING TRAPPED IN THE AIR PILOT WHEN NOT CONNECT TO COMPRESSED AIR.

2.4 Establishing Flow

For Pit Valves with Manual Pilots, lift the L shaped handle on the Pilot that is bolted to the side of the Pit Valve. When lifted sufficiently, it will lock in place. This will allow the main Piston (14) of the Pit Valve to be pushed open by pressure and flow coming from the delivery system.

For Pit Valves with Air Pilots, apply compressed air to the Air Pilot by the use of the Deadman control. This will allow the main Piston (14) of the Pit Valve to be pushed open by pressure and flow coming from the delivery system. A minimum of 35 psig must be supplied to the Air Pilot for proper operation.

Note that the Pit Valve will only open as far as it needs to in order to deliver flow as limited by downstream controls.

2.5 Stopping Flow

For Pit Valves with Manual Pilots, pull the lanyard on the Manual Pilot to close the Pilot. This will cause the main Piston (14) of the Pit Valve to close. When the lanyard is pulled, the L shaped handle that was pulled to start flow will snap back down to the closed position.

For Pit Valves with Air Pilots, release the Deadman control to exhaust the compressed air from the Air Pilot. This will cause the main Piston (14) of the Pit Valve to close. Also, if the air fitting is removed from the Air

Pilot when charged with compressed air (Pit Valve open), the air within the Air Pilot will automatically exhaust and the Pit Valve will close.

2.6 Disconnection

Rotate the Operating Lever of the Coupler to the closed position and lift the Collar. While holding the Collar up, lift the Coupler off of the top of the Pit Valve.

Disconnect the air Deadman line from the Air Pilot, if so fitted.

It is common for residual fuel to be present on the top of the Pit Valve.

3.0 MAINTENANCE

3.1 Visual Inspection

3.1.1 The Basics

A quick visual inspection of the Pit Valve can be a very effective way of preventing dangerous fuel spillage. Each Pit Valve should be inspected at least every 3 months (every quarter) to verify that the Pit Valve is in operating order.

When inspecting the Pit Valve, first look for physical damage that might occur from impact from other items or surfaces (including from Hydrant Couplers). Significant scrapes or gouges on the top sealing surface of the Pit Valve (under the Dust Cover (38)) can result in exterior leakage when connected and flowing and also can result in a personal hazard.

3.1.2 Look for Missing Parts

In particular, look at the outlet end of the Pit Valve that interfaces with the Hydrant Coupler. Verify that the bolts holding the Pilot onto the side of the Pit Valve are tight and in place. Verify the location and condition of the L shaped handle and the lanyard on the Manual Pilot, or the location and condition of the air fitting on the Air Pilot.

Check the underside of the API shape of the top of the Pit Valve. Carefully feel around and under the outer lip of the Pit Valve for severe dents or missing metal. If this lip is badly worn, a seal-tight connection with a Hydrant Coupler will be difficult.

Verify that the Dust Cap (38) is in place and that the Dust Cap cable is securely attached to one of the Pit Valve flange bolts. The continual use of the Dust Cap keeps the top of the Pit Valve clean and prevents dirt from being introduced into the fuel flow after connection to a Hydrant Coupler.

3.1.3 Inspect all Handles and/or Fittings

The L shaped handle of the Manual Pilot must not be bent of cracked.

The lanyard cable of the Manual Pilot must not be frayed or crushed. The hose sleeve around the lanyard cable must be in place and must not be cracked or broken. The hose sleeve must be long enough to product the edge of the pit opening from damage from the lanyard cable.

The air fitting of the Air Pilot must be clean and undamaged. NOTE: DO NOT EXCHANGE THIS FITTING. THE FACTORY SUPPLIED FITTING IS DESIGNED TO PREVENT AIR FROM BEING TRAPPED IN THE AIR PILOT WHEN NOT CONNECT TO COMPRESSED AIR. USING A NON-FACTORY APPROVED FITTING WILL VOID ALL WARRANTIES AND MAY RESULT IN THE PIT VALVE NOT CLOSING.

3.1.4 A Hot Hydrant

The top portion of the Pit Valve should normally be un-pressurized when not connected to a Hydrant Coupler. When pressure exists in the upper portion of the Pit Valve, it is commonly referred to as

being “hot”. This is a symptom of the lower portion of the Pit Valve needing service, or that the Manual Pilot has been left in the “on” condition (with the L shaped handle latched in the up position).

To check for a Hot Hydrant, pull the lanyard of the Manual Pilot (if so fitted) to assure that the Pilot is closed. Remove the Dust Cover (38) and place a rag or other such protection on the top of the Pit Valve. This will deflect any flow during this test. USING GREAT CARE, slowly depress the Pressure Equalization Stem (29) located in the centre of the top Poppet (32). If the Pit Valve is in correct working order, only a small amount of fuel or pressure will be expelled when the Pressure Equalization Stem (29) is depressed. If fuel continues to flow freely from the Pressure Equalization Stem (29), then the Pit Valve needs service to repair the leak.

3.2 Replacing Seals

The life of rubber seals is affected by contact with fuel. Seal manufacturers recommend that they be replaced every 12 months. However actual service life of these components can be much longer depending on the application. Cla-Val recommends that all rubber seals within the Pit Valve be replaced every 5 years or sooner. The following is a list of all seals within each Basic Pit Valve subassembly.

Item	Qty.	Part No.	Description
3	1	DUK6000302	O-Ring (per MS29512-12)
5	1	DUK6000304	O-Ring (Size 2-012)
7	1	DUK6000306	Disc Retainer**
12	1	DUK6000311	Square Cut Ring
16	1	DUK6000315	Cap Seal
17	1	DUK6000316	O-Ring (Size 2-242)
20	1	DUK6000319	Flapper Seal
24	1	DUK6000321	O-Ring (Size 2-261)
31	1	DUK6000327	Disc, Pres. Eq. Valve
33	1	DUK6000329	Disc, Poppet

** The Disc Retainer is permanently affixed to the end of the Servicing Valve Stem (4) and must be replaced as a complete assembly.

The following replacement seal kit is available for maintaining the valve as noted:-

Part No.	Description
DUK6000112	This kit is for use in repairing/overhauling any 352GF Hydrant Valve less the pilot valve and contains items 3, 5, 12, 16, 17, 20, and 24.

Follow the instructions in section 4.0 REPAIR below to remove and replace these seals. Other than these resilient seals, and the visual inspections described above, the mechanical parts of the Pit Valve need no routine maintenance.

4.0 REPAIR

NOTE: ALL THE PROCEDURES COVERED WITHIN THE REPAIR SECTION ARE TO BE PERFORMED ON A MAINTENEANCE BENCH AND MUST NOT BE PERFORMED IN A HYDRANT PIT. THE PIT VALVE MUST BE REMOVED FROM THE DELIVERY PIPE SYSTEM BEFORE PERFORMING THESE REPAIR PROCEDURES.

4.1 Remove and Replace Static O-ring around Servicing Valve Body

Required Tools:
- 1¼ Inch Wrench
- An O-ring Pick or similar tool
- An O-Ring lubricant that is specifically formulated for use with rubber O-Rings
- Torque wrench for 80 ft.-lbs

Removal:
- Remove Servicing Valve Assembly from side of Pit Valve Body (23) by un-threading it out if the corresponding port. The entire assembly will come out as a unit.
- Using an O-ring Pick or similar tool, remove the O-ring (3) from the Servicing Valve Body (2).

Re-assembly:
- Lubricate the new O-ring (3) and pass it over the threads of the Servicing Valve Body (2) into the groove under the hex portion of the Body (2)
- Lubricate the gland portion of the port on the side of the Pit Valve Body (23).
- Make certain that the Servicing Valve Assembly is in the Open configuration by turning the Servicing Valve Stem (4) and Spring Pin (1) counter clockwise until they stop. This must be done before re-installing the Servicing Valve Assembly back into the Pit Valve Body (23).
- Screw the Servicing Valve Assembly into the port on the side of the Pit Valve Body (23).
- Torque the Servicing Valve Body into the Pit Valve Body (23) to 40 to 80 ft-lb.

4.2 Remove and Replace O-ring on Servicing Valve Stem:

Required Tools:
- 1¼ Inch Wrench
- An O-ring Pick or similar tool
- An O-Ring lubricant that is specifically formulated for use with rubber O-Rings
- Torque wrench for 80 ft.-lbs
- Hammer
- 1/8 inch diameter Punch or Drift

Removal:
- Remove Servicing Valve Assembly from side of Pit Valve Body (23) by un-threading it out if the corresponding port. The entire assembly will come out as a unit.
- Drive the Spring Pin (1) out of the end of the Servicing Valve Stem (4).
- Unscrew the Servicing Valve Stem (4) from the Servicing Valve Body (2).
- Using an O-ring Pick or similar tool, remove the O-ring (5) from the Servicing Valve Stem (4)

Re-assembly:
- Lubricate the new O-ring (5) and pass it over the threads of the Servicing Valve Stem (4) into the groove.
- Thread the Servicing Valve Stem back into the Servicing Valve Body (2).
- Drive the Spring Pin (1) back into the end of the Servicing Valve Stem (4).

- Make certain that the Servicing Valve Assembly is in the Open configuration by turning the Servicing Valve Stem (4) and Spring Pin (1) counter clockwise until they stop. This must be done before re-installing the Servicing Valve Assembly back into the Pit Valve Body (23).
- Screw the Servicing Valve Assembly into the port on the side of the Pit Valve Body (23).
- Torque the Servicing Valve Body into the Pit Valve Body (23) to 40 to 80 ft-lb.

4.3 Remove and Replace Servicing Valve Shut-off Seal:

Required Tools:
- 1¼ Inch Wrench
- A Paper Clip or very small diameter Punch
- An O-Ring lubricant that is specifically formulated for use with rubber O-Rings
- Torque wrench for 80 ft.-lbs

Removal:
- Remove Servicing Valve Assembly from side of Pit Valve Body (23) by un-threading it out if the corresponding port. The entire assembly will come out as a unit.
- Using the straight leg of a Paper Clip, or using a small diameter punch, remove the Retaining Ring (6) by inserting the Paper Clip or Punch into one of the small holes drilled into the outer diameter of the Disc Retainer (7). Push against the Retaining Ring (6) to deflect it out of the groove within the Disc Retainer (7). Tip the Servicing Valve Stem (4) out from within the Disc Retainer (7) when compressing the Retaining Ring (6). Take great care not to lose the Retaining Ring (6).

Re-assembly:
- Assemble the new Disc Retainer (7) onto the end of the Servicing Valve Stem (4) and snap the Retaining Ring (6) down into the groove within the Disc Retainer (7) so as to keep the Disc Retainer (7) on the end of the Servicing Valve Stem (4).
- Make certain that the Servicing Valve Assembly is in the Open configuration by turning the Servicing Valve Stem (4) and Spring Pin (1) counter clockwise until they stop. This must be done before re-installing the Servicing Valve Assembly back into the Pit Valve Body (23)
- Screw the Servicing Valve Assembly into the port on the side of the Pit Valve Body (23).
- Torque the Servicing Valve Body into the Pit Valve Body (23) to 40 to 80 ft-lb.

4.4 Remove and Replace Main Piston Shut-off Seal:

Required Tools:
- A medium or large size flat blade screw driver
- An O-Ring lubricant that is specifically formulated for use with rubber O-Rings
- Torque wrench with flat screw blade for 20 in-lbs

Removal:
- **CAUTION**: THIS PROCEDURE REQUIRES THAT YOU REMOVE THE SPRING LOADED PISTON (14). THOUGH THE SPRING LOAD ON THIS ITEM IS NOT LARGE, PROPER CLAMPING AND/OR CONTAINMENT OF SPRING LOADED INTERNAL COMPONENTS MUST BE CONSIDERED FOR YOUR SAFETY. THESE INSTRUCTIONS CAN BE PERFORMED BY ONE MECHANIC, BUT IT IS RECOMMENDED THAT IT BE FIRST ATTEMPTED BY 2 MECHANICS WORKING TOGETHER, OR BY ONE MECHANIC UTILIZING AN ARBOR PRESS, OR SIMILAR CONTAINMENT EQUIPMENT.
- Place the Pit Valve inverted on a sturdy work surface, inlet end up.

- Remove 6 of the 8 Flat Head Screws (10) that retain the Seat Ring (11), leaving 2 Flat Head Screws (10) that are 180° apart from each other.
- As the last 2 Flat Head Screws (10) are removed, Seat Ring (11), the Square Cut Seal (12), and the spring loaded Piston (14) will be travelling up and out of the Pit Valve Body (23) as dictated by the force of the Piston Spring (15). Take great care to depress the Seat Ring (11) before removing the last 2 Flat Head Screws (10) as the spring force will eject the Piston (14) if not controlled resulting in damage to parts or injury to you, or both.
- After removing the last Flat Head Screws (10), allow the Seat Ring (11) and the Square Cut Seal (12) and the Piston (14) to rise out of the Body (23). Leave the Piston (14) resting on the Piston Spring (15). TAKE GREAT CARE TO KEEP THE PISTON (26) CLEAN. Any contamination on the outside diameter of the Piston (14) could result in damage to the Cap Seal (16).

Re-assembly:

- Lightly coat the new Square Cut Seal (12) with O-ring lubricant to aid in installation.
- Place the new Square Cut Seal (12) onto the Piston (14). Place the Seat Ring (11) onto the Square Cut Seal (12).
- Put 2 of the Flat Head Screws into 2 of the holes in the Seat Ring (11) utilizing 2 holes that are 180° apart.
- Depress the components down into the Pit Valve Body (23) taking care to align the Piston (14) so that it travels down on the Centre Post (22) and smoothly enters within the Cap Seal (16).
- Tighten the 2 Flat Head Screws (10) to hold the Seat Ring (11) in place against the spring force.
- Install all other Flat Head Screws (10). Torque the Flat Head Screws (10) to 20 in-lbs.

4.5 Remove and Replace Main Piston Cap Seal:

Required Tools:

- A medium or large size flat blade screw driver
- An O-ring Pick or similar tool
- An O-Ring lubricant that is specifically formulated for use with rubber O-Rings
- Torque wrench with flat screw blade for 20 in-lbs

Removal:

- Follow the instructions in section 4.1.4 above to remove the main Piston (14).
- Lift away the Piston (14) and the Piston Spring (15) from within the Body (23).
- Using an O-ring pick, or similar thin object, carefully remove the Cap Seal (16) from the Body (23). Take great care to not damage the O-ring (17) under the Cap Seal (16). Also take great care to not scratch the O-ring groove.
- Remove the O-ring (17) from the O-ring groove within the Body (23).

Re-assembly:

- Lubricate the new O-ring (17) and place it within the groove within the Body (23).
- To install the new Cap Seal (16), you will need to slightly deform it so as to get it into the groove within the Body (23) and onto the O-ring (17). Dent in one side of the round seal so that it looks more like a bean shape. Take great care to not kink or otherwise sharply deform the seal because a kink or sharp fold will cause the seal to leak.
- Place the Piston Spring (15) down into the cavity within the Body (23).
- Lubricate the outside of the Piston (14) to aid in the insertion of the Piston (14) into the Cap Seal (16).
- Place the Piston (14) onto the Piston Spring (15). Make certain that the Piston (14) is very clean.
- Follow the instructions in section 4.1.4 above to re-assemble the Piston (14), Square Cut Ring (12) and the Seat Ring (11).

4.6 Remove and Replace Small Piston Shaft Seal:

Required Tools:
- A medium or large size flat blade screw driver
- An O-ring Pick or similar tool
- An O-Ring lubricant that is specifically formulated for use with rubber O-Rings
- Torque wrench with flat screw blade for 20 in-lbs

Removal:
- Follow the instructions in section 4.1.4 above to remove the main Piston (14).
- Remove the Piston (14) from atop the Piston Spring (15).
- Using an O-ring pick, or similar thin object, carefully remove the O-ring (13) from within the Piston (14). Take great care to not scratch or otherwise damage the O-ring groove

Re-assembly:
- Lubricate the new O-ring (13) and place it within the groove within the Piston (14).
- Place the Piston (14) onto the Piston Spring (15). Make certain that the Piston (14) is very clean.
- Follow the instructions in section 4.1.4 above to re-assemble the Piston (14), Square Cut Ring (12) and the Seat Ring (11).

4.7 Remove and Replace Flapper Seal:

Required Tools:
- A medium AND large size flat blade screw driver
- An O-Ring lubricant that is specifically formulated for use with rubber O-Rings
- Torque wrench with flat screw blade for 20 in-lbs

Removal:
- Follow the instructions in section 4.1.4 above to remove the main Piston (14).
- Carefully lift out the Piston (14) and the Piston Spring (15) so that the Cap Seal (16) is not scratched or damaged.
- Remove the four Pan Head Screws (18) and remove the Flapper Retainer (19).
- Lift out the Flapper Seal (20) off of the Centre Post (22).

Re-assembly:
- Place the new Flapper Seal (20) onto the Centre Post (22) and align it so that the four screw holes in the Centre Post (22) are accessible.
- Place the Flapper Retainer (19) onto the Flapper Seal (20) and align it so that the four screw holes in the Centre Post (22) are accessible.
- Install the four Pan Head Screws (18) into the four threaded holes in the Centre Post (22). Torque these to 9 in-lbs
- Follow the instructions in section 4.1.4 above to re-assemble the Piston (14), Square Cut Ring (12) and the Seat Ring (11).

4.8 Remove and Replace Main O-ring Between Pit Valve Body and API Top:

Required Tools:
- 3/32 inch hex key (Allen wrench)
- An O-Ring lubricant that is specifically formulated for use with rubber O-Rings
- A thread ant-seize compound
- Special tool for applying torque to Upper Seat Ring (see below)

Removal:

- **CAUTION**: THIS PROCEDURE REQUIRES THAT YOU REMOVE THE SPRING LOADED COMPONENTS. THOUGH THE SPRING LOAD ON THESE ITEMS IS NOT LARGE, PROPER CLAMPING AND/OR CONTAINMENT OF SPRING LOADED INTERNAL COMPONENTS MUST BE CONSIDERED FOR YOUR SAFETY. THESE INSTRUCTIONS CAN BE PERFORMED BY ONE MECHANIC, BUT IT IS RECOMMENDED THAT IT BE FIRST ATTEMPTED BY 2 MECHANICS WORKING TOGETHER, OR BY ONE MECHANIC UTILIZING AN ARBOR PRESS, OR SIMILAR CONTAINMENT EQUIPMENT.
- NOTE: For this repair, you will need to fabricate a special tool. This tool will be used to apply torque to the stainless steel Upper Seat Ring (37) of the Pit Valve while holding the Body (23) stationary in a bench vice or by other methods. This tool consists of a long bar, at least 3 feet long and very stiff. Drill a 3/8 inch diameter hole near the end of the bar and install a 3/8 inch diameter bolt. The bolt should be long enough to extend from 1 to 2 inches.
- Clamp, or otherwise secure, the Pit Valve to a work surface. The Body (23) must be held very securely to perform the following instructions.
- Using the 3/32 inch hex key, remove the 8 Set Screws (36).
- Insert the bolt of the special tool into one of the 8 product selection holes drilled through the flange of the Upper Seat Ring (37). Rotate the bar of the special tool counter clockwise until it contacts the side of the Upper Seat Ring (37). Continue applying force to the special tool so as to torque the Upper Seat Ring (37) off of the Body (23). REMEMBER THAT THE INTERNAL COMPONENTS ARE SPRING LOADED.
- Continue rotating the Upper Seat Ring (37) until it comes free of the threads on the top of the Body (23). The internal spring load will cause the Upper Seat Ring (37) to rise about 1 inch when it comes from of the Body (23).
- Carefully lift the Upper Seat Ring (37) up off of the Poppet (32) and set it up-side-down on the work surface. Take care to leave all other internal components in place.
- Remove the O-ring (24). It will likely be inside the Upper Seat Ring (37), though it might stay on the top of the Body (23).
- Inspect the Upper Seat Ring (37) for excessive wear of damage caused by the repeated connection of Hydrant Couplers. Other than just dents and dings, there should be now gouging on the underside of the connecting lip. Any missing metal from the underside of the API shape may be cause for poor or leaky connections. Also inspect the sealing surface on the top of the Upper Seat Ring (37) where the sealing element of a Hydrant Coupler makes contact. (This sealing surface is the slightly recessed surface adjacent to the 4 inch diameter fuel port.)

Re-assembly:

- Lubricate the new O-ring (24) and place it within the recess (just past the internal threads) inside the Upper Seat Ring (37).
- Apply a light coating of the anti-seize compound to the internal threads of the Upper Seat Ring (37) and to the external threads of the Body (23).
- Carefully place the Upper Seat Ring (37) back onto the Poppet (32).
- Press the Upper Seat Ring (37) down until it comes into contact with the threads on the Body (23). This will require that you align the Stem (26) into the guidance hole in the Body (23). Take care to avoid any binding or jamming of the Stem (26) as it travels down into the corresponding hole.

- Rotate the Upper Seat Ring (37) onto the threads on the Body (23). Thread the Upper Seat Ring (37) onto the Body (23) by hand as far as possible, the use the special tool to finish torqueing the Upper Seat Ring (37) until it stops snuggly. It must be turned until a positive stop is achieved and torqued tightly, but not so tightly that it cannot be serviced again in the future. The 8 Set Screws (36) are utilized to prevent this threaded joint from un-screwing.
- Verify the free movement of the Poppet (32) by depressing it by hand. It should be free to travel against the internal spring force and it must re-seat squarely when released.
- Install the 8 Set Screws (36) into the threaded holes around the Upper Seat Ring (37) and tighten hand tight. No torque value is specified.

4.9 Remove and Replace Poppet Shut-Off Seal (Poppet Disc):

Required Tools:
- 3/32 inch hex key (Allen wrench)
- A medium or large size flat blade screw driver
- An O-Ring lubricant that is specifically formulated for use with rubber O-Rings
- A thread ant-seize compound
- Torque wrench with flat screw blade for 20 in-lbs
- Special tool for applying torque to Upper Seat Ring (see 4.1.8)

Removal:

- **CAUTION**: THIS PROCEDURE REQUIRES THAT YOU REMOVE THE SPRING LOADED COMPONENTS. THOUGH THE SPRING LOAD ON THESE ITEMS IS NOT LARGE, PROPER CLAMPING AND/OR CONTAINMENT OF SPRING LOADED INTERNAL COMPONENTS MUST BE CONSIDERED FOR YOUR SAFETY. THESE INSTRUCTIONS CAN BE PERFORMED BY ONE MECHANIC, BUT IT IS RECOMMENDED THAT IT BE FIRST ATTEMPTED BY 2 MECHANICS WORKING TOGETHER, OR BY ONE MECHANIC UTILIZING AN ARBOR PRESS, OR SIMILAR CONTAINMENT EQUIPMENT.
- Follow the instructions in section 4.1.8 above to remove the main Upper Seat Ring (37).
- Lift the Poppet assembly out of the Body (23) and off of the Poppet Spring (25).
- Take great care to protect the Stem (26) from bending or other damage.
- Remove the 8 Flat Head Screws (35).
- Remove the Disc Retaining Ring (34) from the Poppet (32).
- Remove the Poppet Disc (33) from the Poppet (32).

Re-assembly:

- Lubricate the new Poppet Disc (33) and place it onto the top of the Poppet (32) in the recess provided for it.
- Place the Disc Retaining Ring (34) onto the Poppet (32) and install the 8 Flat Head Screws (35). Torque these screws to 20 in-lbs.
- Place the Poppet assembly onto the Poppet Spring (25).
- Follow the instructions in section 4.1.8 above to re-assemble the Upper Seat Ring (37) over the Poppet assembly and onto the Body (23).

4.10 Remove and Replace Pressure Equalizing Valve Seal:

Required Tools:
- 3/32 inch hex key (Allen wrench)
- Bench vice with soft jaws
- Strap wrench
- An O-Ring lubricant that is specifically formulated for use with rubber O-Rings
- A thread ant-seize compound
- Special tool for applying torque to Upper Seat Ring (see 4.1.8)

Removal:

- **CAUTION**: THIS PROCEDURE REQUIRES THAT YOU REMOVE THE SPRING LOADED COMPONENTS. THOUGH THE SPRING LOAD ON THESE ITEMS IS NOT LARGE, PROPER CLAMPING AND/OR CONTAINMENT OF SPRING LOADED INTERNAL COMPONENTS MUST BE CONSIDERED FOR YOUR SAFETY. THESE INSTRUCTIONS CAN BE PERFORMED BY ONE MECHANIC, BUT IT IS RECOMMENDED THAT IT BE FIRST ATTEMPTED BY 2 MECHANICS WORKING TOGETHER, OR BY ONE MECHANIC UTILIZING AN ARBOR PRESS, OR SIMILAR CONTAINMENT EQUIPMENT.
- Follow the instructions in section 4.1.8 above to remove the main Upper Seat Ring (37).
- Lift the Poppet assembly out of the Body (23) and off of the Poppet Spring (25).
- Clamp the Stem (26) in the soft jaws of a bench vice. Turn the Poppet (32) counter clockwise to loosen (unthread) it from the Stem (26). DO NOT REMOVE POPPET (32) FROM STEM (26). SMALL LOOSE PARTS ARE CONTAINED WITHIN.
- Remove the Poppet assembly from the vice. Place the Poppet (32) face down on the work surface with the Stem (26) up. Now, remove the Stem (26) from the Poppet (32). Remove also the Lock Washer (28).
- While ready to catch the loose parts, turn the Poppet (32) over. The Pressure Equalizing Valve Stem (29), Disc Retainer (30), Pressure Equalizing Valve Disc (31) and the Pressure Equalizing Valve Spring (27) should fall free. If they don't, push them out from the other side of the Poppet (32). Separate the Pressure Equalizing Valve Disc (31) from the other parts for replacement.

Re-assembly:

- Lubricate the new Pressure Equalizing Valve Disc (31). Place the Disc Retainer (30) inside the Pressure Equalizing Valve Disc (31).
- With the flat flange portion of the Pressure Equalizing Stem (29) resting on the work surface, put the above seal assembly onto the Pressure Equalizing Valve Stem (29) with the larger portion of the Pressure Equalizing Valve Disc (31) up, away from the flange on the Pressure Equalizing Stem (29).
- Place the Poppet (32) on the work surface with the flat face down. Carefully install all the above parts into the centre hole of the Poppet (32) so that the thin stem portion of the Pressure Equalizing Valve Stem (29) extends into the small centre hole of the Poppet (32).
- Place a large amount of O-ring Lubricant on the end of the Pressure Equalizing Valve Spring (27) and insert it down into the centre hole of the Stem (26) threaded end. The intent is to have the O-ring Lubricant make the Spring (27) stay in the hole when the Stem (26) is inverted.
- Place the Lock Washer (28) onto the threaded hole of the Poppet (32).
- Insert the threaded end of the Stem (26) through the Lock Washer (28) and into the threaded centre hole of the Poppet (32). Thread the two together, but do not tighten.
- Turn the assembly over and verify that the Pressure Equalizing Valve Stem (29) extends through the centre hole of the Poppet (32) and that it can be depressed against the spring force.
- Clamp the Stem (26) in the soft jaws of the bench vice. Tighten the Poppet (32) onto the Stem (29). Use a strap wrench to tighten this joint without damaging the Poppet (32) or the Stem (26).
- Place the Poppet assembly onto the Poppet Spring (25).

- Follow the instructions in section 4.1.8 above to re-assemble the Upper Seat Ring (37) over the Poppet assembly and onto the Body (23).

5.0 POST-REPAIR TESTING:

5.1 Examination of the Pit Valve:

- After every form of service other than simple visual inspection, the Pit Valve must be evaluated and tested prior to being put back into service.
- Verify that the Pressure Equalizing Valve Stem (29) can be depressed and that it re-seats correctly. The Pressure Equalizing Valve Stem (29) must protrude from the face of the Poppet (32) about .050 inch, or about 1/16 inch.
- If fitted with a Manual Pilot, pull on the L shaped handle to open the Pilot, then pull on the Lanyard to close the Pilot. When the Lanyard is pulled, the L shaped handle should snap down to its closed position.

5.2 Pressure Testing:

- All pressure tests should be performed using jet fuel or a suitable substitute such as Mil-C-7024 Type II calibration fluid. DO NOT TEST WITH WATER. Wear appropriate safety gear.
- Bolt the Pit Valve to a test flange for testing. Be prepared to catch or contain any fluid that might leak from the Pit Valve during testing.
- Push open the Poppet (32) of the Pit Valve. Open the Pilot, either by pulling the L shaped handle of the Manual Pilot or applying at least 30 psig of air pressure to the hose fitting on the Air Pilot. Slowly fill the Pit Valve with test fluid. Allow the Poppet (32) to close when test fluid has filled the Pit Valve. Close the Pilot by pulling the Lanyard (Manual Pilot) or by relieving the compressed air (Air Pilot).
- Pressurize the inlet of the Pit Valve to 4 to 6 psig. Hold this pressure for one minute. After one minute, place a rag over the Pressure Equalizing Valve Stem (29) and carefully depress the Stem (29). There may be a small amount of pressure exhausted. Release the Stem (29), wait one minute, and depress the Stem (29) again. There should be no pressure released and there should be no flow from the Stem (29) when depressed open. If pressure or flow is detected, the Pit Valve must be repaired before continuing.
- If the previous test is passed with no leakage, pressurize the Pit Valve to 415 psig. Hold this pressure for one minute. After one minute, place a rag over the Pressure Equalizing Valve Stem (29) and carefully depress the Stem (29). There should be no pressure released and there should be no flow from the Stem (29) when depressed open. If pressure or flow is detected, the Pit Valve must be repaired before continuing.
- Relieve all pressure and open the Pilot (by pulling the L shaped handle or by applying compressed air). Pressurize the inlet of the Pit Valve to 4 to 6 psig. Hold this pressure for one minute. Observe the exterior surfaces of the Pit Valve for leakage, including around the sealing interface between the Poppet (32) and the Upper Seat Ring (37). There must be no leakage detected. If pressure or flow is detected, the Pit Valve must be repaired and re-tested before putting into service.

6.0 TROUBLESHOOTING:

6.1 Difficulty connecting a Hydrant Coupler to the Pit Valve:

6.1.1 The “Hot Hydrant”:

A “Hot Hydrant” refers to a “closed” Pit Valve that has a pressurized top. When there is pressure under the Poppet (32) when the Pit Valve Pilot is in the closed state, then there is a leak either past

the Piston (14) or through the Pilot Valve. In either case, A "Hot Hydrant" will not allow the Poppet of the Coupler to push open the Poppet of the Pit Valve. The leak may be too bad to allow the pressure to equalize between the Pit Valve and the Coupler when trying to open the Coupler because the Pressure Equalization Valve Stem (29) cannot exhaust the pressure within the Pit Valve.

To verify the "Hot Hydrant" condition, place a heavy rag over the Pressure Equalization Valve Stem (29) and then depress the Stem (29). Try using a wrench or the tip of a screw driver for this. Hold down the Pressure Equalization Valve Stem (29) long enough to relieve any excessive pressure under the Poppet (32). Release the Pressure Equalization Valve Stem (29) and wipe away any excess fuel. Then depress the Pressure Equalization Valve Stem (29) and again for 1 minute. If the top of the Pit Valve fills with fuel and overflows within 1 minute, then there is a leak either through the lower portion of the Pit Valve or through the Pilot that must be repaired. FOR A MORE FORMAL EVALUATION OF THE HOT HYDRANT USING A TEST COUPLER, SEE SECTION 6.3 BELOW.

To determine where the leak may be, close the Servicing Valve on the side of the Pit Valve. This will block the path of fuel that might be leaking through the Pilot Valve. If the leak through the Pressure Equalizing Valve stops, then the cause of the "Hot Hydrant" is the Pilot Valve. Follow the instructions in the Maintenance Manual for the Air Pilot or the Manual Pilot for repair of the Pilot Valve.

If the leak through the Pressure Equalizing Valve does not stop when the Servicing Valve is closed, then the cause of the "Hot Hydrant" is one or both of the seals that contact the Piston (14). The leak could be past the Square Cut Ring (12) or past the Cap Seal (16).

6.1.2 A physical interference:

The Collar of the Coupler must be free to fall (travel) down around the top of the Pit Valve in order to allow for the rotation of the Operating Lever on the Coupler. If the Collar does not completely fall due to gravity alone, then it may need to be pushed down.

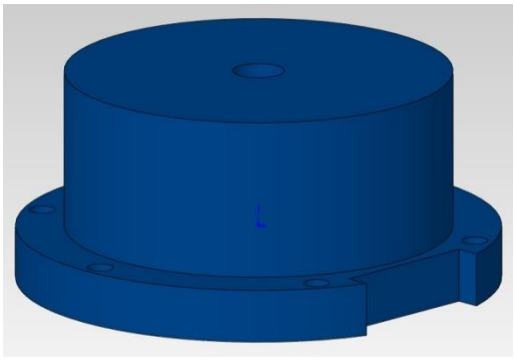
If the Collar will not easily travel the full extent to allow for the complete rotation of the Operating Lever, it is not likely caused by the Pit Valve. Check for free travel of the Collar around the Body of the Coupler. Consult the maintenance manual for the Coupler.

6.2 Puddle of fuel always on the top of the Pit Valve:

- It is common for the top of the Pit Valve to be wet or to have a puddle of fuel captured on the top of the Poppet (32). The act of removing the Hydrant Coupler from the Pit Valve will result in wetness or even a small puddle of fuel remaining on the top of the Pit Valve. This is normal.
- However, if fuel is continually flowing off of the top of the Pit Valve and accumulating in the Pit, this might indicate that the Pit Valve is not shutting off correctly (see 6.1.1 regarding "Hot Hydrants" above) and that there is a leak past the Poppet (14).
- Follow the steps discussed in section 6.1.1 to diagnose the source of the leak through the lower half of the Pit Valve.
- It is also recommended that you refresh both the Poppet Disc (33) that seals around the outer diameter of the Poppet (32) and the Pressure Equalizing Valve Disc (31). Repair instructions for these two components are discussed in sections 4.1.9 and 4.1.10.

6.3 Hot Hydrant Test using Test Coupler:

- Joint Inspection Guidelines (JIG) document "JIG 2" details the need to check Hydrant Pit Valves for seal integrity on a monthly basis. Cla-Val makes available a test adapter that can be assembled onto the lower subassembly of any Cla-Val Hydrant Coupler.



- The Test Coupler must be fitted with a calibrated pressure gauge (0 to 15, or 0 to 30 psi range), a ball valve, and a length of hose for bleeding into a bucket or other container.

- Step 1: Bring a clean, white bucket (or other suitable container) along with the Test Coupler to the Pit Valve being tested. The bucket is for bleeding fuel from the Test Coupler.
- Step 2: Verify that the Pit Valve being tested has normal supply pressure applied to the inlet. Also verify that the Test Coupler is full of fuel. Testing will be invalid if there is air in the Test Coupler.
- Step 3: Place the Test Coupler onto a Pit Valve, making certain that the outer Sleeve (or Collar) is pushed down fully to engage the Test Coupler onto the Hydrant Pit Valve. Place the bleed hose into the bucket and open the ball valve.
- Step 4: While watching the pressure gauge, slowly rotate the Operating Lever to the fully open position. Do not let the pressure rise above the range on the face of the pressure gauge. In most cases, this will not be a problem. Proceed to Step 5 below. If the Hydrant Pit Valve is leaking badly, the pressure may rise so quickly that the gauge could be damaged. If this does occur, then the seals in the

Pit Valve require repair and the Pit Valve must be removed from service. Rotate the Operating Lever to close the Test Coupler. Proceed to Step 6 below.

- Step 5: Open the ball valve to relieve in pressure in the Test Coupler. Close the ball valve and start timing.
- REQUIREMENT: The pressure in the Test Coupler must not raise more than 3 psig in 60 seconds. If the Pit Valve fails this test, proceed to Step 6 below. If the pressure measured is acceptable, then rotate the Operating Lever to the closed position. Note that you will have to open the ball valve to complete this task to relieve internal pressure as the Coupler is closing. Lift the Sleeve (Collar) and remove the Test Coupler from the Pit Valve. Close the ball valve. Replace the dust cover onto the Pit Valve.
- Step 6: If the Pit Valve failed the test above, close the servicing valve on the side of the Pit Valve and retest (Steps 4 & 5). This step will block the possible leak path through the Pilot Valve on the side of the Pit Valve. 1) If the Pit Valve PASSES THE TEST REQUIREMENT (above), then the Pilot Valve is leaking badly and must be removed from service for repair. 2) If the Pit Valve FAILS THE TEST REQUIREMENT, then the LEAK COULD BE IN BOTH the main valve and the Pilot Valve, so the Pit Valve must be removed from service for repair.