



# 800 Series Deluge

(Tubular Diaphragm Valve)

## FIRE DELUGE VALVE

### BODY INTRODUCTION

The Cla-Val Deluge 800 Series Valve is a pressure operated in-line axial valve. It is actuated by a tube diaphragm. It is comprised of 3 major components; Tube 1, Barrier 2 and Body 3.

The tube forms a drip tight seal around the barrier when the pressure is equalized between the valve inlet and the control chamber. When pressure is removed from the control chamber the valve is open. Forty p.s.i. inlet pressure is the minimum recommended operating pressure.

Maximum pressure rating for deluge service is 250 p.s.i. (See ANSI std. B-16.5).

The tube diaphragm is a one piece homogeneous nitrile rubber part, which is extremely durable. The ends of the tube are thick solid rubber designed to fit between mating flanges. This design eliminates the possibility of cutting the tube diaphragm due to over tightening or piping misalignment during installation.

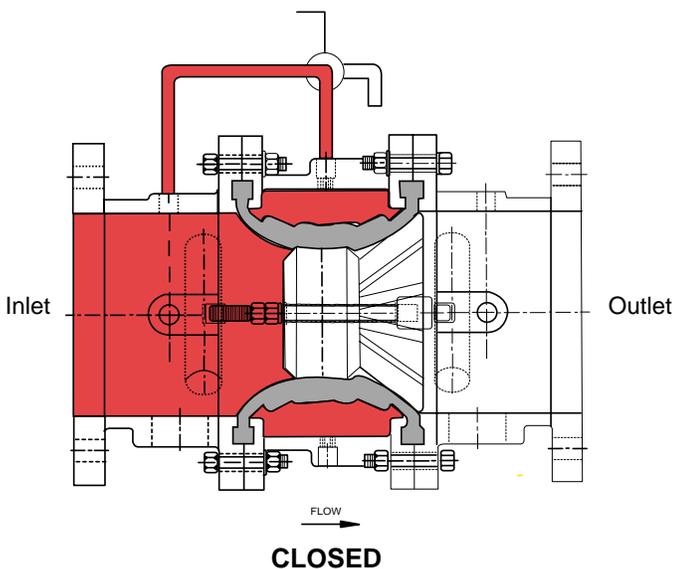


### DELUGE OPERATION

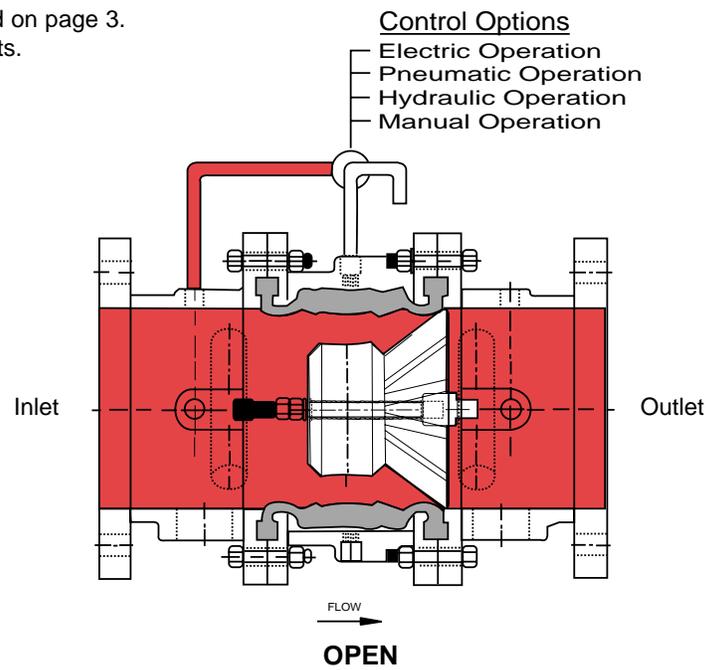
Note: Each valve is equipped with items indicated on drawings listed on page 3.

The adjustable pressure switch has single pole double throw contacts.

See data sheets for pressure switch and solenoid operated valve.



Water pressure (equal to inlet pressure) from valve inlet is applied to the control chamber. Valve closes bubble tight.



When pressure in the control chamber is relieved the valve opens.

## MAINTENANCE

The only maintenance normally required is periodic inspection of the control system to insure there is no buildup of solids that might cause poor performance. This is usually accomplished by cleaning the strainer screen. Also, see pilot valve maintenance bulletin.

Established client fire and safety systems test guidelines must be followed. NFPA 25 Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems must also be followed.

**CAUTION: BEFORE PROCEEDING WITH THE DISASSEMBLY OF ANY CLA-VAL PRODUCT, STRICT COMPLIANCE WITH YOUR FACILITIES ESTABLISHED SAFETY PROCEDURE FOR ISOLATING, TESTING OR EXHAUSTING PRESSURE FROM A CONTROL SYSTEM OR DEVICE IS REQUIRED.**

**MEDIA CONTROL SYSTEMS CONTAIN HIGH LEVELS OF STORED ENERGY. DO NOT ATTEMPT TO CONNECT, DISCONNECT OR REPAIR THESE PRODUCTS WHENEVER A SYSTEM IS PRESSURIZED.**

**NOTE: ALWAYS EXHAUST THE PRESSURE FROM THE SYSTEM BEFORE PERFORMING ANY SERVICE WORK. FAILURE TO DO SO CAN RESULT IN SERIOUS PERSONAL INJURY.**

## TUBE DIAPHRAGM REPLACEMENT

If it becomes necessary to replace the tube diaphragm, use the following procedure:

### A. TOOLS REQUIRED

- 1 - Nylon or rubber hammer
- 2 - 1" dia. x 3' long wooden dowels
- 1 - 5/8" dia. x 3' long wooden dowel (Used to get 1" dowel into position)
- 1 - Replacement tube diaphragm
- 2 - Replacement o-rings

**B. REMOVAL (IMPORTANT: Protect all coated surfaces during this operation.) (Note: The outlet end of the tube diaphragm is 1/8" thicker than the inlet end.)**

1. Follow depressurization and removal permit procedures in effect at the site.
2. Remove valve from line.
3. Remove control tubing connecting end pieces and control chamber. Mark inlet and center for reassembly, i.e. "line-up marks"
4. Remove control chamber assembly bolts.
5. Remove barrier by hitting on inlet end of barrier rod with rubber hammer. Remove barrier, nuts and rod.

Install new O-rings.

6. Remove tube diaphragm from control chamber by forcing inlet end of tube to center of control chamber using 1" dowel.
7. Once inlet end of tube is inside the control chamber, place 1" wooden dowel between tube and control chamber on the inlet end and push it all the way through. After the dowel is protruding from both ends of the control chamber, push down on the tube diaphragm and force it out of the control chamber.

This is best done with the control chamber in a vise. Remember to protect the coated surfaces.

**C. ASSEMBLY (IMPORTANT: Protect all coated surfaces during this operation.)**

1. Place tube diaphragm into control chamber as follows: (Note: The outlet end of the tube diaphragm is 1/8" thicker than the inlet end.)

- a) Grease end of tube and the inside of control chamber. (WD-40 is a satisfactory lubricant).
- b) Fold inlet end of tube and push into control chamber to within 1" of the opposite end.

This operation best done on the floor on top of a corrugated box or piece of plywood.

- c) Place the inlet end up on the floor. (Be sure to protect all coated surfaces.)
- d) Depress tube to center using large or small wooden dowel. Small dowel is used on 3" & 4" tube diaphragms to make space for the large dowel.
- e) Insert wooden dowel between tube diaphragm and control chamber and leave in place.
- f) Force rubber open in another spot and insert another wooden dowel.
- g) Force solid rubber ends over lip of control chamber with wooden dowels. (Similar to removing a tire from a rim).
- h) Place the outlet end up on the floor.

2. Install new O-rings and barrier assembly rod, washers and nuts. Make sure that the barrier is centered over the unthreaded portion of the shaft. (Note: The end of the shaft with the threaded portion is installed on the inlet side of the barrier.)

3. Install barrier into tube diaphragm. (Use grease, WD-40 or soapy water for lubrication). (Note: The thicker end of the tube diaphragm must be on the outlet end (white stripe). The barrier fins must also be on the outlet end).

4. Center the barrier assembly inside of the tube diaphragm.

5. Assemble the end pieces to the control chamber.

6. The control chamber body assembly flange bolts only require 45 foot pounds of torque to seal the tube diaphragm. The flanges are metal to metal externally.

The tube diaphragm is suspended from these flanges internally, providing a seal. The sealing capability of this assembly is very good due to the compression of the thick solid rubber ends of the tube diaphragm.

7. Inlet End - Torque the bolts to maximum 45 foot pounds maintaining an even space all the way around until flanges touch.
8. Outlet End "White Stripe" - Torque the bolts to maximum 45 foot pounds maintaining an even space all the way around until flanges touch. (Note: The outlet end of the tube diaphragm is 1/8" thicker than the inlet end.)

9. Reassemble control tubing.

10. Assembly is complete. Return valve to service.

## TROUBLESHOOTING

If trouble is experienced with the operation of the valve, it usually falls into one of the following categories:

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Valve leaks, will not close drip tight. & barrier.	1) Trash caught between tube  2) Tube diaphragm failure. (very unlikely possibility)	Remove valve, clean.  Remove valve, replace tube diaphragm.
Valve will not open, close or operates sluggishly.	1) Strainer plugged  2) Dirt in control system or valve trim orifice.  3) Dirt in pilot valve  4) Dirt in solenoid valve or incorrect voltage	Remove strainer screen and clean.  Remove, clean trim and orifice.  Remove pilot, inspect and clean. See specific pilot instructions.  Remove SOV, inspect and clean. Verify correct voltage to coil.
Pipes move, bang or rattle	1) Water hammer and/or hydraulic surge  2) Valve operating too fast	May require system hydraulic analysis.  Change closing speed orifice in control tubing, or install opening speed orifice in pilot exhaust.

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## OPERATING DESCRIPTION FOR DELUGE VALVE

### A. EQUIPMENT DESCRIPTION

1. The operation of the basic valve is described above.
2. Reference Data
  - a) Cla-Val Job No.:
  - b) Cla-Val Dwg. No(s).

(Note: Detailed parts list on a Cla-Val dwg)

### B. OPERATION

1. The valve is trimmed and constructed as indicated on the drawing referenced above.

2. The pilot is a Cla-Val 150-300, Manual Reset Deluge pilot.

Opening Speed – The calculated opening speed for an 8" valve is 8 seconds from full closed to full open. Flow starts immediately. If the opening speed proves to be too fast, an orifice can be installed in the pilot exhaust port.

Closing Speed – Controlling closing speed eliminates surges and water hammer caused by closing too rapidly.

The closing speed is approximately 25 seconds. This should eliminate surges. The valve trim is fitted with an orifice nipple in the control tubing. The closing speed orifice bores are:

4" Valve - .0781" dia.

6" Valve - .1250" dia.

8" Valve - .1719" dia.

### C. PILOT OPERATION

1. Electric – A normally de-energized 3-way N.O. solenoid provides water or air pressure to the control port of the deluge pilot. When power is applied to the solenoid coil, inlet to the solenoid valve is blocked and pressure on the deluge pilot control port is exhausted to atmosphere. In turn, water pressure trapped in the control chamber of the main valve is exhausted to atmosphere via the deluge pilot exhaust port causing the main valve to open.

2. Manual Override – Manual operation of the main valve is done with a quarter turn ball valve which exhausts water pressure from the control chamber of the main valve causing it to open.

## OPERATING DESCRIPTION FOR DELUGE VALVE (con't)

The I.D. of the manual override valve is greater than the closing speed orifice. Therefore, the control chamber empties faster than it is filled.

## INSTALLATION

All valves are 150 pound flat faced flanged ends. Use normal piping installation practices to install. i.e., good alignment is essential.

The control chamber body assembly flange bolts only require 45 foot pounds of torque to seal the tube diaphragm. The flanges are metal to metal externally. The tube diaphragm is suspended from these flanges internally, providing a seal. The sealing capability of this assembly is very good due to the compression of the thick solid rubber ends of the tube diaphragm.

## MOUNTING POSITION

The valve can be mounted vertically or horizontally. It is usually preferred to mount so that the adjusting screw or any other accessory controls are easily accessible.