Backflow Prevention for Fire Sprinkler Systems

State of Illinois Plumbing Code

Backflow Prevention

Fire safety systems connected to a public water supply will require a backflow prevention device between the fire safety system and the public water supply.

Types of Valves

Check

Double Check

Reduced Pressure

Check Valve

- A valve which permits flow in one direction, from the supply to the end use.

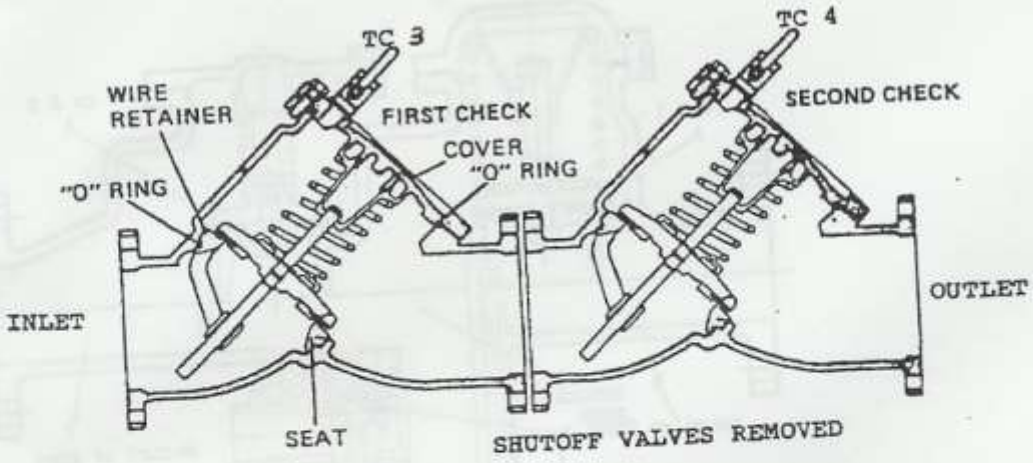
State of Illinois Plumbing Code

- The State of Illinois requires a DDC (Double Detector Check) valve on all fire protection systems.

Double Check Valve Assembly-DDC or DCVA

This assembly consists of two internally loaded check valves, either spring or internally loaded, weighted, installed as a unit between two tightly closing resilient-seated shutoff valves as an assembly, and fittings with properly located resilient seated test ports or cocks.

Diagram

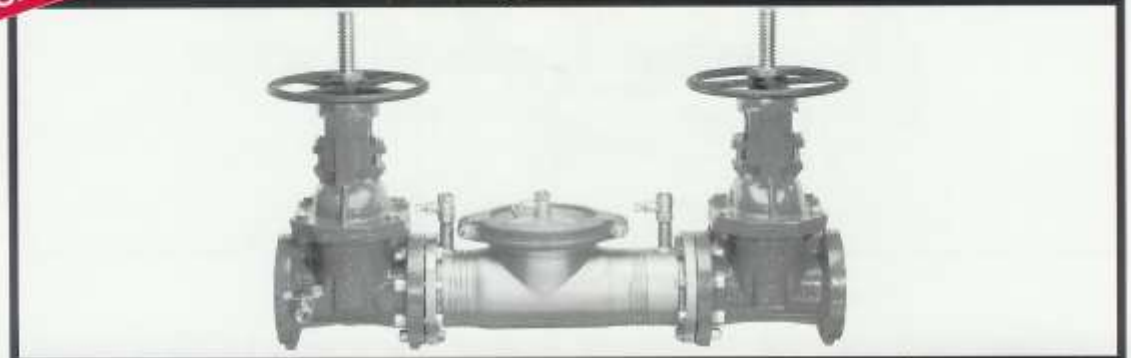


NOTE: No. 1 and No. 2 test cocks and shutoff valves not shown

Cut-away of a double check valve

Single Check Valve Length !

SILVER BULLET
next generation



MODEL 2001SS Double Check Assembly

APPLICATION
The Ames 2001SS provides positive drip-tight closure against the reverse flow of non potable liquids caused by a cross connection. The 2001SS can be used in fire protection systems, irrigation systems and other systems requiring non-health hazard protection.

INSTALLATION
The 2001SS may be installed vertically or horizontally. Refer to local codes for specific installation requirements.

SPECIFICATIONS
The double check shall consist of two independently operated spring loaded cam-check valves, required test cocks, and optional inlet and outlet resilient wedge shut off valves. Each cam check shall be internally loaded and provide a positive drip tight closure against the reverse flow of liquid caused by back siphonage or back pressure. The modular cam-check includes a stainless steel spring and cam-arm, rubber faced disc and a replaceable seat.

NATIONAL APPROVALS
Contact the Ames factory for specific approvals.

FEATURES
- 50% Shorter end to end dimensions for compact inexpensive installation.
- 60% lighter in weight, reduces installation and handling costs.
- Stainless steel reinforced patented cam check assembly for long term reliability and low head loss.
- Reversible cam check disc.
- 100% Lead Free.
- No Special Tools Required for Servicing.
- 300 stainless steel one piece body.
- Same lay length as most Detector Check Valves, for retrofit applications.

AMES CO.
FLUID CONTROL SYSTEMS

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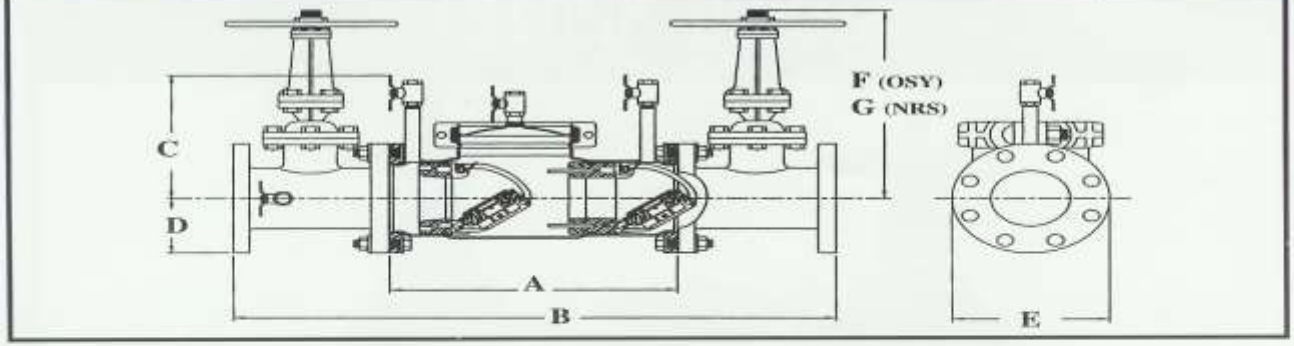
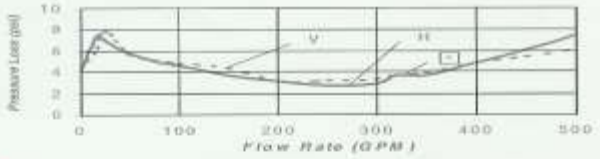
MODEL 2001SS Double Check Assembly



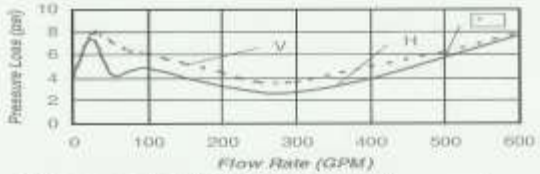
Ames 2001SS - Weights & Dimensions

Size	A	B	C	D	E	F	G	Weight w/ Gates	Weight w/o Gates
	in.	in.	in.	in.	in.	in.	in.	lbs.	lbs.
3"	20"	36 1/8"	10 1/2"	3 3/4"	7 1/2"	18 7/8"	12 3/8"	190	43
4"	16 1/2"	34 5/8"	10 1/2"	4 1/2"	9"	22 3/4"	14 3/4"	255	42
6"	22 1/2"	43 5/8"	12 1/2"	5 1/2"	11"	30 1/8"	19"	399	78
8"	22 1/2"	45 5/8"	12 1/2"	6 3/4"	13 1/2"	37 3/4"	22 1/2"	613	92

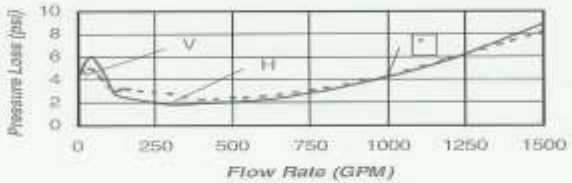
3" Documented Flow Characteristics (Including Shut-off valves)



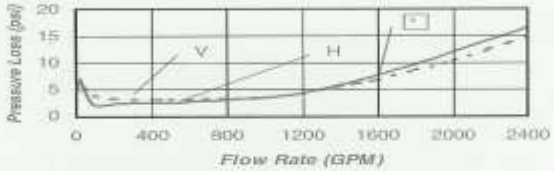
4" Documented Flow Characteristics (Including Shut-off valves)



6" Documented Flow Characteristics (Including Shut-off valves)



8" Documented Flow Characteristics (Including Shut-off valves)



[*] Approximate head loss at the UL rated flow.
V = Vertical
H = Horiizontal
Contact Ames Company for "N" pattern configuration information.

Physical Characteristics

Sizes: 3", 4", 6", 8"
Rated working pressure: 175 psi
Temperature range: 32°F to 110°F
Flange dimension in accordance with AWWA Class D
All internal metal parts: 300 series stainless steel
Construction: 300 series stainless steel

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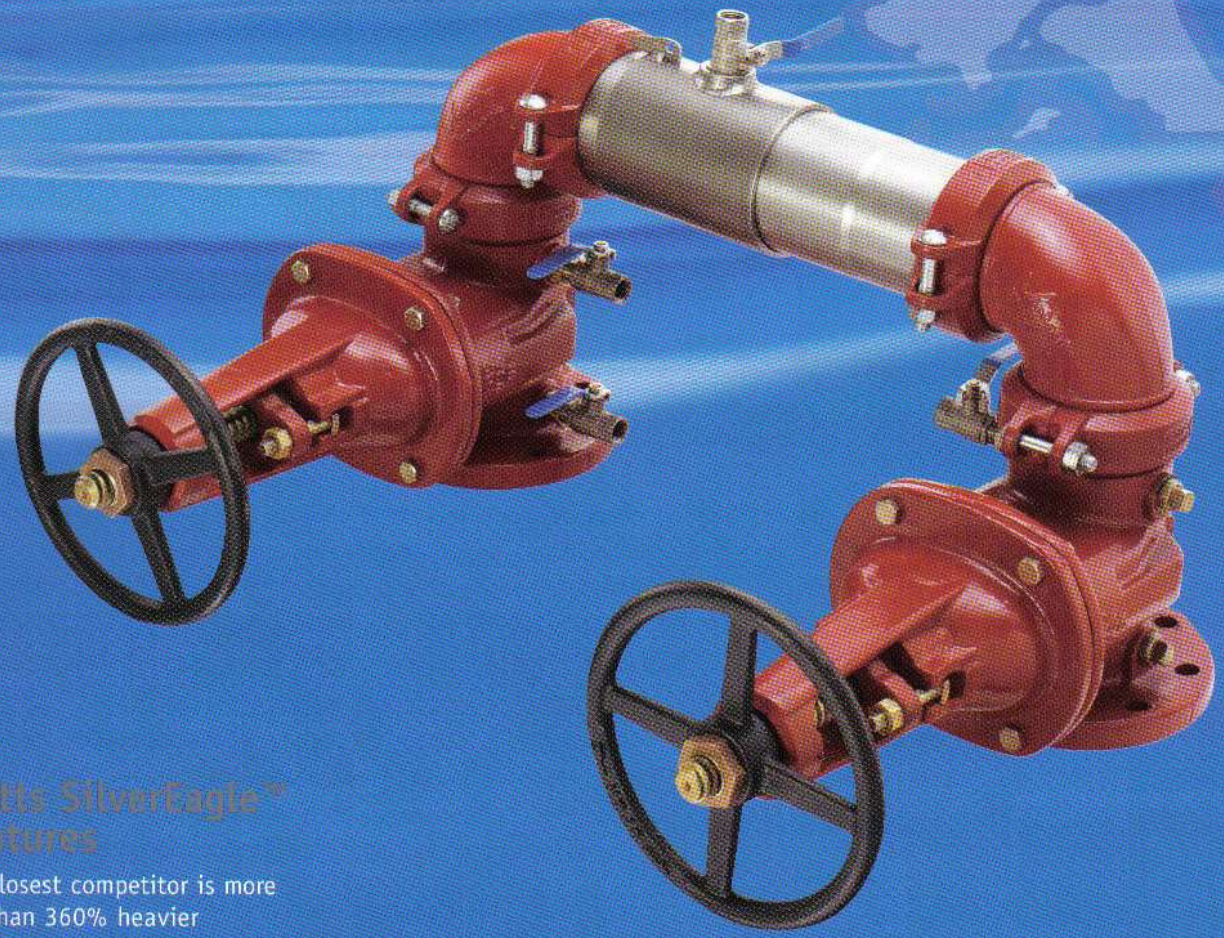
M82-108
8/99

Watts SilverEagle™ Series

757 Double Check Valve Assemblies

757DCDA Double Check Detector Assemblies



Watts SilverEagle™ Features

- Closest competitor is more than 360% heavier

Single Check Valve Length!

SILVER BULLET
next generation

Lower Head Loss!!

MODEL 3001SS Double Check Detector Assembly

Application

The Ames 3001SS provides positive drip-tight closure against the reverse flow of non potable liquids caused by a cross connection. The 3001SS can be used in fire protection systems, irrigation systems and other systems requiring non-health hazard protection.

Installation

The 3001SS may be installed vertically or horizontally. Refer to local codes for specific installation requirements.

Specifications

The double check detector assembly shall consist of two independently operated spring loaded cam-check valves, required test cocks, UL, FM, OSY resilient wedge gate valves and bypass assembly. Each cam check shall be internally loaded and provide a positive drip tight closure against the reverse flow of liquid caused by back siphonage or back pressure. In the incidence of minimal water flow, the valve clapper remains closed so that the water flows through the bypass loop. When major water flow is required, the water pressure will open the main valves to allow full water flow.

National Approvals

Contact the Ames factory for specific approvals.

Features

- 50% shorter end to end dimensions for compact inexpensive installation.
- 60% lighter in weight, reduces installation and handling costs.
- Detects leaks or unauthorized use of water.
- Stainless steel reinforced patented cam check assembly for long term reliability and low head loss.
- Reversable cam check disc.
- 100% Lead Free.
- No Special Tools Required for Servicing.
- 300 stainless steel one piece body.
- Same lay length as most Detector Check Valves, for retrofit applications.

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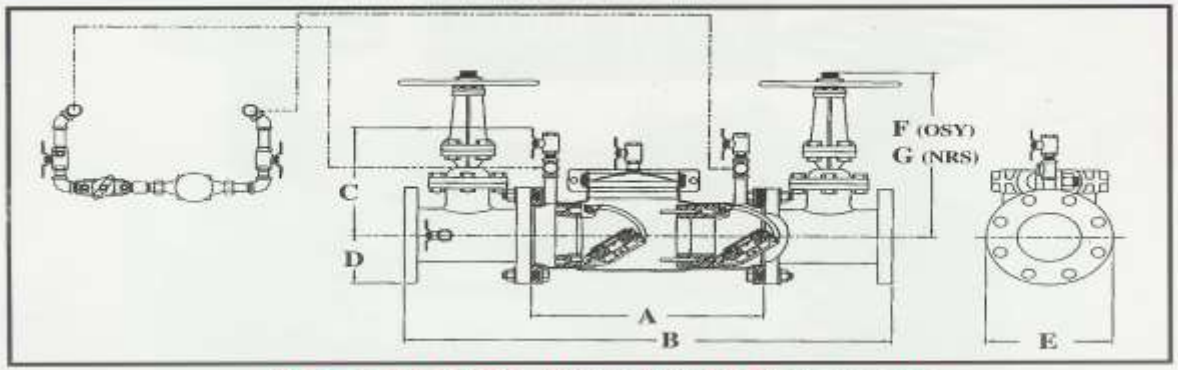
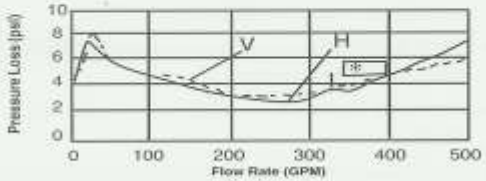
MODEL 3001SS Double Check Detector Assembly



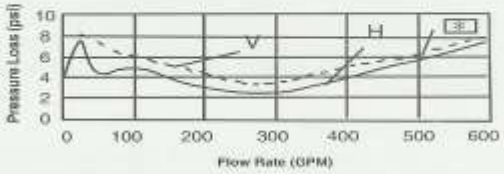
Ames 3001SS - Weights & Dimensions

Size	A	B	C	D	E	F	G	Weight w/ Gates	Weight w/o Gates
	in.	in.	in.	in.	in.	in.	in.	lbs.	lbs.
3"	20"	36 1/8"	13 1/4"	3 3/4"	7 1/2"	18 7/8"	12 3/8"	201	54
4"	16 1/2"	34 5/8"	13 1/4"	4 1/2"	9"	22 3/4"	14 3/4"	266	53
6"	22 1/2"	43 5/8"	15"	5 1/2"	11"	30 1/8"	19"	411	90
8"	22 1/2"	45 5/8"	15"	6 3/4"	13 1/2"	37 3/4"	22 1/2"	626	105

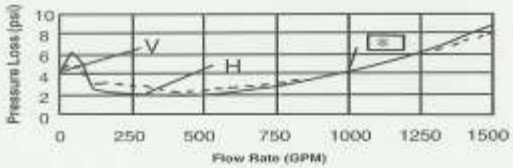
3" Documented Flow Characteristics (Including Shut-off Valves)



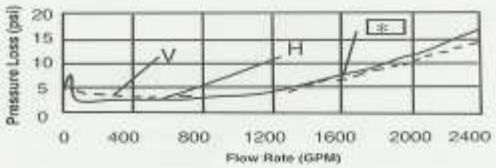
4" Documented Flow Characteristics (Including Shut-off Valves)



6" Documented Flow Characteristics (Including Shut-off Valves)



8" Documented Flow Characteristics (Including Shut-off Valves)



*Approximate head loss at the UL rated flow.

V = Vertical
H = Horizontal
Contact Ames Company for "N" pattern configuration information.

Physical Characteristics

Sizes: 3", 4", 6", 8"
Rated working pressure: 175 psi
Temperature range: 32°F to 110°F
Flange dimension in accordance with AWWA Class D
All internal metal parts: 300 series stainless steel
Construction: 300 series stainless steel

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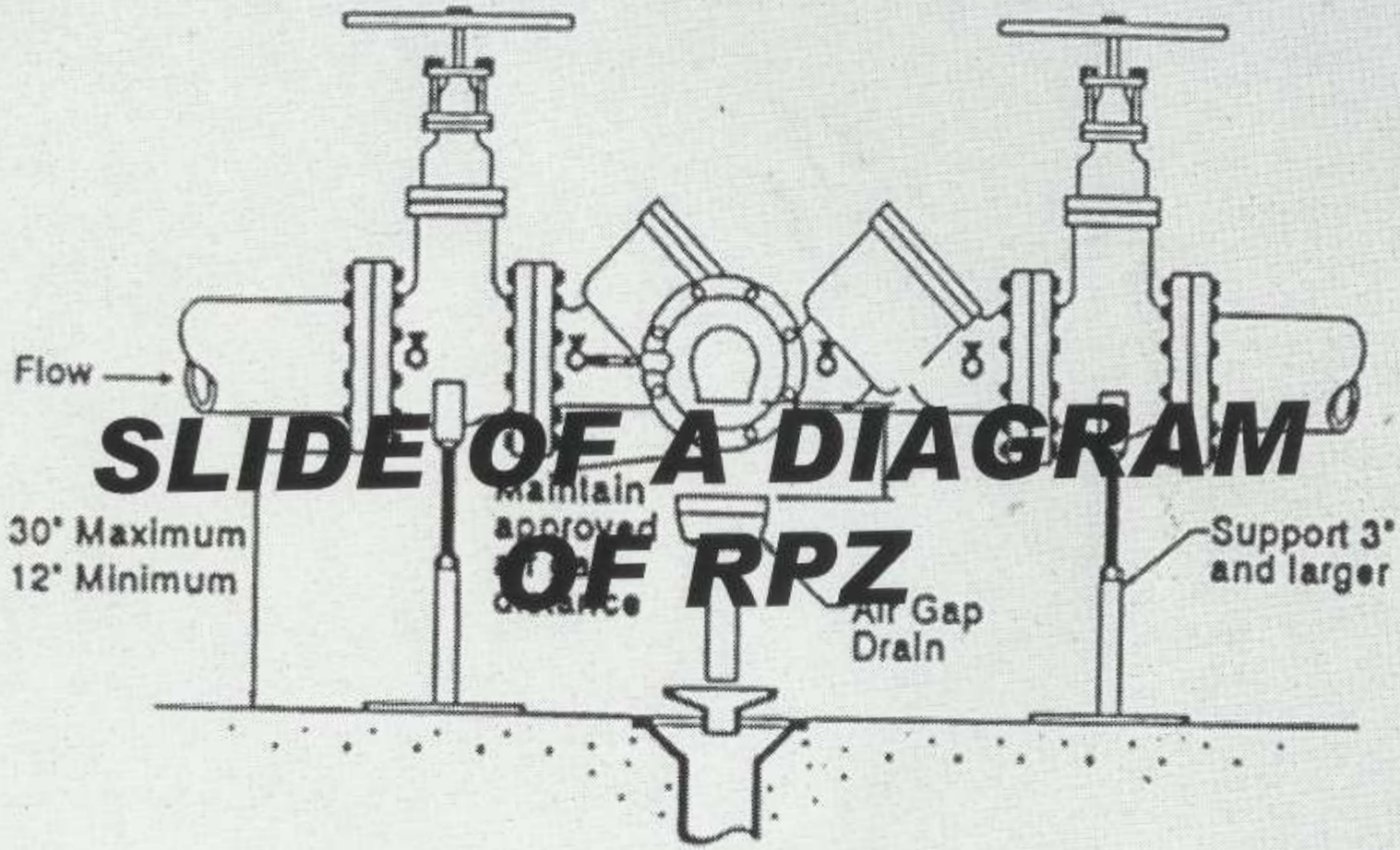
Reduce Pressure Zone (RPZ) or Reduced Pressure Backflow Assembly (RPBA)

Two independently acting check valves together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and below the first check valve. These units are located between two tightly closed resilient seated shutoff valves, as an assembly, and are equipped with properly located resilient seated test cocks.

State of Illinois Plumbing Code

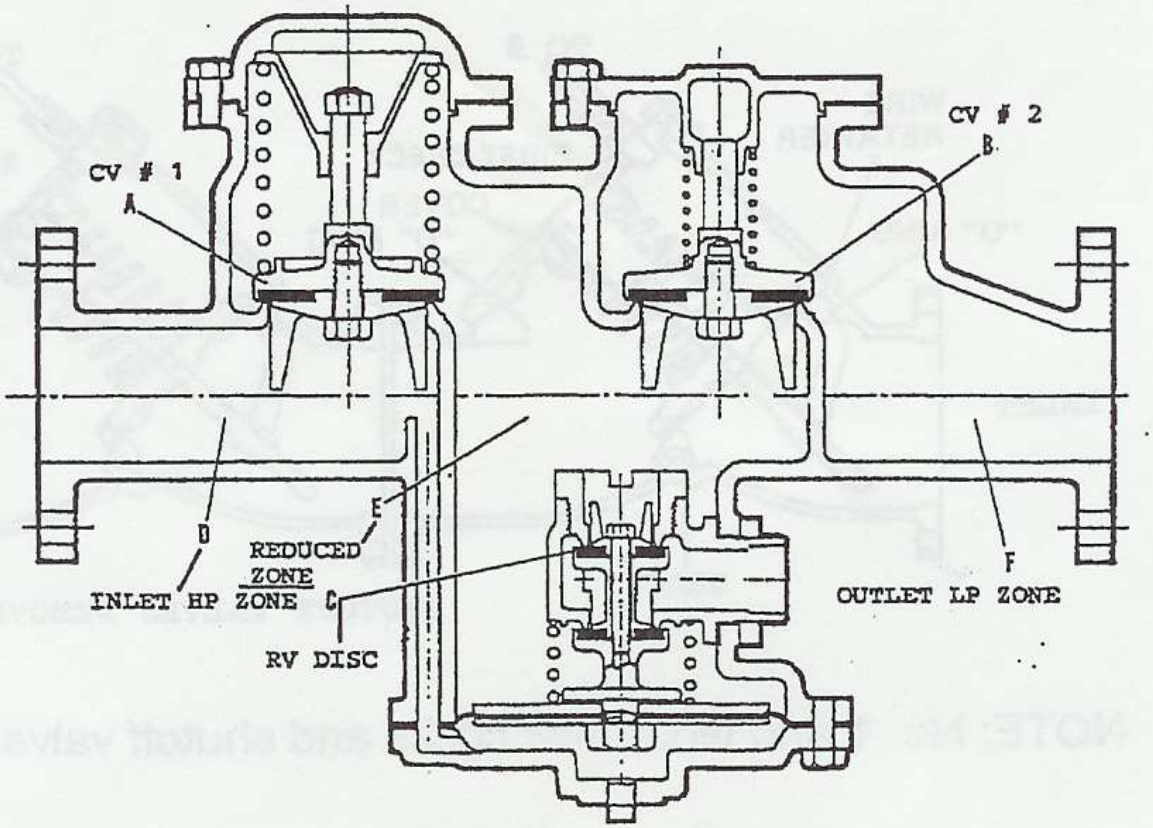
- The State of Illinois requires an RPZ/RPBA valve on all fire protection systems when the following conditions exist.

- If the system contains anti-freeze or other chemicals, then an RPZ device is required.
- If water can be pumped from a non-potable water supply such as a retention pond or lake then an RPZ is required
- If there is a permanent or emergency connection whereby water can be pumped into the fire safety system-RPZ



SLIDE OF A DIAGRAM OF RPZ

Reduced pressure backflow preventer



Typical cut-away of RP

4001SS

Reduced Pressure Principle Backflow Prevention Assembly

APPLICATION

Maximum protection is achieved against back-siphonage and backpressure conditions utilizing reduced pressure principle backflow preventers. The Ames 4001SS, 4001SSN and 4001SSZ provide protection to the potable water supply from contamination caused by a cross connection in a high hazard application.

INSTALLATION

The 4001SS is designed to be installed in a horizontal position (device not shown). The 4001SSN and 4001SSZ may be installed in confined areas where space is limited. Refer to local codes for specific installation requirements.

SPECIFICATIONS

The reduced pressure backflow preventer shall consist of two independently operated spring loaded cam-checks, required test cocks and inlet and outlet resilient seat shut off valves. When normal flow exists, both checks are open and the pressure in the area between the checks, called the zone is at least 2psi lower than the inlet pressure. The differential pressure relief valve is closed during normal flow.

NATIONAL APPROVALS

Contact the Ames factory for specific approvals.

4001SSN

4001SSZ

Features

- **Excellent for retrofit**
- **Flanged, in-line "N" & "Z" configurations**
- **Enhanced cam-check assembly utilizes a spring-loaded center-loaded check to radically improve seating consistency and reduce replacement part costs**
- **Lowest documented flow loss in the industry**
- ***Dia-Seal*™ Relief Valve assembly improves performance, utilizes fewer parts, reduces maintenance time and cost**
- **Stainless steel, one-piece body is *lead free*, requires *no coatings***
- ***60% lighter and 40% shorter* than other manufacturer's assembly**

Physical Characteristics

- **Sizes: 3", 4" & 6"**
- **Rated working pressure: 175psi**
- **Temperature range: 32° F to 110° F**
- **Flange dimension in accordance with AWWA Class D**
- **All internal metal parts: 300 series stainless steel**
- **Construction: 300 series stainless steel**

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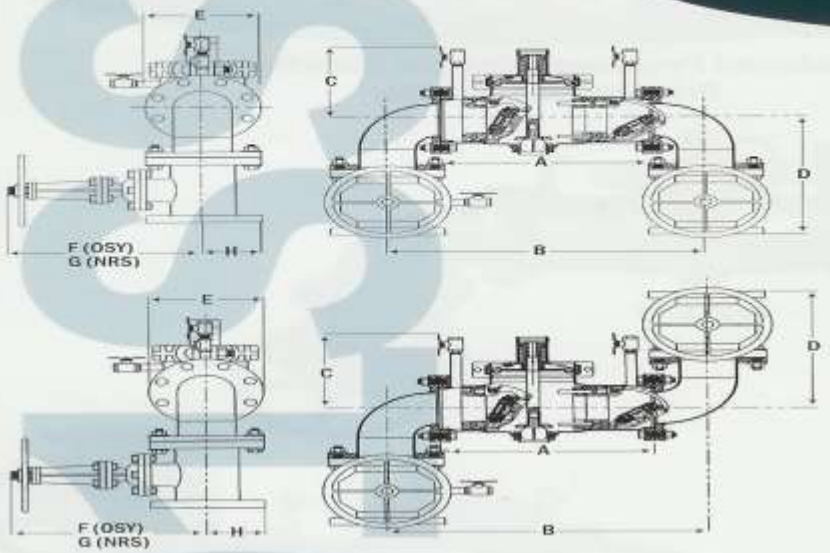
4001SS

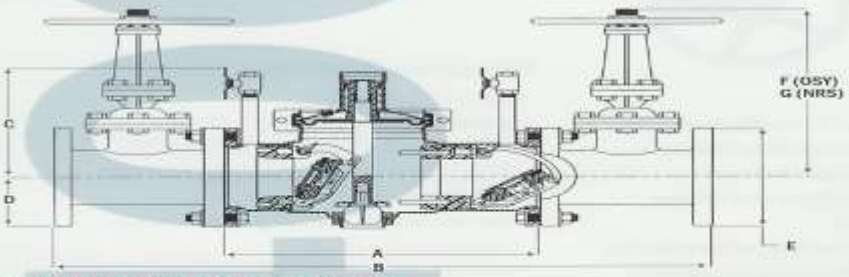
Reduced Pressure Principle Backflow Prevention Assembly



4001SSN&Z with NRS/OSY Gates

Size in.	A in.	B in.	C in.	D in.	E in.	F in.	G in.	H in.	Weight w/gates* lbs.	Weight w/o gates lbs.
3	20	29-5/8	10-1/2	12-13/16	7-1/2	18-7/8	12-3/8	3-3/4	230	83
4	16-1/2	25-1/8	10-1/2	15-13/16	9	22-3/4	14-3/4	4-1/2	312	99
6	22-1/2	35-1/8	12-1/2	18-5/16	11	30-1/8	19	5-1/2	491	170

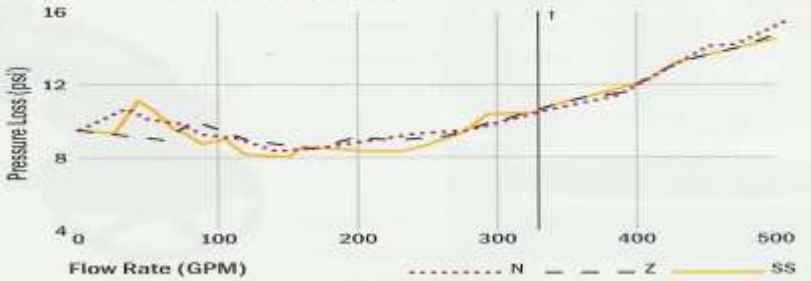
*Includes elbows



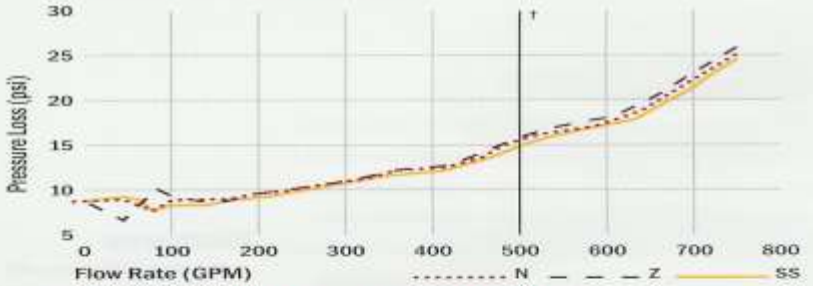
4001SS with NRS/OSY Gates

Size in.	A in.	B in.	C in.	D in.	E in.	F in.	G in.	H in.	Weight w/gates lbs.	Weight w/o gates lbs.
3	20	36-1/8	10-1/2	3-3/4	7-1/2	18-7/8	12-3/8	—	194	47
4	16-1/2	34-5/8	10-1/2	4-1/2	9	22-3/4	14-3/4	—	259	46
6	22-1/2	43-5/8	12-1/2	5-1/2	11	30-1/8	19	—	408	87

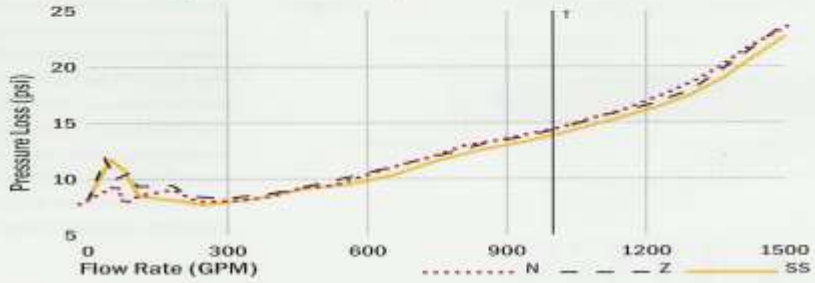
3" Documented Flow Characteristics (including Shut-off Valves)



4" Documented Flow Characteristics (including Shut-off Valves)



6" Documented Flow Characteristics (including Shut-off Valves)



†Approximate head loss at the UL rated flow.

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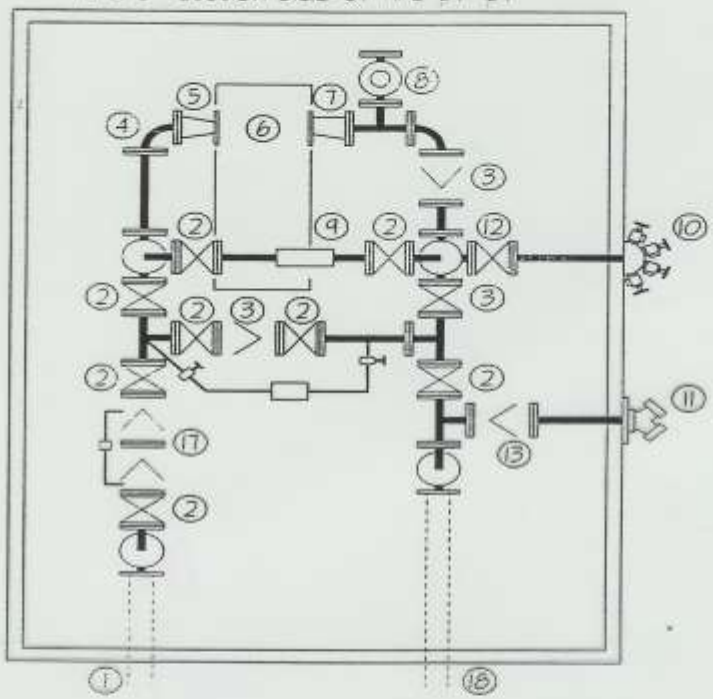
WATTS
REGULATOR
Watts SilverEagle™ Series
957 Reduced Pressure Zone Assemblies
957RPDA Reduced Pressure Detector Assemblies
Watts SilverEagle™
Features
957 model available with quarter-turn
ball valve shutoffs (2½" – 3")

Location of the DDC or RPZ

- Normally the DDC or RPZ is located on the incoming water supply before connection to the fire system
- If there is a Fire Pump, the RPZ or DDC should be located on the discharge side of the pump

FIRE PUMP RPZ ON INTAKE SIDE

HORIZONTAL FIRE PUMP
RPZ on suction side of fire pump.



Legend:

1. Fire Pump suction supply
2. OS&Y gate valve
3. Check valve
4. Long turn elbow
5. Eccentric Reducer
6. Fire Pump
7. Concentric Reducer
8. Relief valve, if required
9. Flow meter, if required
10. Hose Test Header
11. Fire Department Connection
12. OS&Y Gate valve w/ 1/2" ball drip
13. Check valve w/ 1/2" ball drip
14. Fire Pump Controller
15. Jockey Pump Controller
16. Jockey Pump
17. Reduced Pressure Backflow Preventor if required
18. Fire Pump Discharge

FIRE SAFETY CONSULTANTS, INC.
1025 W. WISE ROAD SUITE 200
SCHAUMBURG, ILLINIOS 60193
(847) 891-3665

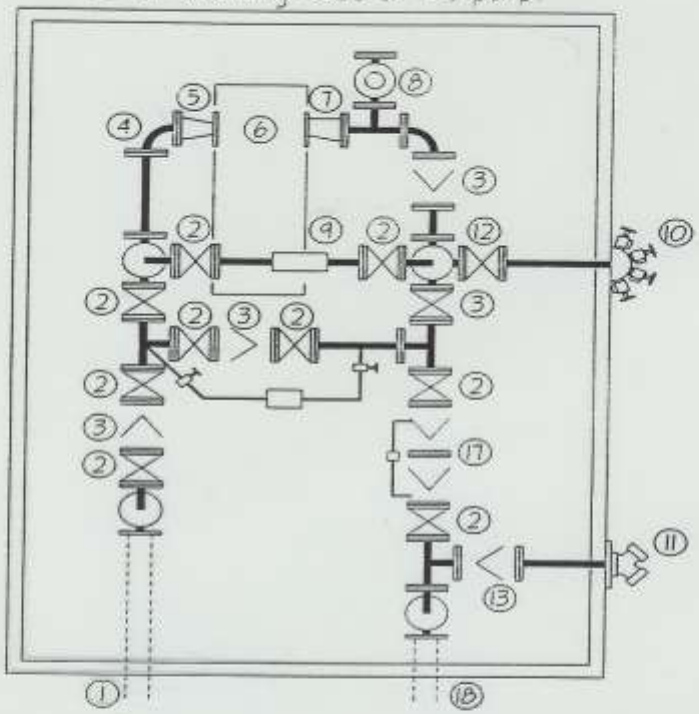
10-7-96

FPSK-2

Graph's: compliments of FSI

FIRE PUMP RPZ ON DISCHARGE

HORIZONTAL FIRE PUMP
RPZ on discharge side of fire pump.



Legend:

1. Fire Pump suction supply
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6. Fire Pump
7. Concentric Reducer
8. Relief valve, if required
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18. Fire Pump Discharge

FIRE SAFETY CONSULTANTS, INC.
1025 W. WISE ROAD SUITE 200
SCHAUMBURG, ILLINIOS 60193
(847) 891-3665

10-7-96

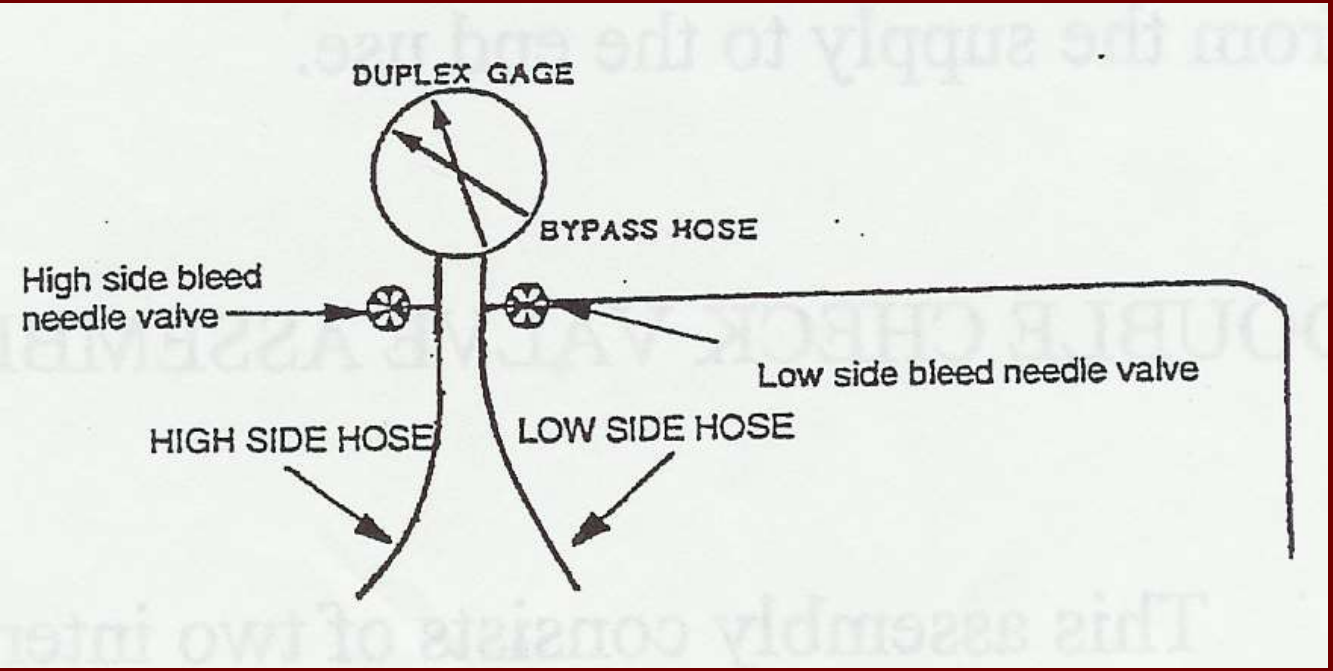
Retrofitting DDC's or RPZ's

- The devices will add from 4 -15 psi on the average to the fire protection system hydraulic calculation demand.
- Most sprinkler systems are hydraulically calculated to within 5 psi of the available water supply.

Who Can Test or Repair an RPZ or DDC

- A licensed plumber who is also a certified cross control detector inspector.

Diagram


DUPLEX GAGE
BYPASS HOSE
High side bleed
needle valve
Low side bleed needle valve
HIGH SIDE HOSE
LOW SIDE HOSE

NFPA 25- Backflow Preventors Section 9-6

- Maintenance
  - Conducted by trained individual following manufacturer's instructions Certified Cross Control Detector Inspector (CCCDI).
  - Rubber parts replaced in accordance with frequency required by authority having jurisdiction and manufacturer's instructions

NFPA 25- Backflow Preventors Section 9-6

- Inspection
  - Weekly for valves supervised with seals
  - Monthly for other supervision methods
  - Verify: in normal open position
  - All RPZ devices must be inspected weekly to determine that the relief port is not discharging

1998 NFPA 25
7-3.8 Other Devices

- Other devices, such as check valves, detector check, and backflow preventors that are installed on the fire sprinkler system shall be inspected and maintained so that they do not impede the flow of water and fire main pressure.

9-6.2 Testing, Backflow

- 9-6.2.1 All backflow preventors shall be tested annually
  - A) A forward flow test shall be conducted at the system demand
  - B) A backflow certification test, as required by the authority having jurisdiction shall be conducted at the completion of the forward flow test.

Sample of Backflow Test form

CBI

"Protecting Your Drinking Water"

Chicago Backflow, Inc.

12607 S. Laramie
Alsip, IL 60803
708-389-5600

Web- www.backflow.com Fax- 708-389-5632 E-mail- info@backflow.com

BACKFLOW PREVENTION ASSEMBLY TEST AND CERTIFICATION REPORT

Address

MAKE AND MODEL	SER. NO.	SIZE	RETEST DATE	SERVICE
LOCATION				

		CHECK VALVE #1		CHECK VALVE #2		RELIEF VALVE	
INITIAL TEST	LEAKED	( )	LEAKED	( )	OPENED AT _____PSI	( )
	CLOSED TIGHT	( )	CLOSED TIGHT	( )	REDUCED PRESSURE DID NOT OPEN	( )
DIFFERENTIAL PRESSURE	_____PSID		_____PSID			
FINAL TEST	CLOSED TIGHT	( )	CLOSED TIGHT	( )	OPENED AT _____PSI REDUCED PRESSURE	( )
DESCRIBE REPAIRS	CLEANED	( )	CLEANED	( )	CLEANED	( )
	REPLACED:	( )	REPLACED:	( )	REPLACED:	( )
	Disc	( )	*Disc*	( )	*Disc*	( )
	Disc Holder	( )	*Disc Holder*	( )	*Disc Holder*	( )
	Stem	( )	*Stem*	( )	*Stem*	( )
	Retainer	( )	*Retainer*	( )	*Spring*	( )
	O-Rings	( )	*O-Rings*	( )	*Diaphragm*	( )
	Seat	( )	*Seat*	( )	*Seat*	( )
	Spring	( )	*Spring*	( )	*Spacer*	( )
	Guide	( )	*Guide*	( )	*Exercised*	( )
	Bushings	( )	*Bushings*	( )	*Other*	( )
	Other	( )	*Other*	( )	*Described Below*	

SPECIAL COMMENTS: _____

_____

_____

_____

TEST KIT: ZURN CALIBRATION DATE: _____

FINAL TEST BY: _____ DATE _____ PASS ☐ FAIL ☐

PLUMBING LICENSE _____ CCCDH _____

THIS REPORT IS CERTIFIED TO BE TRUE: (NAME) _____

Inspection • Certification • Repair

NFPA 25- Control Valves Section 9-3

- Annual Test
  - Forward flow test at system demand
    - Exceptions to Forward Flow Test
      - When connections for system demand are not available, run test at maximum flow
      - For 2 inch or smaller valves, run test without measuring flow
      - Where water rationing is in effect for more than 1 year, internal inspection can substitute for flow
      - Flow Test not required where pump testing causes demand flow through backflow device
      - Backflow certification test (after flow test)

Forward Flow Test NFPA 13 1999 10-2.6

- The backflow prevention assembly shall be forward flow tested to ensure proper operation. The minimum flow rate shall be the system demand, including hose stream where applicable.
- This is a requirement also called out in NFPA 25 1998 Edition

Underground Piping Tests

- HYDROSTATIC TEST
- 200 PSI FOR 2 HOURS
- From the street line non-indicating valve to the first supply side valve in the protected building.

Underground Flush Test

- This test is to be conducted before the underground pipe is connected to the fire sprinkler system.
- Flow the required rate of water listed by the AWWA until the water is clear and there is no collection of material in a burlap bag which is to be placed on the end of the pipe.

Flow rates shown on the next slide…

Sprinkler Pipe Tests

- Flow rates:
  - 390 gpm for a 4” line
  - 880 gpm for a 6” line
  - 1,560 gpm for a 8” line
  - 2,440 gpm for a 10” line
  - 3,520 gpm for a 12” line

Why is this Important?

To remove any sand, grit, or debris from underground that may disturb valves or obstruct fire sprinkler head water flow

To insure that the PROPER water supply is available as it was designed