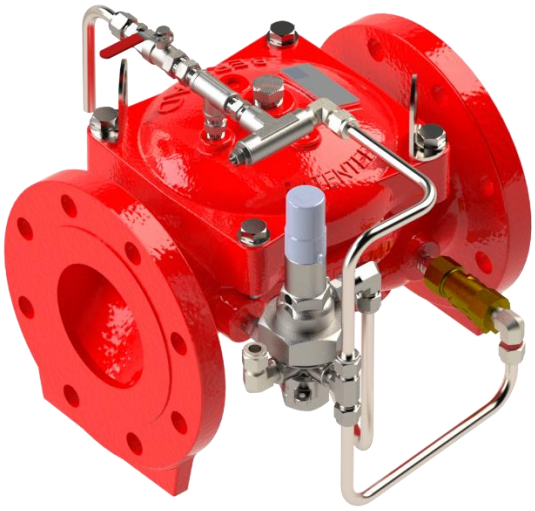
Model: 426-02

Bermad Pressure Differential Control Valve (PDCV)



Installation Operation Maintenance Manual (IOM)

Revision Date: 30/01/2025

Safety First

BERMAD believes that the safety of personnel working with and around our equipment is the most important consideration. Please read all safety information below and any other relevant source before attempting to perform any maintenance function. Comply with all approved and established precautions for working with your type of equipment and/or environment. Only authorized personnel should perform maintenance tasks.
Prior to performing a procedure, read it through, to the end and understand it. If anything is not clear, ask the appropriate authority. When performing a procedure, follow the steps in succession without omission.

1. General

Bermad 426-02 Bermad PDCV is a pilot-operated, diaphragm-actuated, straight-through flow type with low pressure-loss. It is an automatic pressure control high performance valve.
The 426-02 is equipped with an adjustable differential pilot valve and is used to sense the differential between two different points.
When the differential between the two sensed pressures rises above the pre-set value the pilot valve will tend to close the main valve regulating the pressure and keeping the differential at the pre-set minimum.
The 426-02 is ideal for balanced foam proportioning systems, also as a safeguard for dosing pump flow overload.

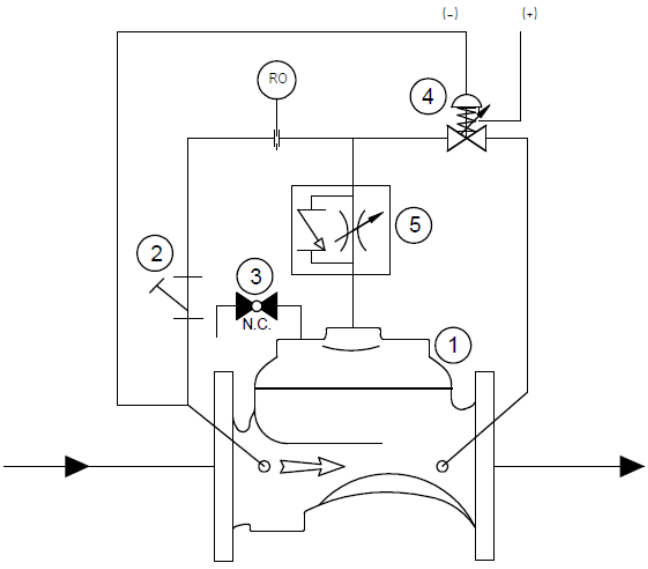
1.1 Approvals

The 426-02 is ABS, Lloyd's Register and DNV approved.
Consult Bermad for any component approval recently to appear in any equipment directory.

1.2 Principle of Operation

The BERMAD model 426-02 is held closed by inlet pressure in the control chamber [1] supplied via the pilot line filter [2] and the restriction orifice [RO]. To open the valve the pressure in the control chamber must be released to the outlet by way of the pilot [4] opening.
The pilot senses two pressures, a higher pressure (+) and a lower pressure (-). Should the differential between these two pressures approach the set maximum (determined by the pilot adjusting screw) the pilot will tend to close, thus allowing pressure to accumulate in the valve control chamber causing the main valve to throttle. This regulates the pressure in the downstream pipeline keeping the differential pressure below the set maximum.
Should the differential pressure fall, the pilot will open, releasing pressure in the valve control chamber thereby causing the main valve to open and maintain the differential pressure.

Figure 2: Operation Drawing



Components:
1. BERMAD 400 Main Control Valve
2. Priming Strainer
3. Manual Opening valve
4. Differential Pressure pilot valve
5. Opening Speed Control Device (OSCD)

RO - Restriction Orifice

1.3 Pressure and Flow ratings

Models and sizes covered by this document include the Bermad 426-02 PDCV, shown in table 1.

Table 1: PDCV Sizes and capacity:
Sizing shall be not less than stated:

Valve Size in.	**1.5”**	**2"**	**2.5"**	**3”**	**4”**	**6”**	**8”**	**10”**	**12”**
DN	**40**	**50**	**65**	**80**	**100**	**150**	**200**	**250**	**300**
Kv (Cv) Note 1	57 (66)	57 (66)	78 (90)	136 (157)	204 (236)	458 (529)	781 (902)	829 (354)	1,932 (2,231)
Leq m (ft) Note 2	9.1 (30)	9.1 (30)	12.1 (40)	13.7 (45)	14 (46)	27 (90)	46 (150)	108 (179)	57 (187)
Max. Recommended Flow-Rate m3/hr (GPM)	27 (119)	42 (187)	67 (297)	102 (450)	180 (792)	363 (1600)	644 (2836)	1006 (4431)	1500 (6604)
Proportioner Recommended Nominal Flow L/Min	-	500	1,000	2,000	3,000	6,000	10,000	15,000	20,000
Pressure Control Pilot Valve, Note (2)	2PBL-D	2PBL-D	2PBL-D	2PBL-D	2PBL-D	2PBL-D	2PBL-D	2PBL-D	2HC

Notes:
1. For fully open valve
2. Valve Equivalent Length Value (Steel Pipe), for use in hydraulically calculated systems.

2. Installation

2.1 Installation Instructions

A typical installation of the BERMAD model 426-02 uses the automatic valve actuation via a pilot control to modulate to close the 426-02 in response to an increase in differential pressure between two points. The 426-02 is ideally suited for regulation in foam dosing applications see Figure 1a. below.

2.1.1 Before the valve is installed, flush the pipeline to remove any dirt, scale, debris, etc. Not flushing the line might result in the valve being rendered inoperable.
2.1.2 Allow enough room around the valve assembly for any adjustments and future maintenance/disassembly work.
2.1.3 Install the valve in the pipeline with the valve flow arrow on the body casting in the proper direction. Use the lifting eye/s provided on the main valve cover for lifting and lowering the valve.
2.1.4 For best performance, install the valve horizontally with the cover up. However, other positions are acceptable. Ensure that the valve is positioned so that the cover and diaphragm can be easily removed for future maintenance.
2.1.5 Install the sensing (+) line to the Dosing Pump proportioner upstream side.
2.1.6 After installation, slowly allow water pressure to fill the pipeline, then carefully inspect/correct any damaged accessories, piping, tubing/fittings and ensure that there are no leaks.
2.1.7 Bleed air from both (+) and (-) sensing tube fitting connected to the pilot valve.

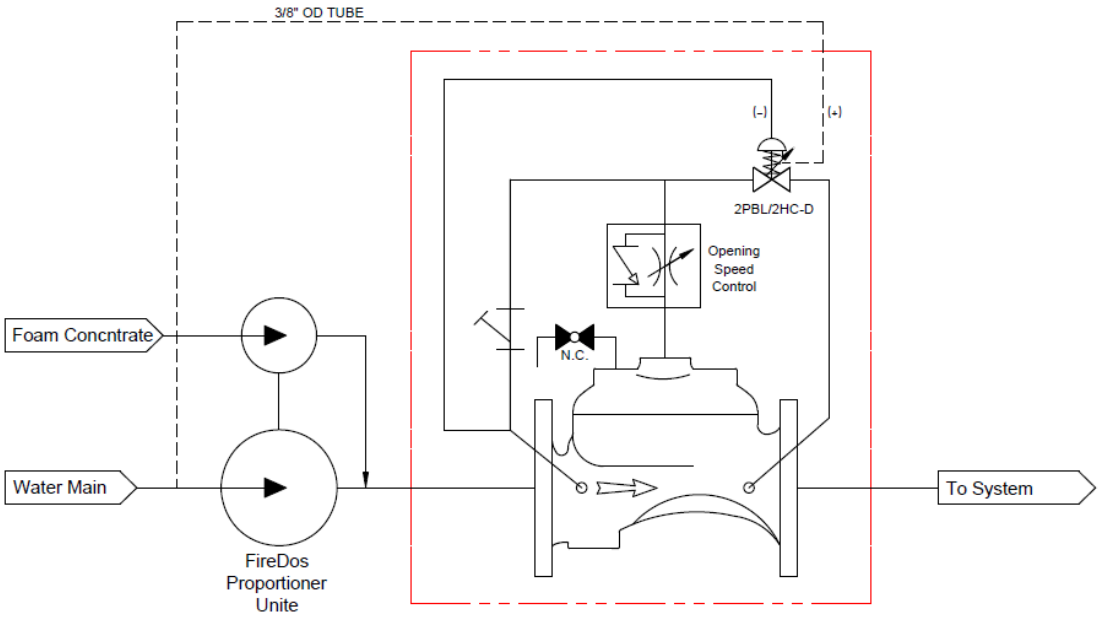
2.2 Optional Features / Accessories

2.2.1 **Valve Position-Flow Indicator (code I):** provides the means for Visual Indicating of the Valve Position at all times, by detecting the motion of main the valve internal assembly. This feature must be ordered in advance and therefore not field retrofit-able.
2.2.2 **Valve Position Limit Switch (code S or SS):** provides Remote Valve Position Signaling, it shall be assembled and installed according to instructions within its package, consult Bermad if any field adjustment is to be made.
2.2.3 **Large Control Filter (code F):** provides extra capacity means for filtering of the water supplied to the water control pilot system to achieve the essential level of debris free water. It is recommended for those cases where there is any doubt as to the level of particulate matter in the water.

2.3 Typical Installation

Figure 1a: Foam Proportioning Pump, Typical Installation Diagram

By sensing the differential pressure across the Dosing Pump, the 426-02 tends to throttle when the maximum allowable flow rate for the dosing pump has been reached, regulating, and preventing the flow from exceeding the recommended maximum for the dosing pump, avoiding dangerous pump overload. When flow is lower than the pre-set maximum the 426-02 fully opens.

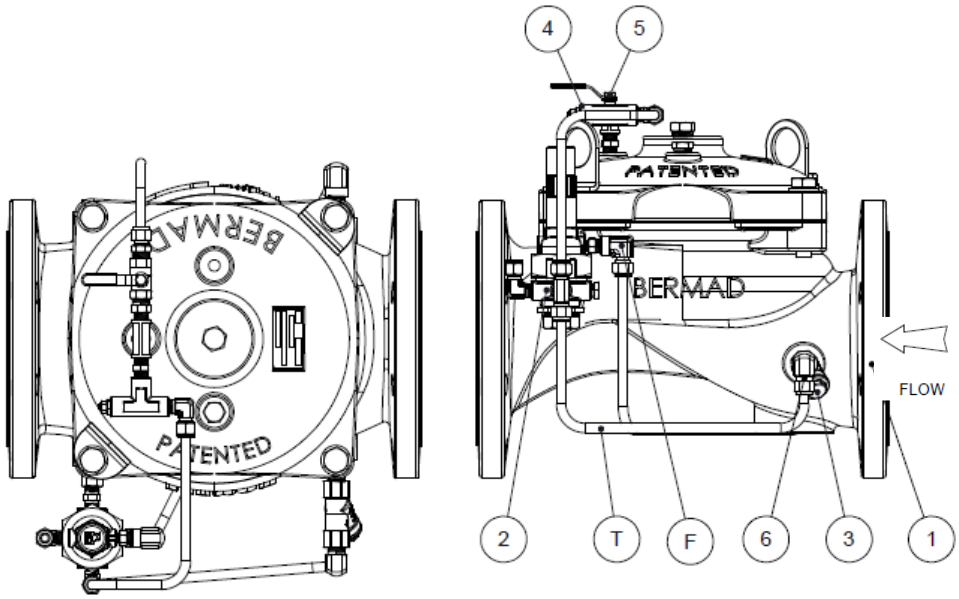


Installation Notes:

1. Valve is CLOSED under no flow conditions.
2. Valve opened slowly by the opening speed control device when flow is created.
3. The Pilot Valve controlling the flow rate preventing any overload to the Dosing Pump proportioner during filling by sensing the Pressure Differential of the Proportioner unit.
4. A bypass line to the Bermad 426-02 is not required.

3. Operation

Figure 3: Control Trim General Arrangement Drawing



Components

1. BERMAD 400 Globe Control Valve, Line Serviceable Type
2. Pressure Differential Pilot Valve 2PBL-D/2HC-D
3. Y Control Strainer 500 Mic.
4. Opening Speed Control Device
5. Manual Opening Valve (N.C.)
6. Restriction Orifice Insert

T. 3/8"-1/2" OD Tubing

F. Double Compression Fittings

2. Starting up

This valve is designed to restrict excessive flow by sensing the differential pressure between two points, where the differential pressure will rise as the flow increases. Therefore, for checking or readjusting, a method of reading the differential pressure or flowrate between the two points is imperative.

2.1.1 Provide system pressure supply to the 426-02 PDCV inlet.

2.1.2 Create sufficient flow through the PDCV to create valve regulation.

2.1.3 While the PDCV is operating, observe the differential pressure or flow and ensure it does not exceed the set or allowable maximum when conditions allow.

3. Readjusting Procedure

Tools required:

13 mm/½" Spanner/wrench or a small adjustable wrench.

The pilot valve is factory pre-set; the setting is clearly indicated on the pilot valve cover.

If readjustment to either the differential pressure or valve response is required, implement the following steps.

3.1.1 Ensure that there is an available flow through the valve.

3.1.2 Loosen the locking nut on the pilot adjusting screw.

3.1.3 Adjust the setting by gradually turning the adjusting screw (#4, fig.2) on the pilot valve whilst observing the differential pressure, or flowrate: Counterclockwise to decrease (-) the differential pressure or clockwise to increase (+) the differential pressure.

4. Maintenance

Warning: Do not turn off the water supply, to make repairs, without notifying local security guards or firefighting officials.

- In any of the following inspections or testing procedures, if an abnormal condition exists, see Troubleshooting for possible cause and corrective action.
- The 426-02 valve is to be inspected, tested, and maintained in accordance with the Maintenance Instructions of the plant, this Maintenance Manual, as well as the Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, NFPA 25.

1. **Two-Month Inspection and Test**

4.1.1 The system should be inspected under flow conditions.
4.1.2 Check that the main valve, pilot system, accessories, tubing & fittings, are all in good condition, damage free and not leaking.
4.1.3 The fastening nut, of the pilot valve (#4 in fig.2) adjusting screw, should be fastened tightly.
4.1.4 Verify that the pressure upstream of the PDCV fittings in the fire pump discharge piping does not exceed the pressure for which the system components are rated.
4.1.5 During the two-month pump flow test, verify that the PDCV is correctly adjusted and set to regulate at the appropriate differential pressures / flows.

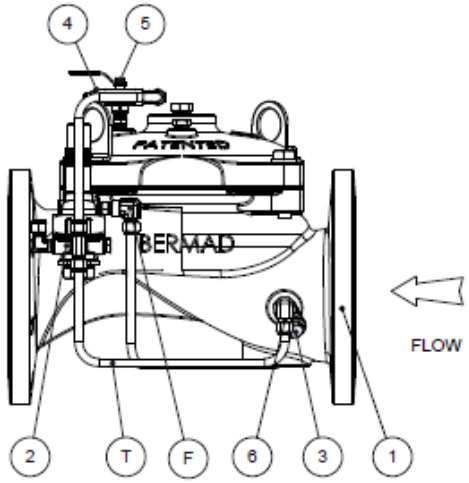
2. **Five-Years Inspection and Test**

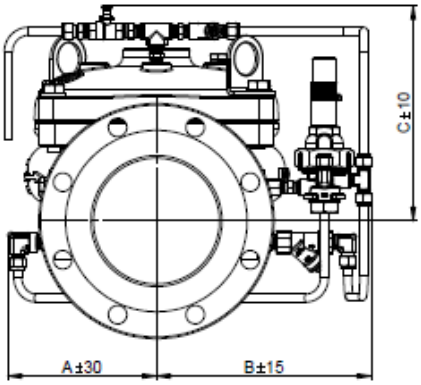
4.2.1 Complete Weekly and Monthly inspections.
4.2.2 Place the system out of service (See “Removing the System from Service” above).
4.2.3 The interior of the Control Valve should be cleaned and inspected.
4.2.4 The Elastomeric Diaphragm Assembly shall be inspected for wear and if necessary, shall be replaced with a new Diaphragm.
4.2.5 Place the system back in service. (See instructions "Placing the System in Service").
4.2.6 The valve and the pilot system must be activated at full flow.
4.2.7 Take all additional measures as required by NFPA-25 "Standard for the Inspection Testing and Maintenance of Water-Based Fire Protection Systems."

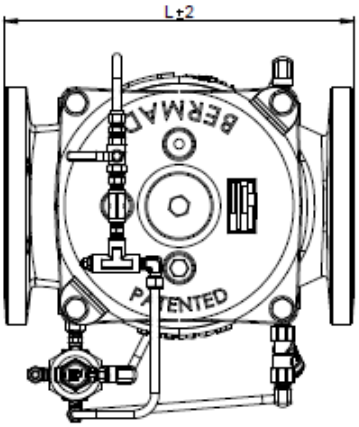
5. Abnormal Conditions – Troubleshooting

Symptom	Probable cause	Remedy
Valve fails to regulate	Restrictor is blocked	Clean and flush the restriction
	Filter blocked	Remove filter cap and screen to clean
	Air trapped in main valve cover	Loosen cover tube fitting at the highest point, bleed air and re-tighten
Valve fails to open	Insufficient inlet pressure	Check/create inlet pressure
	Pilot valve is adjusted to high	Readjust according to paragraph 5.2
Valve fails to seal properly	Filter blocked	Remove filter cap and screen to clean, see Note below
	Debris trapped in main valve	Remove the valve cover, clean the seat and the interiors from debris
	Diaphragm in main valve is leaking	Inspect the diaphragm and replace if damaged

Figure 4: Model 426-02 GA Drawing







Valve Size	2"	2.5"	3"	4"	6"	8"	10"
DN	50	65	80	100	150	200	250
Metric	mm	mm	mm	mm	mm	mm	mm
L	205	205	257	320	415	500	605
A	109	109	125	151	177	191	211
B	169	181	196	206	255	262	282
C	161	160	174	192	279	304	305
Weight (Kg)	12	14	23	28	77	139	156

6. Opening Speed Control Devise (OSCD), Code 02

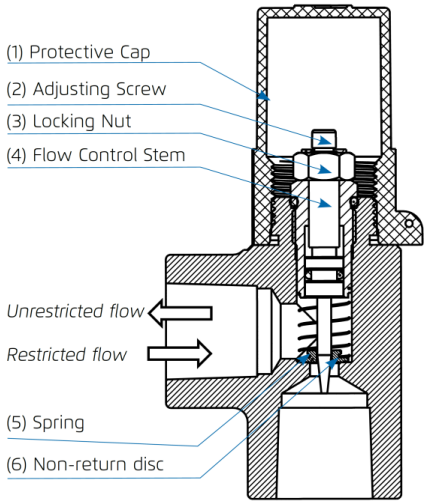
General

Water hammer or overpressure spikes from surge, which may result from quick opening or closing of a deluge valve can be reduced by adjusting opening speed devices.

Note: The speed control needle stem has a special shape to prevent complete closure, thus at fully closed position the speed control device will not prevent the Deluge Valve from operating.

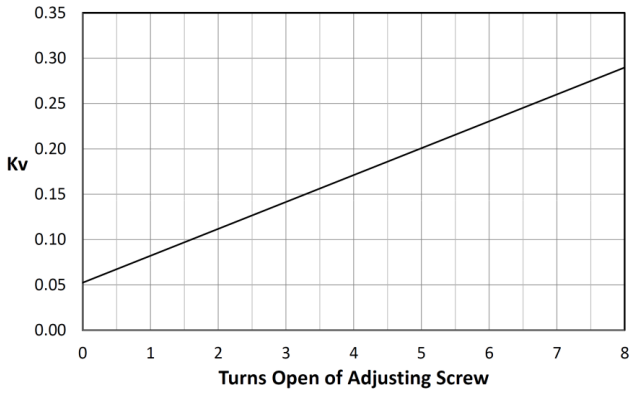
6.1 The Bermad Opening Speed Control Device (OSCD) is a valve control accessory that has an adjustable restricted flow in one flow direction and an unrestricted flow in the opposite direction.
The OSCD is designed to be installed on the control trim of Bermad valves, to reduce the opening speed and thus decrease or eliminate damaging water surge or water hammer. Reduction of the main valve's opening speed is achieved by adjusting the OSCD to restrict the rate of water flow exiting the main valve's control chamber controlling the rate at which the main valve opens.
The closing speed remains unaffected as flow in the opposite direction, entering the control chamber to close the main valve remains unrestricted.

Fig. A.2.a: OSCD Device



6.2 Principle of Operation
The flow direction to fill the Bermad Deluge valve control chamber is in the "unrestricted flow", direction against the spring (5) and the flow control stem (4), the flow causes the non-return disc (6) to leave the seat presenting a relatively unrestricted flow path.
When water is released from the Bermad Deluge valve in the "restricted flow" direction to Open, the non return disc is held in place on the seat by the spring force and the flow, presenting a restricted flow path between the orifice in the non-return disc and the flow control stem.

Fig. A.2.b: OSCD Flow Coefficient (Kv) Vs. Opening Turns



6.3 Re-Adjustment
Unscrew the protective cap (1) and loosen the locknut (3). Turning the adjusting screw (2) clockwise decreases the flow, and will slow the main valve opening. Turning the adjusting screw counter-clockwise increases the flow, and will quicken the main valve opening.
Caution: the OSCD supplied installed on a valve trim is factory adjusted for optimum performance and any further adjustment may affect the optimum functionality of the deluge valve.

Fig. A2.c: Opening Speed Control (Code 02) Trim Installation