

MINUTES OF THE SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES.

The meeting was called to order by Chairperson Don Sallee at 8:00 a.m. on February 9, 1994 in Room 423-S of the Capitol.

All members were present :

Committee staff present: Raney Gilliland, Legislative Research Department  
Dennis Hodgins, Legislative Research Department  
Don Hayward, Revisor of Statutes  
Clarene Wilms, Committee Secretary

Conferees appearing before the committee:

Roy Chaney, Chaney, Inc., Lawrence, Kansas  
Jim DeHoff, Executive Secretary, Treasurer, Kansas AFL-CIO  
Written testimony only, Larry Shannon, Acting Superintendent, City of Topeka  
Water Division, representing Kansas Section-American Water Works  
Association  
Written testimony only, in rebuttal of testimony presented, Brett Blackburn,  
Blackburn Nursery, Topeka, KS  
Larry Kennedy, Secretary-Treasurer, Turf Equipment Supply Co., Las Vegas, NV  
David R. Warren, Water & Sewer Director, City of Wichita, Kansas

Others attending: See attached list

SB-611 - water pollution; lawn irrigation systems

Roy Chaney, Chaney, Inc., Lawrence, Kansas, appeared before the committee and presented written testimony opposing SB-611. Attachment 1 Mr. Chaney told committee members he was a plumber with 28 years experience and his concern about this bill was for the health of the people in the state of Kansas. The information attached to his testimony included several articles copied from newspapers.

Jim DeHoff, Executive Secretary /Treasurer, Kansas AFL-CIO, appeared before the committee and presented written testimony opposing SB-611. Attachment 2 Mr. DeHoff told members of the committee he was appearing on behalf of the 1500 members who work in the plumbing and pipefitting trade within the state of Kansas. He stated lawn irrigation systems can be very dangerous to home owners and an improperly installed or poorly maintained system can cause a siphoning action to occur which can contaminate the water that we drink.

Written testimony dated February 2 was provided by Larry Shannon, Kansas Section-American Water Works Association, who, due to the continuation of hearings was unable to appear this date. Mr. Shannon's organization opposed SB-611 stating the bill did not adequately define the terms used in the bill and it appeared to limit the degree of safety that a property owner can install on his irrigation system. Testimony dated February 8 was presented to committee members in rebuttal to previous comments made in committee meetings. Attachment 3

Written testimony was provided by Brett Blackburn, Blackburn Nursery, Topeka, Kansas, and presented to committee members in rebuttal of testimony previously presented to the committee. Mr. Blackburn stated his company had been installing sprinkler systems since 1936 and even though the systems were totally unprotected until the 1970s' no case has been found where contamination was caused by a lawn sprinkler. Attachment 4

Written testimony from Larry Kennedy, Secretary/Treasurer, Turf Equipment Supply Co., Las Vegas, NV, was provided to committee members listing facts to substantiate testimony given by Mark Hirschey, Professor

## CONTINUATION SHEET

MINUTES OF THE SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES, Room 423-S Statehouse, at 8:00 a.m. on February 9, 1994.

of Business, Lawrence, Kansas. Attachment 5

Written testimony from David R. Warren, Water and Sewer Director, City of Wichita, was presented to committee members registering that department's opposition to SB-611. Attachment 6

A brief discussion concerning SB-611 followed the close of testimony.

Senator Hardenburger made a motion to report SB-611 favorable for passage. Senator Morris seconded the motion and the motion carried. Senator Walker requested his NO vote be recorded.

The chairman told committee members that William Bider, Bureau of Waste Management would not have all of his people at 8:00 a.m. Monday morning but the committee would meet with those who could be present concerning HB-2428, presentation of rules and regulations on solid waste management. The complete presentation will be presented at 3:30 p.m. Monday, February 14, 1994 in room 526-S to the House Committee on Energy and Natural Resources.

The meeting adjourned at 8:50 a.m.

The next meeting is scheduled for February 10, 1994.

## GUEST LIST

## SENATE COMMITTEE ON ENERGY &amp; NATURAL RESOURCES

DATE February 9, 1994(PLEASE PRINT)  
NAME AND ADDRESSMARK HINSCHHEY, 4604 MERION CT LAWRENCE KS  
66047Jim KlettoffJerry GrantGlen WesterveltBrian BertrandTERRY RANGLESDARREN HUFFRichard C. KolpeKON BAKERDick StuntzMARTI CROW, LeavenworthJANET STUBBSHarry MerigtonATTD.

ORGANIZATION

LAWRENCE HOMEOWNER /KVKansas AFL-CIOKDHELAWRENCE FRR-ASSN.Lawrence Irrigation AssnCITY OF TOPEKATURFMASTERS LAWRENCEWolford LandscapeLAWRENCE IRRIGATION ASS.Alvamar Inc., LawrenceKDHEKBIALeague of KS MunicipalitiesMajority Leadership Office

...by Chaney owner of Chaney Inc. (plumbing & mechanical contractor in Lawrence.)

28 yrs. experience in plumbing (for the public health)

Member of PHCC, MCAK

Served on local plumbing board for 12 yrs and been chairman for about 4 years.

Plumbers only benefit for opposing this bill is for safe drinking water.

I'll probably won't come out of this meeting with many friends in this room but I believe the truth and health of the people in Kansas is what is important. No matter what it cost myself.

The KOTK chairman was wrong last meeting on the prices of backflow preventers. I double checked with my supplier and a 1" RPZ is 200<sup>9</sup> and a pressure vacuum breaker is less than 60<sup>00</sup>. Also he said there were three types that were high hazard but there is only two.

Mr Chairman what would be the one factor that would make you say this bill is wrong.

Senator Praeger says she is very much for the health of the people of Kansas.

Senate Energy & Nat'l Resc.  
February 9, 1994  
Attachment 1

I would like to pass out some information now to prove my point.

There are septic tanks in Topeka and Lawrence that I personally know that have lawn sprinklers over the top of them. In the Spring of 1993, Milwaukee had 370,000 people become ill and 50 people died from contaminated water, so think about the septic tanks.

The AWWA has the responsibility to make sure the water is safe under all foreseeable circumstances.

In Detroit they had a low hazard backflow preventer fail. If it had been a high hazard they would have had an extra safety precaution. I know Mr. Chairman anything can fail but some things are better.

It's not the cost of the systems but it is the safety. Health comes first.



# Rules called lax for drinking water

WASHINGTON (AP) — Federal and state officials are failing to protect millions of Americans who are exposed to contaminants every time they drink a glass of tap water or take a shower, says a private environmental watchdog group.

Water systems throughout the country routinely violate the federal Safe Drinking Water Act, but penalties are rare, according to "Think Before You Drink," a report released Sunday by the Natural Resources Defense Council.

The federal Environmental Protection Agency logged 300,000 state and federal violations in 1991 and 1992, but only about 1 percent resulted in penalties, said Erik Olson, author of the report.

Most of the violations involved failure to regularly test water quality, report contamination, follow proper water treatment methods or notify the public of violations, Olson said. The violations affected at least 100 million people.

Olson said most water systems are complying with the environmental rules on the books and "there is no need for panic." Nevertheless, the report said some utilities are "capitalizing on consumer faith" that tap water is safe and lax government enforcement to let water quality slide.

Olson said the public is largely unaware of the potential dangers of unclean drinking water, possibly because of widespread under-reporting of violations.

"Chemical contaminants ... which have been found in the

drinking water of millions of Americans, may be responsible for certain cancers," the report said. It said Centers for Disease Control and Prevention data suggest that more than 900,000 people each year become sick from waterborne disease, and that as many as 900 of these people die.

The report said that exposure to some chlorination byproducts, radon and other volatile compounds, often occurs when people inhale fumes while showering.

Lead in drinking water makes up about 20 percent of the average person's total lead exposure and up to 85 percent for some bottle-fed infants, the report said.

Earlier this month, the EPA, acknowledging some problems with drinking water contamination, released a package of legislative recommendations aimed at ensuring drinking water safety.

About 370,000 people became ill and about 50 died after drinking contaminated water in Milwaukee last spring. Reports published in last week's editions of The Milwaukee Journal outlined flaws in the system of rules the EPA issues and enforces to guarantee safe drinking water.

The Natural Resources report recommends federal officials take several steps to strengthen the Safe Drinking Water Act:

- Create a revolving fund for local water systems trying to upgrade their equipment.

- Prohibit the creation of new water systems too economically weak or small to meet federal health requirements and consolidate such systems that are now in operation.

## CABLE 6 TONIGHT



# An AWWA Statement of Policy on Public Water Supply Matters.

Cross Connections (Adopted by the Board of Directors on Jan. 26, 1970, and revised on June 24, 1979, and reaffirmed June 10, 1984)

The American Water Works Association recognizes that the water purveyor has a responsibility to provide its customers at the service connection with water that is safe under all foreseeable circumstances. Thus, in the exercise of this responsibility, the water purveyor must take reasonable precaution to protect the community distribution system from the hazards originating on the premises of its customers that may degrade the water in the community distribution system.

Cross-connection control and plumbing inspections on premises of water customers are regulatory in nature and should be handled through the rules, regulations and recommendations of the health authority or the plumbing-code enforcement agencies having jurisdiction. The water purveyor, however, should be aware of any situation requiring inspection and/or reinspection necessary to detect hazardous conditions resulting from

cross-connections. If, in the opinion of the utility, effective measures consistent with the degree of hazard have not been taken by the regulatory agency, the water purveyor should take such measures as he may deem necessary to ensure that the community distribution system is protected from contamination. Such action would include the installation of a backflow prevention device, consistent with the degree of hazard at the service connection or discontinuance of the service.

In addition, customer use of water from the community distribution system for cooling or other purposes within the customer's system and later return of the water to the community distribution system is not acceptable and is opposed by AWWA.

*Kansas City, Mo. has just rewritten their ordinance to up-grade yard sprinklers to High-hazard. It has not been acted on, but the officials have felt the AWWA requires it under their Policy Statement.*

*Chair: Mid Am Backflow - Dan Grover - 913-722-2852, Esti-258*

# Unwanted guests

## resident finds parasites in tap water

Carol Baldwin  
Writer

SOUTHGATE — Parasitical worms were found in the water at homes on Netherwood last week after a malfunctioning underground sprinkler coupled with a water-break sucked the nematodes into the water system.

The nematodes first showed up the

**"This happened Tuesday and I was still getting living things in the water Wednesday night."**

**— Jerry Blick  
Netherwood resident**

ment determined that an atmospheric vacuum breaker had malfunctioned and was in the open position. We had a water main break, and that caused a vacuum in the system."

WHEN THE WATER pressure dropped, the vacuum in the system sucked some water from the sprinkler into the city water, but was only distributed to two homes, according to Jarski.

He said DPS crews purged the water system and blew out hydrants for three blocks north and south of Netherwood to eliminate the nematodes.

Homeowner Jerry Blick found the worms swimming around in his bathtub when he started filling the tub for his child. He said he was appalled to find the critters, as well as rust and other debris, in his water.

"This happened Tuesday and I was still getting living things in the water Wednesday night," Blick said. "It's disgusting. If these have always been in the lines, then how come no one's

See WATER — Page 8-A



Larry Caruso/Photo Editor

Southgate resident Jerry Blick was furious when live nematodes came spraying out of his bathtub faucet. He said he also found the organisms when he took the screen off of his kitchen faucet.

evening of Oct. 1 after the back-flow prevention system on the privately owned underground sprinkler malfunctioned.

Stan Jarski, the city's Department of Public Services (DPS) director, said Monday that water samples taken since then have been tested by both Detroit and Wyandotte's water departments and have come back negative for bacteria and are safe.

"We got good clean samples from Detroit and Wyandotte," he said. "The Wayne County Health Depart-

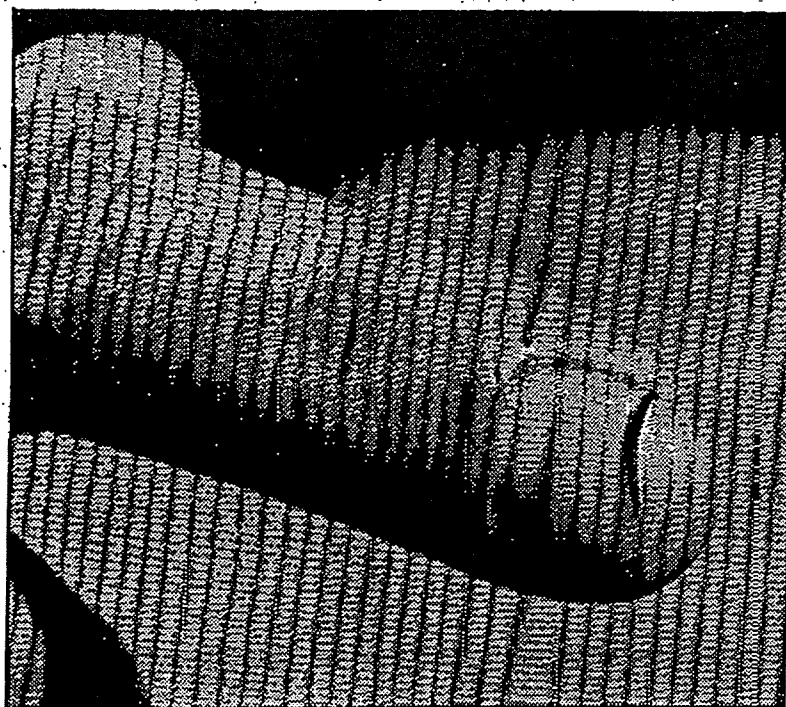
DWAYNE

THIS IS THE LATEST INCIDENT IN OUR AREA THAT I AM AWARE OF.

I'VE SENT YOU THE ACTUAL ARTICLE BY MAIL

CARL SCHARREDER





Larry Caraso/Photo Editor

Homeowner Jerry Blick was disgusted to find the nematodes floating in his son's bathwater and scooped up a sample to show the city's Department of Public Services.

# Water

Continued from Page 1-A

ever seen them before?"

"The only reason I noticed it is because I have children and was giving my kid a bath. If you have a screen on your kitchen faucet or you were taking a shower, you wouldn't see it."

**JARSKI EXPLAINED** that the nematodes never would have found their way into the water if the sprinkler's backflow mechanism had worked properly.

He said the contractor who installed the sprinkler system didn't pull a city permit and used a "cheap" atmospheric vacuum breaker, and when it malfunctioned, which was at the time of the water main break, the nematodes were pulled right in.

"You can get a cheaper price, but it can cost you in the long run," Jar-

ski said.

He said the resident who owns sprinkler would be cited by county for improper installation.

"This is nothing the system of Jarski said. "We can monitor, sure and chlorine, but we're lited."

Blick said he tested the water chlorine and there was none when the nematodes first shower.

Jarski said a pool tester will pick up traces of chlorine in water. He said the DPS tested chlorine on Netherwood and blocks away and it was a "per situation."

**BLICK SAID HE** thinks the is trying to "candy coat" the problem and he's not buying the scene presented by the DPS. He wants water main replaced.

Jarski said the problem should happen again if residents have sprinkling systems checked by professionals.

# Kansas AFL-CIO

110 W. 6th St.

Topeka, KS 66603

(913)357-0396



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**Dale Moore**

Executive Secretary  
Treasurer  
**Jim DeHoff**

Executive Vice  
President  
**Wayne Maichel**

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Senate Committee on Energy & Natural Resources  
Senator Don Sallee, Chairman  
SB 611 - February 3, 1994  
Room 4235

Mr. Chairman & Committee Members:

I am Jim DeHoff, Executive Secretary of the Kansas AFL CIO. I am here on behalf of the 1500 members who work in the plumbing and pipefitting trade within our state. I appear before you today to oppose SB 611.

SB 611 seeks to make a determination that lawn irrigation systems shall be low hazard even though the Kansas Department of Health & Environment has designated lawn irrigation systems high hazard and requires an above ground high hazard backflow prevention system.

Lawn irrigation systems can be very dangerous to home owners. An improperly installed or poorly maintained system can cause a siphoning action to occur that can contaminate the water that we drink, cook with and use for other sanitary uses.

The home owner can suffer flu like symptoms and even get cancer from systems that have failed to stop chemicals and other harmful things which are deposited on lawns, from entering their water systems. Most home owners would never know their level of exposure or the potential danger that comes from their water systems. This is why it is important that the Kansas Department of Health and Environment, cities and counties adopt regulations to protect its citizens.

Neighboring states such as Colorado and Nebraska have adopted this type of protection and Missouri is in the process of doing so.

The proponents of SB 611 will tell you it will drive up the costs of lawn sprinkler systems if SB 611 is not passed. It would cost an average of \$350.00 to conform with the high hazard regulations. This is a small price for the home owner's assurance against this health hazard.

It is very important to all residents in Kansas to have above ground



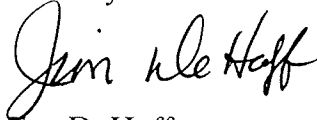
Senate Energy + Nat'l Resources  
February 9, 1994  
Attachment 2

high-hazard backflow prevention devices for their lawn sprinkler systems, which can be tested easily. Underground preventive devices are not subject to periodic inspection, simply because, home owners don't want to have their nice lawn dug up to do so. Above-ground high hazard backflow preventers are easy to maintain and to test. Freezing of the pipes is not a problem because every lawn sprinkler system must be drained for winter months anyway.

Above ground backflow preventers are a very important function to assuring safe, sanitary conditions. Unfortunately, backflow preventers do fail if not checked and replaced when required.

We ask that you look at this issue very carefully, and we urge you to report SB 611 unfavorably.

Thank you.

A handwritten signature in black ink, appearing to read "Jim DeHoff". The signature is fluid and cursive, with the first name "Jim" being more prominent.

Jim DeHoff  
Executive Secretary



## Kansas Section-American Water Works Association

February 2, 1994

Chairman Don Sallee  
Senate Committee on Energy  
and Natural Resources  
State Capitol, Room 128-S  
Topeka, KS 66612

Re: Senate Bill 611 - An Act Relating to Water Pollution;  
Concerning Law Irrigation Systems.

Chairman Sallee:

I am Larry Shannon, Acting Superintendent for the City of Topeka Water Division. I am here representing the Kansas Section - American Water Works Association.

The Kansas Section opposes Senate Bill No. 611 because it does not adequately define the terms used in the bill, and it appears to limit the degree of safety that a property owner can install on his irrigation system.

Terms such as high hazard non-community water system, high hazard backflow prevention device, and low hazard backflow prevention devices are not defined. Requiring a low-hazard backflow prevention device to be installed when a property owner may want to install a high hazard device appears to limit the property owners option. It may take the responsibility and liability for possible contamination from the irrigation system from the property owner, water purveyor, or municipality and place the liability on the state.

It is the feeling of the Kansas Section - American Water Works Association that possible contamination of water systems from backflow be dealt with through a backflow prevention program.

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Senate Energy + Nat'l Res.  
February 9, 1994  
Attachment 3





Kansas Section-American Water Works Association

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Chairman Don Sallee  
February 2, 1994  
Page 2

Thank you for the opportunity to testify before this committee.

Sincerely yours,

*Larry Shannon*

Larry Shannon  
Trustee Kansas Section  
American Water Works Association

LDS:dc



## Kansas Section-American Water Works Association

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February 8, 1994

Chairman Don Sallee  
Senate Committee on Energy  
and Natural Resources  
State Capitol, Room 128-S  
Topeka, KS 66612

Re: Senate Bill 611 - An Act Relating to Water Pollution;  
Concerning Law Irrigation Systems.

Chairman Sallee:

After coming to two Committee Hearings to present testimony on Senate Bill 611, I regret that I will be unable to be present for the hearing scheduled on February 9, 1994. I hope the written testimony I have provided will be sufficient to state the position of the Kansas Section American Water Works Association.

I do feel I must respond to some testimony presented on February 3, 1994. One of the conferees spoke of a problem in Topeka that occurs when fire hydrants are opened and closed quickly causing dirty water problems at a laundromat. The impression may have been conveyed that the dirty water was coming from exterior sources through drain holes in the fire hydrant barrel.

Fire hydrants are designed with drain holes in the barrel to allow the barrel to drain to keep from freezing. The valve in the fire hydrant functions so that the drain holes are open when the valve is closed, and the drain holes are closed when the valve is open. While the fire hydrant is in use, the valve is open, the drain holes are closed, and the barrel is pressurized. When the fire hydrant is closed, the drain holes are open, and the barrel is empty.

Many years ago, it was common practice to install cast iron water lines without interior coatings. Over the years, some of these mains have rusted on the inside. When there are sudden changes in flow in the main, such as caused by opening and closing a fire hydrant too quickly, the rust will break loose and cause dirty water.

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## Kansas Section-American Water Works Association

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Chairman Don Sallee  
February 2, 1994  
Page 2

We do have a flushing program in place to attempt to alleviate the rusty water problem. We also have an infrastructure replacement program where we try to replace some of the unlined rusty water mains each year.

I hope this explanation offers a better understanding of what is occurring with the rusty water problem. The source of the dirty water is not from the fire hydrant.

The Kansas Section remains opposed to Senate Bill No. 611.

Sincerely yours,

*Larry Shannon*

Larry Shannon  
Trustee Kansas Section  
American Water Works Association

LDS:dc

*Some facts and comments responding to testimony given against senate Bill 611*

Addressing the Question of how long have lawn irrigation systems been installed in Kansas. *Blackburn Nursery, Topeka is one of the oldest contractors in Kansas and has installed since 1936. Until the mid 1970's no backflow prevention was required on these systems. Even with thousands of totally unprotected systems in Kansas we have been unable to find a case where a contamination was caused by a lawn sprinkler system.*

1) All double check valves need to be rebuilt every five years.

*We support a testing program, and a state certified tester program as long as the requirements for the testing are resonable and do not cause undue hardship on the sprinkler system owner. We see no reason to rebuild a device that tests properly but recognize the need to replace internal parts when the device fails the testing standards.*

2) It is as expensive to rebuild a double check valve assembly as it is to replace it with the RPZ assembly.

*Page 1 of your packet shows the actual cost for the kit to rebuild the varies devices as well as the cost of each one. These prices do not include labor.*

*If the double check backflow preventer assembly is to be replaced with an above-ground device it will need to be relocated so that it will not be in the center of the yard. The cost of this relocation was not considered by the KDHE in their testimony.*

*The \$29 unit mentioned by the KDHE is not allowed on sprinkler systems under current KDHE guidelines, although it was used show how inexpensive it was to retrofit a system.*

*The concrete vault is yet another example of the KDHE saying that something is "required" when it fact it is only a "suggested practice" by someone.*

*The irrigation industry uses the plastic valve boxes shown on pages 2 and 3 of the packet. While these valve boxes may not be large enough for the larger double check valves, they are quite ideal for the 1" and 3/4" devices that are commonly used for residential sprinkler systems. These plastic "vaults" provide easy access for testing and repair of these smaller assemblies.*

3) This is an Issue that only involves the Lawrence area. There is no support from the irrigation industry as a whole. The American Waterworks Assn. as well as the American Backflow Prevention Assn. does not support the position that the double check valve is the proper device for lawn irrigation systems.

*We do have the support of the irrigation industry there are very few, if any, in our industry that do not think the Double Check Valve is the proper device on a lawn sprinkler system. Unfortunately we do not have a large association, or a lot of money to push this common sense issue. The only reason this was not opposed by larger numbers in other cities is because most thought that KDHE had a regulation requiring above ground devices. This also accounts for the large number of water purveyors the are said to support the above ground devices. People can not make a good decision with poor information.*

*Page 4 is a letter to the KDHE from the Pacific Northwest Section of the American Water Work Assn. Assn. that was said to support the above ground devices. If you read this letter you will see that this region has recognized that with their freezing climates the above ground devices are not the proper protection on a lawn sprinkler system. They suggest the use of the double check valve installed below ground for lawn sprinkler systems.*

Senate Energy & Natural Res  
February 9, 1994  
Attachment 4



*They go on in this letter to produce evidence that the Pressure Vacuum Breaker fails the test over 3 times as much as the double check valve. The Pressure Vacuum Breaker is considered by the KDHE as adequate protection for lawn sprinkler systems.*

*Mr. Bratton also expressed over the phone that they had problems with people replacing frozen ruptured devices with a piece of pipe in order to avoid the expense of a new backflow preventer device. He did not include this in his letter.*

*Page 5 contains a letter for the manufacturer representative for Febco, a major backflow preventer manufacturer. This letter states that the Pressure Vacuum Breakers fail more often than the Double Check Valve "805".*

4) The Freezing problem was overstated in Las Vegas and is really not the problem and it has been blown out of proportion.

*Page 6 contains statements from distributors in Las Vegas*

*Page 7 and 8 are statements from Irrigation Distributors in Kansas and Nebraska stating that they have experienced problems with freezing of the above ground backflow preventers.*

*Item 9 is a Febco catalog. On page 3 of this catalog is a highlighted area that shows that the manufacturer considers the 805YD a suitable device for Sprinkler Irrigation Systems.*

5) The KDHE relies on testing from Southern California University for their policies.

*The Backflow Manufacturers provide grants for these testing laboratories as well as paying an hourly rate for all testing and certification. Very few homeowners, installers and wholesalers belong to the membership of the testing labs.*

When presented with the facts, and the proven track record of the Double Check Valve, it is obviously the most safe and reliable choice for the maximum protection for lawn sprinkler systems. If the KDHE was serious about water safety they would look at those parts of the water system that have proven to be a continual source of contamination, instead of a part of the system that has never been a source on contamination even when protected with any type of backflow preventer..

Respectfully submitted,

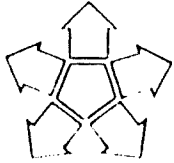
Glen Westervelt  
*Lawrence Irrigation Association*

**Backflow Preventer Type****New Price    Rebuild kit**

Reduced Pressure Assy.	\$230.00	\$210.00
Pressure Vacuum Breaker	\$110.00	\$56.25
Double Check Valve	\$148.00	\$50.00

*These Devices are all 1"*  
*All Prices are Published List*  
*From Febco*

*Labor and Relocation cost*  
*not included.*



# Modern Distributing Company

*The Midwest's Premier Distributor*

Turf Masters  
c/o Darrell Huff  
637 E. 22nd Street  
Lawrence, KS 66046

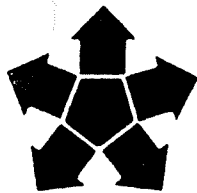
Darrell,

Please find enclosed, the Quote you requested. You will find the list prices quoted are the ones printed in our 1994 Price Book, effective 01-15-93. This book is distributed to all of our irrigation contractor accounts at our annual sales and product meeting. This years book was distributed 01-13-93.

As it has been in the past, you will recieve a 45% discount off list price to achieve your net price. This discount structure is explained on the first page of the Irrigation Contractor Program under the Contractor Program Benefits section.

If you have any further requests just let me know and I will do what I can to help.

Joe Scheetz  
Modern Distributing Co.



# MODERN DISTRIBUTING COMPANY



K.C. (816) 333-  
Lenexa (913) 593-3333  
Springfield (417) 862-2771  
Wichita (316) 945-3888

QUOTATION ☒  
ORDER ☐

Terms to Apply: Net 10th

Effective  
Until: 03-01-94

CUSTOMER Turf Masters ATTN: Darrell Huff

STREET 637 E. 22nd Street

CITY Lawrence STATE KS ZIP 66046

QTY.	ITEM #	DESCRIPTION	UNIT PRICE	EXTENSION
1	805Y100	1" Febco Double Check Assembly-List\$148.	77.00	
1	905-044	Repair Kit for Febco #805Y-List\$50.	27.50	
1	765100	1" Febco Pressure Vacuum Breaker-List\$110.	60.50	
1	905-048	Bonet Assembly-List\$32.95	18.12	
1	905-050	Popit Assembly-List\$23.30	12.93	
1	825Y100	1" Febco Reduced Pressure Assy-List\$230.	126.50	
1	905-044	Check Assembly-List\$50.	27.50	
1	905-045	Relief Valve Assembly-List \$160.	88.00	
1	825YA100	1" Febco Reduced Pressure Assy. (Angle)		
		List \$280. (Repair parts are the same		
		as the 825Y100)	154.00	
1	781-054	Febco 1" Ball Valve w/Test Port-Lst \$62.74	34.51	
1	10-170-106	Ametek 12" Turf Irr. Vlve Bx-Lst \$22.80	12.54	
1	10-170-003	Ametek 6" Ext. for 10-170-106-Lst \$11.40	6.27	

Authorized By: Joseph R. Scheetz  
*Joseph R. Scheetz*

Date 02-07-94

# BH&L

# ENTERPRISES

5040 Rentworth Ct.

P.O. Box 6811

Lincoln, Nebraska 68506

Phone 402-423-8900

1375 South Bebe

Phone 316-942-4400

Wichita, Kansas 67209

MEMO FROM:  
BH&L TURF IRRIGATION SUPPLY  
REGARDING:  
BACK FLOW PREVENTION LAWS AND REGULATIONS  
TO:  
ALL IRRIGATION CONTRACTORS

DEAR CONTRACTORS,

FEBRUARY 1ST, 1994

THANKS TO A FEW CONTRACTORS IN KANSAS, YOU HAVE THE ABILITY TO CONTACT  
YOUR LOCAL SENATOR OR REPRESENTATIVE TO GET

**SENATE BILL NO. 611 PASSED.**

THIS SENATE BILL WILL ENABLE YOU AS A CONTRACTOR TO INSTALL A DOUBLE  
CHECK ASSEMBLY INSTEAD OF AN ABOVE GROUND PRESSURE VACUUM BREAKER OR A  
REDUCED PRESSURE BACKFLOW PREVENTER ON IRRIGATION SYSTEMS THAT DO NOT  
HAVE CHEMICAL INJECTION SYSTEMS INSTALLED ON THEM.

THIS MAKES SO MUCH SENSE WE CAN NOT AFFORD TO PASS UP THIS OPPORTUNITY.

AS A DISTRIBUTOR OF TURF IRRIGATION EQUIPMENT WE SELL BACKFLOW  
PREVENTION PARTS TO REPAIR PRESSURE AND RP UNITS, 95%+ OF THE PARTS WE  
SELL ARE TO REPAIR FROZEN BACKFLOW PREVENTERS THAT WERE NOT WINTERIZED  
EARLY ENOUGH IN THE FALL.

WITH OUR CLIMATE CONDITIONS WHERE THE TEMPERATURE GOES UP TO THE 70'S  
DURING THE DAY TO BELOW FREEZING AT NIGHT, WITH EXPOSED BACK-FLOW  
PREVENTERS MOST ALL SYSTEMS HAVE TO BE WINTERIZED BY EARLY OCTOBER AND  
NOT TURNED ON TILL LATE APRIL.

TAKE TIME NOW TO READ THE ENCLOSED ARTICLES AND CONTACT YOUR LOCAL  
LEGISLATORS TODAY.

KENT BROBST & KEVIN MARKS

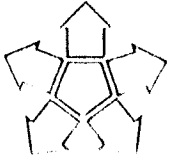


The Irrigation Association

LAWN SPRINKLER SYSTEMS / A WONDERFUL WAY TO WATER



4-6



# Modern Distributing Company

*The Midwest's Premier Distributor*

To Whom it may concern,

A question was asked of me whether I had an opinion regarding the backflow preventor issues of late. Well, I do. I am a sales representative for a large wholesale irrigation distributor. I cover a territory that extends from Topeka, KS to Columbia Missouri. My responsibilities are to call on irrigation contractors, municipalities and Educational Facilities. My job is to sell irrigation products and handle any service and warranty issues. My position provides me with tremendous exposure to most of the people working in the irrigation industry. This exposure provides me a lot of insight as to the challenges faced by todays contractors. The one I see and hear of most often are the problems above ground backflow preventors present.

A few years ago when the Johnson County Water District #1 announced their new backflow prevention codes it was met by a lot of opposition which soon faded into compliance. For the first year many seemed to "live with it", then winter came early and many of the above ground devices that are now required froze and burst. Imagine explaining to a customer who bought 50 or 60 above ground devices from you that season that you could not help them because the manufacturer would not warranty any device damaged by freezing. And your customer is livid because they now have to buy a new device because the temperature dropped below freezing in early October. This scenario just multiplies as each season passes and the number of devices installed multiplies each year.

The most common concern I hear each fall is "how are we going to get all these backflow preventors winterized before the freeze?" That challenge becomes a greater task each year and will only continue to compound in the future. To me the fear of literally thousands of devices installed above grade that could potentially freeze and burst overnight is real and causes me much concern.

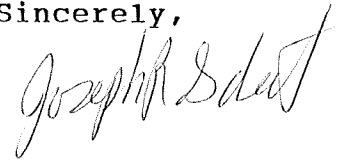
I am not only a sales representative, I am a homeowner and the owner of a lawn irrigation system. I have had no freezing problems with my backflow preventor, which is installed below grade in an Ametek valve box, for over four years. My irrigation system has never been winterized before the first week of December and this year it was not winterized until around Dec. 20th.

1610 N. Topping Ave. • Kansas City, MO 64120 • Phone (816) 231-8500 • Fax (816) 241-4803

Springfield (417) 862-2771 • St. Louis (314) 664-2000 • Wichita (316) 945-3888 • Lenexa (913) 599-0333

To me it only makes sense to use a device that is less subject to freezing (and vandalizing or theft) that can be tested and certified safe year after year. The Double Check Assembly meets all of my needs and still provides a safe cross-connection to the domestic water supply.

Sincerely,

A handwritten signature in cursive script, appearing to read "Joseph R. Scheetz".

Joseph R. Scheetz  
Modern Distributing Co.

**THE DWORKIN COMPANY**

manufacturers ★ representative

(816) 631-2500

3314 Roanoke Rd.

Kansas City, Mo. 64111

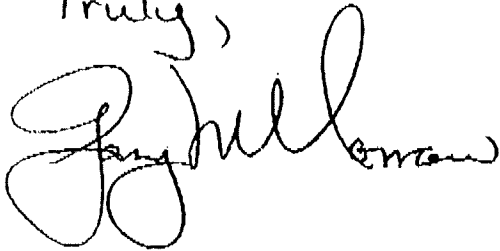
FAX: (816) 756-0326

02-07-94

Modern Distributing  
1620 N. Topping  
KCMO 64120

Attn: Joe Sheets

Per phone conversation today, it is my opinion of all Febco devices used on lawn sprinkler systems. (Models #765, 805 & 825's) The model #765 pressure vacuum breaker assembly is the most likely to fail. Due to what we refer to as cold snaps in the weather. I hope this answers your questions.

Truly,  




6

Contacted two sprinkler distributors in the Las Vegas Area:

On 2-8-94 I spoke with Don Strum at Mesa Sprinkler Supply in Las Vegas. He stated that they replaced 200-300 devices after the freeze. He stated the bodies of the devices froze and split and the ball valves also froze. He also stated that he had worked in the irrigation industry in Montana and Wyoming and that both of those states allowed the doublecheck valve below ground because of the freezing problem. He said he had no way of know the number of devices that froze in Las Vegas but said he would guess a minimum of 2000-3000.

On 2-9-94 I spoke with Kevin Snyder at Simpson Irrigation Supply in Las Vegas. He stated that they had to replace at least 1000 devices or supply repair kits for those that had froze but the body did not rupture. He said that the demand was so high that they could not get rebuilding kits for several week. He estimated 5000-6000 devices froze city wide. He also expressed support for the double check valve because of the freezing problem. He also noted that most devices in Las Vegas have some sort of insulation during the winter months but they still froze.

Glen Westervelt

Lawrence Irrigation Assn.



American Water Works Association

**PACIFIC NORTHWEST SECTION**

Oregon • Washington • Idaho

P.O. Box 19581, Portland, OR 97280

6601 S.W. Taylor's Ferry Road, Portland, OR 97223

February 9, 1994

Mr. Mark E. Gerard, P.E.  
Bureau of Water  
Kansas Department of Health and Environment  
Building 283, Forbes Field  
Topeka, KS 66620-0001

Dear Mr. Gerard;

**STATISTICS ON THE FAILURE RATES OF BACKFLOW ASSEMBLIES**

In reply to your telephone request of February 7, 1994, and to the request of February 7th from Mr. Ron Baker of Willowridge Landscape, please find attached a summary of our failure rate statistics compiled from data submitted by several of the large water utilities in the Pacific Northwest. This summary is based on data collected from 1979 to 1987. Unfortunately, we have not summarized the available data for the last several years.

All test data are for assemblies approved by the USC FCCCHR. All testing is done by state certified testers in Oregon, Washington or British Columbia.

Our detailed analysis includes the failure rate of assemblies for each type, size, make and model. To prevent the detailed information from being used by manufacturers in sales promotion, the tabulation of failure rates for each manufacturer is given only to the participating utility and state health department members of the committee.

Before requiring the annual testing of pressure vacuum breakers, the Portland Water Bureau tested all atmospheric and pressure vacuum breakers in local hospitals. They reported a failure rate of approximately 50 percent for both pressure and atmospheric vacuum breakers. The tests were made on vacuum breakers that were installed for various time periods without ever having been tested or maintained. When Portland required the pressure vacuum breakers to be tested annually, they had a failure rate approximately the same as that for a double check valve assembly.

For lawn irrigation systems, most water utilities in the Pacific Northwest require the installation of a DCVA in a below-ground vault (with test cocks plugged). The DCVA location is near the water meter for ease of inspection and testing.

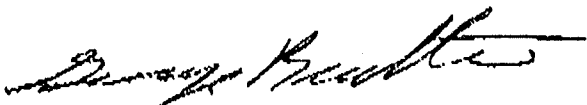
Unless the premises or plumbing is isolated by a DCVA or RPBA, an atmospheric vacuum breakers would not be accepted because they can not be tested. Any backflow preventer used to protect the water system from a health hazard (low or high) must be USC FCCCHR approved and designed for testing. Without annual testing, maintenance is not performed and the likelihood of the vacuum breaker (or any other backflow preventer) failing is significantly increased.

Pressure vacuum breakers are acceptable under the above criteria of being USC approved and designed for testing. However, many water utilities will disapprove a PVB installation because of:

- ... the potential for their removal following freeze damage,
- ... the potential for the irrigation piping to be modified (e.g., raised with the growth of shrubs) to allow a back pressure condition, and
- ... in some locations, the possibility for damage from vandals, theft, etc.

I hope that this information will be of assistance. Please feel free to call me at (206) 678-4552 if you have any questions.

Sincerely,



George Bratton, P. E.  
Chairman, PNWS AWWA Cross  
Connection Control Committee

pc Ron Baker  
Willowridge Landscape  
1453 E. 800 Rd.  
Lawrence, KS 66049-9133

Hank Sims, CCC Committee Secr.

PWWS-AWWABACKFLOW ASSEMBLY FAILURE RATES**SUMMARY OF ANNUAL TEST REPORTS - 1979 to 1987**  
**Backflow Prevention Assemblies**PRESSURE VACUUM BREAKER ASSEMBLIES

## Percent Failure

Check Valve	9.8%
Air Inlet	8.5%
Both C.V & Inlet	7.1%

DOUBLE CHECK VALVE ASSEMBLIES

## Percent Failure

Check Valve # 1	4.0%
Check Valve # 2	2.7%
Both Check Valves	2.0%

REDUCED PRESSURE PRINCIPLE ASSEMBLIES

## Percent Failure

Check Valve # 1	8.2%
Check Valve # 2	2.0%
Both Check Valves	2.2%
Relief Valve	2.6%
Relief Valve and one or both CV failed	0.7%

## Utilities contributing test results:

Portland Water Bureau, OR  
City of Beaverton, OR  
Medford Water Commission, OR  
Seattle Water Dept., WA  
Vancouver Water Dept., WA  
Tacoma Water Div., WA  
Modern Electric Water Co. (Spokane), WA  
Vancouver Water Dept., B.C.  
Richmond Water Dept., B.C.

Total number of test results - RPBA, DCVA, & PVBA: 31,563

**AMETEK**

2 B  
**TURF IRRIGATION  
VALVE BOXES**



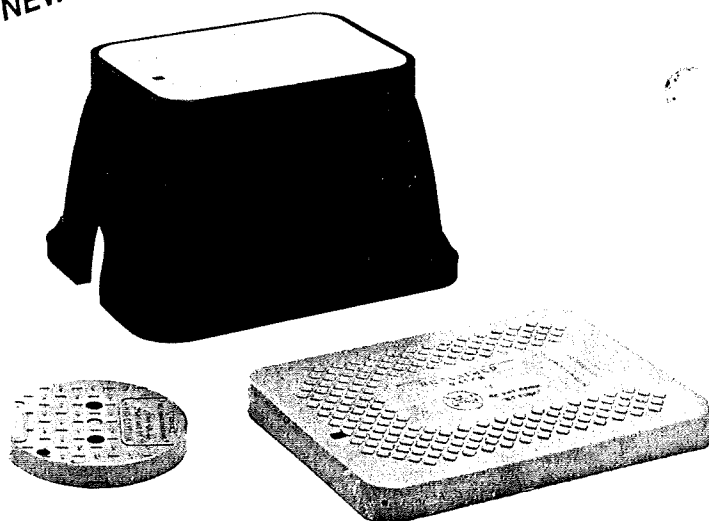
BLACKWOLF RUN, KOHLER, WI

**AMETEK**  
PLYMOUTH PRODUCTS DIVISION



"RECLAIMED WATER"

NEW

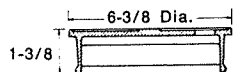
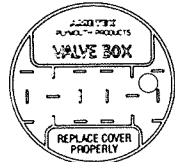


## TYPICAL INSTALLATION

AMETEK's Turf Irrigation Valve Boxes are ideal for use in golf course fairways, cemeteries, residential and any commercial lawn where valves or meters are buried. Their molded-in green color blends in with, rather than sticks out of, your turf. Black covers are available for landscaping needs. Purple covers are available for "reclaimed water" (shown above).

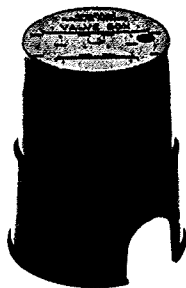
AMETEK's boxes are lighter in weight, easier to handle and less brittle than concrete or cast iron boxes. All boxes nest for simplified storage. And, they are made of a strong, tough thermoplastic material especially suitable for underground use.

AMETEK also offers the standard 12 inch valve box with a black electric cover.

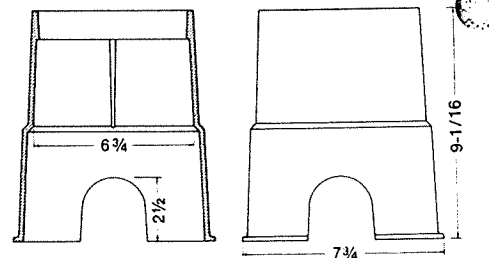


DESCRIPTION	PART #	WEIGHT	SKID
Assembly w/Green Cover (Crated-216)	182101	1 $\frac{1}{10}$ Lbs.	216
Assembly w/Green Cover (Boxed-20)	182103	1 $\frac{1}{10}$ Lbs.	320
Box Only	182001	1 $\frac{1}{4}$ Lbs.	216
Cover Only - Green	182002	$\frac{1}{2}$ Lb.	936
Cover Only - Black	182005	$\frac{1}{2}$ Lb.	936

## ECONOMY TURF BOX



COVER ALSO AVAILABLE MARKED "CATV"

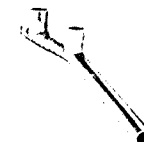
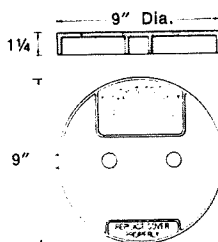
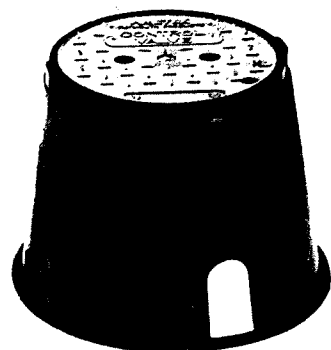


Ametek's ECONOMY TURF BOX has a Snap fit cover and is designed to nest with cover installed during shipment and storage.

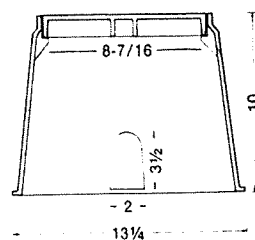
DESCRIPTION	PART #	WEIGHT	SKID
10" Ass'y - w/Green C.V. Cover	181104	4 $\frac{1}{4}$ Lbs.	135
10" Ass'y - w/Black C.V. Cover	181108	4 $\frac{1}{4}$ Lbs.	135
10" Box Only	181014	3 $\frac{1}{2}$ Lbs.	135
10" Cover Only-Green Control Valve	181015	1 $\frac{1}{2}$ Lbs.	650
10" Cover Only - Black Control Valve	181018	1 $\frac{1}{2}$ Lbs.	650
10" Cover Only - Black Electric	181021	1 $\frac{1}{2}$ Lbs.	650
10" Cover Only - Purple "Reclaimed Water"	181022	1 $\frac{1}{2}$ Lbs.	650

## 10" CIRCULAR BOX

AMETEK'S 10" CIRCULAR BOX combines these features:  
TWIST LOCK COVER WITH FLUSH FIT  
GREATER WORKING AREA  
LESS STORAGE SPACE NEEDED  
(Covers are shipped installed)



COVER LIFTING TOOL  
144046



COVERS ALSO AVAILABLE MARKED "CATV", "SEWER" and "ELECTRIC"

DROCKS #1324 SERIES  
PLASTIC VALVE BOX WITH  
LOCKING LID, 18" DEEP  
WITH 3-8" BOTTOM  
EXTENSIONS.

WELDS 1-1/2" DIA

FLOW →

ADJUSTABLE  
STANDS

3"x7"x15" SOLID  
BLOCK FOOTING

1" SCREEN RIVER  
RUN ROCK

## DOUBLE CHECK VALVE ASSEMBLY

SCALE NOT TO SCALE

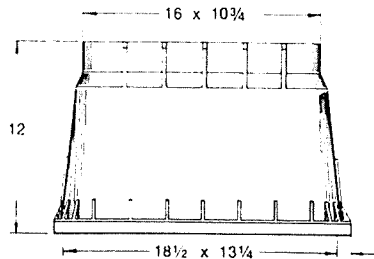
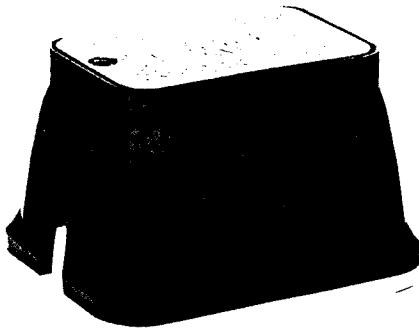
SET TOP OF SPRINKLER  
FLUSH WITH FINISHED  
GRADE

FINISHED GRADE

TORO 300 - SERIES OR  
XP - 300 SERIES ROTARY  
SPRINKLER.

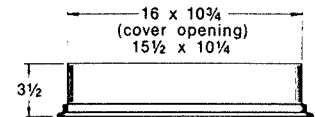
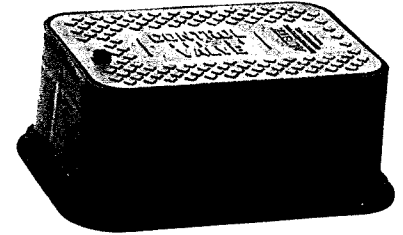
# STANDARD TURF BOXES, COVERS AND EXTENSIONS

12" METER BOX

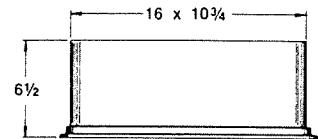


STD. 12" BOX

EXTENSIONS

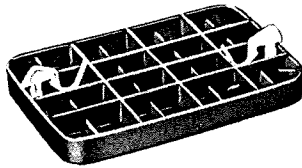


3" EXTENSION

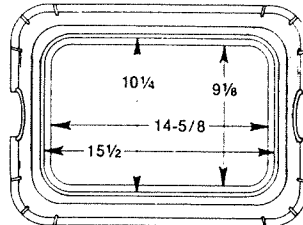


6" EXTENSION

COVER

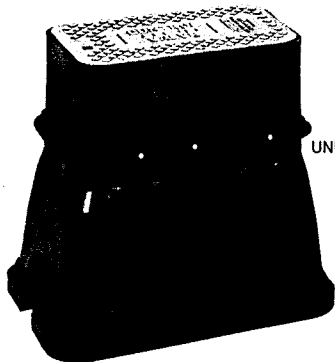


VANDAL-PROOF LID LOCK

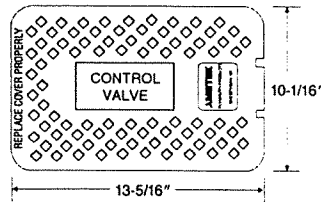


STD. COVER OPENING

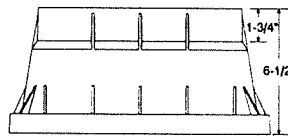
18" METER BOX



SNAP LOCK UNLOCKING TOOL 144022

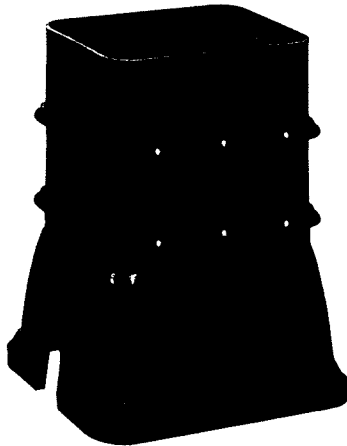


STD. COVER



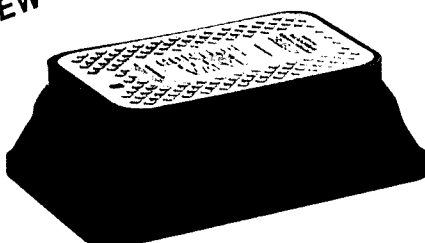
6" FLARED BOX

24" METER BOX



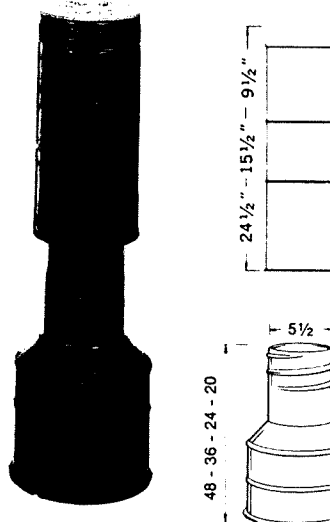
NEW

6" FLARED BOX



DESCRIPTION	PART #	WEIGHT	SKID
12" Black C.V. Cover	171117	3 1/2 Lbs.	225
12" Std. Box w/Green C.V. Cover	170106	11 Lbs.	72
12" Std. Box Only	170101	7 3/4 Lbs.	72
Std. Green C.V. Cover Only	173134	3 1/2 Lbs.	225
Black Elec. Cover Only	171115	3 1/2 Lbs.	225
12" Std. Box w/Pent Lock	170128	7 3/4 Lbs.	72
Green C.V. Cover w/Pent Lock	173142	3 1/2 Lbs.	225
Std. Purple Reclaimed Cover	173143	3 1/2 Lbs.	225
18" Box Only	170124	12 1/4 Lbs.	48
24" Box Only	170125	16 3/4 Lbs.	30
3" Extension Only	170102	2 1/4 Lbs.	126
6" Extension Only	170103	4 1/2 Lbs.	63
6" Flared Box w/Green Cover	170130	8 1/2 Lbs.	78
6" Flared Box Only	170129	4 7/16 Lbs.	90

## 5 1/4" POLYIRON® VALVE BOX

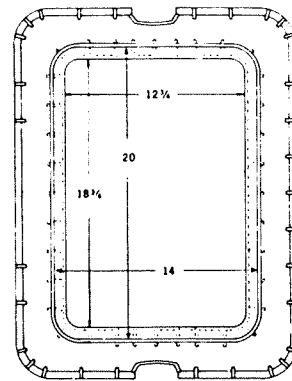
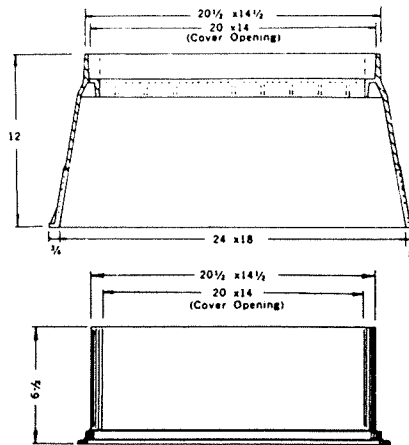
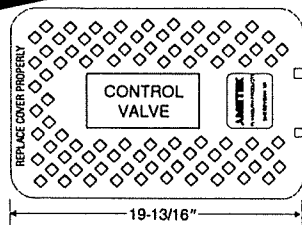
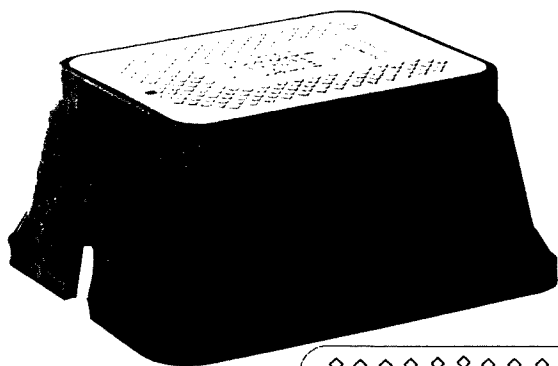


Top sections are made of POLYIRON® magnetically locatable material.

DESCRIPTION	PART #	WEIGHT
9 1/2" Top	111036	2 1/2 Lbs.
15 1/2" Top	111037	4 Lbs.
24 1/2" Top	111038	6 3/4 Lbs.
20" Bottom	111048	4 Lbs.
24" Bottom	111049	4 3/4 Lbs.
36" Bottom	111050	6 1/2 Lbs.
48" Bottom	111051	8 Lbs.
5 1/4" Black Drop Cover	111030	1 1/8 Lbs.
5 1/4" Green Drop Cover	111031	1 1/8 Lbs.



## JUMBO BOX AND 6" EXTENSION

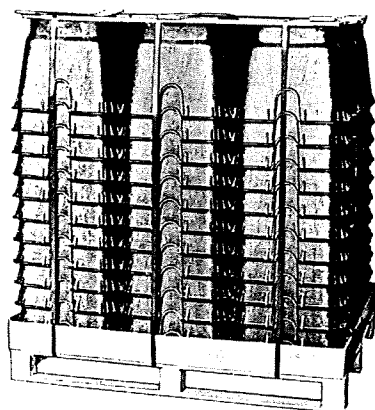


6" JUMBO EXTENSION — 6 Lbs.  
3" JUMBO NOT AVAILABLE

LARGE AND EXTRA LARGE UTILITY BOX SPECIFICATION  
SHEETS ARE ALSO AVAILABLE

DESCRIPTION	PART #	WEIGHT	SKID
Jumbo Box w/Green C.V. Cover	190106	18 1/4 Lbs.	48
Jumbo Box Only	190101	11 1/4 Lbs.	48
Jumbo Green C.V. Cover Only	192101	6 1/4 Lbs.	132
6" Ext. w/Green C.V. Cover	190115	13 1/4 Lbs.	32
6" Ext. Only	190110	6 1/4 Lbs.	40
Jumbo Box w/Gr C.V. Pent. Lock Cover	190121	19 Lbs.	48
Pentagon Green C.V. Cover Only	192109	6 1/4 Lbs.	132
Jumbo Purple "Reclaimed" Cover Only	192110	6 1/4 Lbs.	132

## SPECIFICATIONS, ORDERING INFORMATION



(PALLET SHOWN IS  
STANDARD BOX)  
48 skids per truck load

### PLYMOUTH SUPERFLEXON® BOXES AND COVERS

A rigid combination of polyolefin and fibrous inorganic components. SUPERFLEXON plastic material is chemically inert and normally unaffected by moisture, corrosion and the effects of temperature changes. Superflexon also has a relatively high tensile strength with light weight because it is a solid (not foamed) structural material. Physical properties by ASTM testing method are as follow:

#### Physical Properties of Plymouth Superflexon Products

	ASTM Test Method	Minimum Test Value
Tensile Strength (2.0"/min.)	D-638-82a	3,400 psi
Flexural Modulus	D-790-81	191,000 psi
Compressive Strength (.05"/min.)	D-695-80	3,350 psi
Impact Strength, Izod.	D-256-81	.6 ft. lb./in.
Durometer Hardness, Type D	D-2240-81	60
Deflection Temp. @ 66 psi Stress	D-648-82	230°F
Specific Gravity	D-792-66 (1979)	1.15

## PACKAGING INFORMATION

ITEM	UNITS skd./ctr.	CTR. T/L	CTR. WGT.
Std. Box - No Cover	72/skd.	48	593 Lbs.
Std. Box - w/Cover	72/skd.	48	827 Lbs.
Jumbo Box - No Cover	48/skd.	44	604 Lbs.
Jumbo Box - w/Cover	48/skd.	44	904 Lbs.
Std. Covers Shipped Separately	225/ctr.	48	809 Lbs.
Jumbo Covers Shipped Separately	132/ctr.	48	885 Lbs.
Std. 6" Extensions	63/skd.	48	319 Lbs.
Std. 3" Extensions	126/skd.	48	319 Lbs.
Jumbo 6" Extensions	40/skd.	44	280 Lbs.

ITEM	UNITS skd./ctr.	CTR. T/L	CTR. WGT.
Econo Box w/Cover Crate	216	48	401 Lbs.
Econo Box w/Cover Boxed	320	24	541 Lbs.
10" Box w/Cover	135	48	643 Lbs.
LUB 1324-15"	30	24	730 Lbs.
XLUB 1730-15"	22	24	766 Lbs.
XLUB 1730-18"	18	24	688 Lbs.
6" Flared Box w/Cover	78	48	703 Lbs.
6" Flared Box Only	90	48	468 Lbs.

Superflexon covers are NOT traffic covers and should not be used in roadways, etc. ALL ECONOMY, 10" AND 5-1/4" BOXES ARE PACKED IN CRATES AND NOT SKIDDED.

Products Manufactured From Recycled Plastics

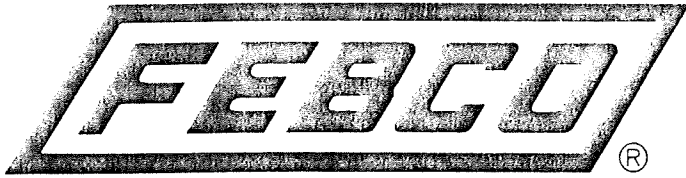
WE RESERVE THE RIGHT TO CHANGE DESIGN, SPECIFICATIONS, OR PRICE WITHOUT NOTIFICATION



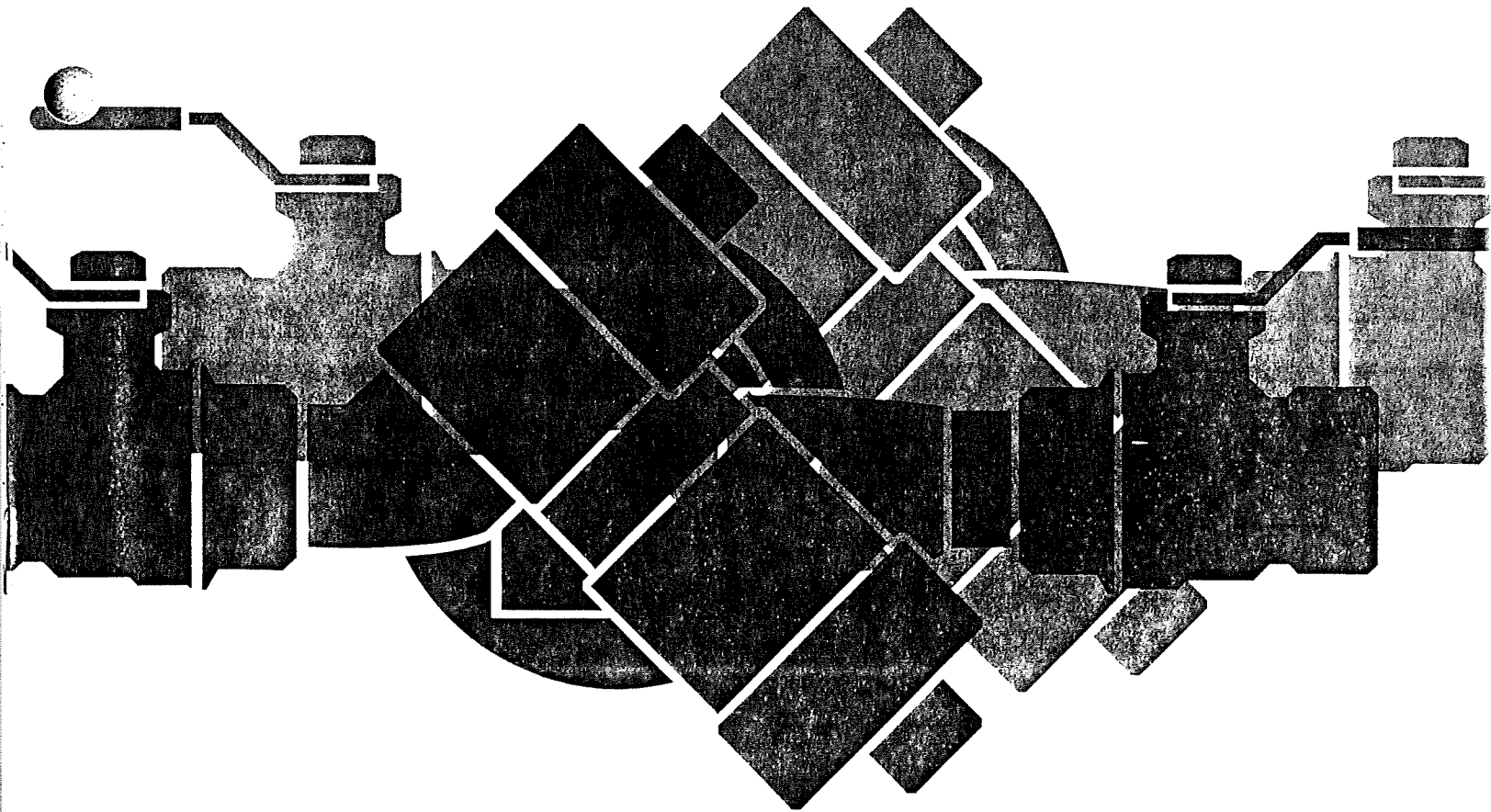
# AMETEK

PLYMOUTH PRODUCTS DIVISION  
502 INDIANA AVENUE — P.O. BOX 1047 SHEBOYGAN, WISCONSIN 53082-1047, U.S.A.  
TELEPHONE: (414) 457-9435 TLX: 6718348 FAX: (414) 457-6652





# BACKFLOW PREVENTION



A division of CMB Industries



## Protecting Potable Water Supplies with Low Head Loss, Reliable Operation, and Easy Serviceability

The preservation of potable water supplies is necessary to the survival of every living thing. During the past 25 years Febco has designed and manufactured backflow prevention assemblies for just that purpose...backflow prevention assemblies which feature low head loss, reliable operation and easy serviceability.

Febco's success in backflow prevention is the result of many years of technological and manufacturing experience. From Febco's earliest days experienced engineers have combined theory with practice to design and manufacture the widest line of top quality USC and ASSE approved backflow prevention assemblies.

Febco's success is also the result of their interest in helping municipalities, engineers, architects, contractors, and the general public understand backflow prevention problems and the importance of utilizing backflow prevention assemblies to preserve our vanishing potable resources.

Febco...with superior designs, a modern manufacturing facility, and a goal to keep our drinking water pure and clean...the way nature meant it to be!

## Backflow Prevention Assemblies: Why They Are Needed

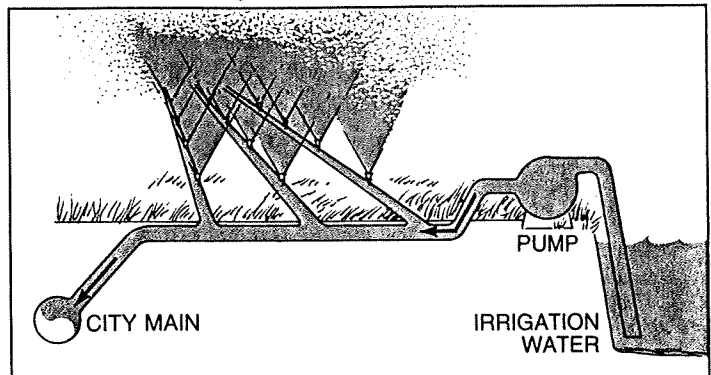
A cross connection control program protects the potable water supply from contaminants being introduced into the potable water system by backsiphonage or backpressure. Approved backflow prevention assemblies are necessary to protect the potable water from this contamination. Understanding backflow prevention assemblies and why they are used requires knowing what a cross connection is and why backflow can occur at a cross connection.

**CROSS CONNECTION:** Any point on a water system where a polluting substance may come in contact with potable water.

**Examples:** Any system piping that allows access to the potable water supply, any connected auxiliary water supply, submerged inlets, bypass arrangements, jumper connections, removable sections, swivel/changeover devices, temporary devices.

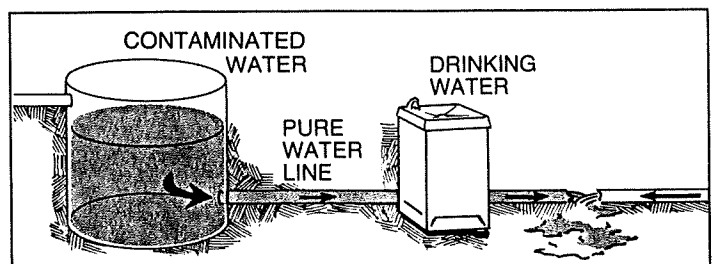
**BACKFLOW:** The undesirable reversal of the flow of water or mixtures of water and other undesirable substances from any source (such as used water, industrial fluids, gasses, or any substance other than the intended potable water) into the distribution pipes of the potable water system. There are two types of backflow conditions: backpressure and backsiphonage.

**Backpressure:** Occurs when the user system is at a higher pressure than the supply water system allowing undesirable substances to be "pushed" back into the potable water system. Causes can be booster pumps, potable water system connections for boilers, interconnections with other piping systems operating at higher pressures, or higher elevations in user systems such as highrise buildings.



In Utah, raw irrigation water was pumped through a farm standby irrigation connection into over half of the entire town's potable water system. The standby connection was not protected with a backflow prevention device.

**Backsiphonage:** Occurs when negative or reduced pressure exists in the supply piping allowing undesirable substances to be "drawn" into the potable water supply. Causes can be undersized supply piping, supply line breaks, reduced supply system pressure on the suction side of an on-line booster pump, or sudden upstream high demand, and scheduled shut-downs.



Broken domestic supply line causes backsiphonage from contaminated water for domestic use.




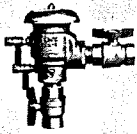
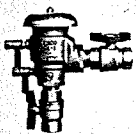
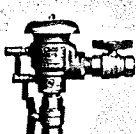
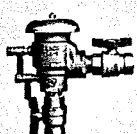








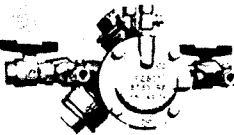


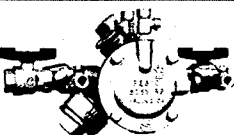





**NON HEALTH HAZARD CROSS CONNECTION:** Any point on a water supply system where a polluting substance may come in contact with potable water aesthetically affecting the taste, odor or appearance of the water, but non-hazardous to health.

**HEALTH HAZARD CONNECTION:** Any point on a water supply system where a polluting substance may come in contact with potable water creating a health hazard, causing sickness or death.

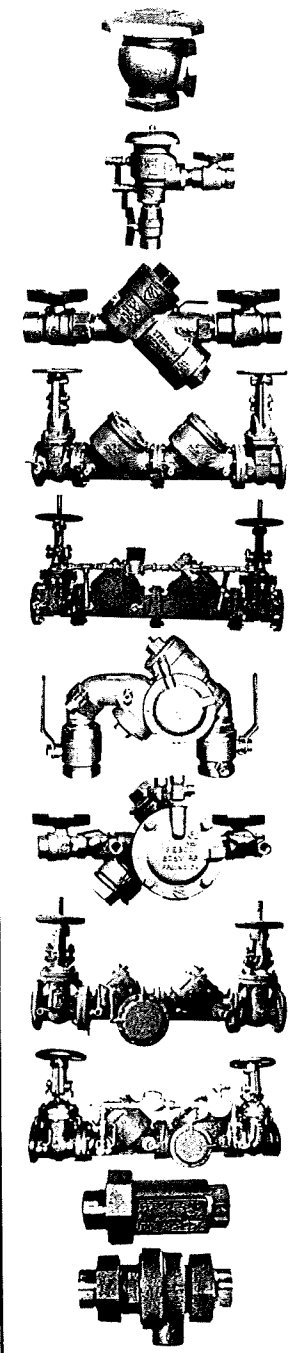
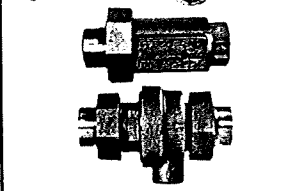
**CONTINUOUS PRESSURE:** In order to deliver water for immediate use most piping systems are continuously pressurized. Some backflow prevention assemblies cannot operate properly under continuous pressure. Check the chart to the right to determine where each assembly is applicable and under which conditions each can be used.



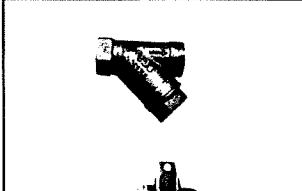

## Types of Cross Connections, Backflow, and Backflow Prevention Assemblies

PRODUCT TYPE	POSSIBLE BACKSIPHONAGE	POSSIBLE BACK PRESSURE	CONTINUOUS PRESSURE	NON HEALTH HAZARD	HEALTH HAZARD
Atmospheric Vacuum Breaker	 710			 710	 710*
Pressure Vacuum Breaker	 765		 765	 765	 765
Double Check	 805Y & 805YD	 805Y & 805YD	 805Y & 805YD	 805Y & 805YD	
Double Check Detector Assembly	 806YD DCDA	 806YD DCDA	 806YD DCDA	 806YD DCDA	
Reduced Pressure and Reduced Pressure Detector Assembly	 825Y, 825YA, 825YD, 826YD	 825Y, 825YA, 825YD, 826YD	 825Y, 825YA, 825YD, 826YD	 825Y, 825YA, 825YD, 826YD	 825Y, 825YA, 825YD, 826YD
Dual Check and Dual Check with Atmospheric Port	 810 & 815 DCAP	 810 & 815 DCAP	 810 & 815 DCAP	 810 & 815 DCAP	

Consult local codes for all applications.

PRODUCT ILLUSTRATION	PAGE NO.	PRODUCT TYPE	SIZE	TYPE OF SERVICE	TYPE OF APPLICATION	APPROVALS, CLASSINGS, & LISTINGS	MAXIMUM WORK PRESSURE
	5	710 Atmospheric Vacuum Breaker	½", ¾", 1", 1¼", 1½", 2"	Non Health Hazard	Commercial dishwasher and laundry machines, lawn sprinkler systems,	ASSE-1001①, CSA, IAPMO Listed, USC	150 PSI
	5	Hose Bibb Vacuum Breaker	¾"	Non Health Hazard	chemical vats, X-ray tanks, laboratory sinks		
	6	765 Pressure Vacuum Breaker	½", ¾", 1", 1¼", 1½", 2"	Non Health Hazard & Health Hazard Service Continuous Pressure	In-plant industrial applications for toxic or non-toxic protection, laboratories, swimming pools, laundries, lawn sprinkler systems, dentist offices	ASSE-1020, CSA IAPMO Listed USC	150 PSI
	7	805Y Double Check	¾", 1", 1½", 2"	Non Health Hazard Service Possible Back Press. Continuous Pressure	Irrigation systems, sprinkler systems, industrial in-plant plumbing	ASSE-1015, CSA IAPMO Listed USC, AWWA-C506	175 PSI
	8	805YD Double Check	2½", 3", 4", 6", 8", 10"	Non Health Hazard Service Possible Back Press. Continuous Pressure	Sprinkler irrigation systems, fire sprinkler systems without chemical additives, protection of industrial plants, in-plant plumbing systems	ASSE-1015, CSA, IAPMO Listed, USC, AWWA-C506, UL, FM③,②	175 PSI
	9	806YD DCDA Double Check Detector Assembly	¾" Bypass 3", 4", 6", 8", 10"	Non Health Hazard Service Possible Back Press. Continuous Pressure	Fire sprinkler pipelines, non health hazard service with metering of unauthorized water usage	ASSE-1015, CSA USC, UL, FM③, ULC	175 PSI
	10	825YA Angle Pattern Reduced Pressure Assembly	¾", 1", 1½", 2"	Health Hazard Service Possible Back Pressure Continuous Pressure	Industrial plants, hospitals, irrigation, morgues, boiler feeds, mortuaries, water lines needing maximum protection, chemical plants	USC ASSE-1013 CSA	175 PSI
	11	825Y Reduced Pressure Assembly	¾", 1", 1¼", 1½", 2"	Health Hazard Service Possible Back Pressure Continuous Pressure	Industrial plants, hospitals, irrigation, morgues, boiler feeds, mortuaries, water lines needing maximum protection, chemical plants	ASSE-1013, CSA IAPMO Listed USC, AWWA-C506	175 PSI
	13	825YD Reduced Pressure Assembly	2½", 3", 4", 6", 8", 10"	Health Hazard Service Possible Back Pressure Continuous Pressure	Industrial plants, hospitals, irrigation systems, morgues, mortuaries, boiler feeds, chemical plants, fire sprinkler systems with chemical additives	ASSE-1013, IAPMO Listed USC, AWWA-C506, UL, FM③,②	175 PSI
	15	826YD Reduced Pressure Detector Assembly	2½", 3", 4", 6", 8", 10"	Health Hazard Service Possible Back Press. Continuous Pressure	Fire sprinkler pipelines, high hazard service with metering of unauthorized usage	USC, UL, FM ASSE 1047	175 PSI
	16	810 Dual Check	¾", 1" IPS ⅝", ¾", 1" meter conn.	Non Health Hazard Service Continuous Pressure	Residential water service	ASSE(¾") -1024 CSA(¾")	175 PSI
	16	815 Dual Check with Atmospheric Port	½", ¾"	Non Health Hazard Service Continuous Pressure	Boiler feed lines, non health hazard laboratory equipment installations, sterilizers	ASSE Listed 1012 CSA	175 PSI

#### MISCELLANEOUS PRODUCTS

	17	3130 "Y" Strainers	½"-2"	NA	Installed before backflow preventers, control valves, meters, and other equipment to protect them from damage due to debris, dirt, scale and other foreign material		WOG 250 PSI
		3131 "Y" Strainers	½"-2"	NA			WOG 300 PSI
		3132 "Y" Strainers	2½"-12"	NA			WSP 125/ WOG 175 PSI
	17	AGD-Y AGD-L	¾"-2" 2½"-10"	NA NA	Air Gap Drain for use with Reduced Pressure Assemblies		NA NA

NOTES: ① Consult the factory for special high temperature devices. ② UL/FM approved installations must include OS & Y gate valves.  
③ 2½" not applicable. ④ For temperatures in excess of 140°F specify-HW on model number.

HYDROSTATIC TEST PRESSURE	TEMP. RANGE	END DETAIL	MAIN VALVE BODY	MAIN VALVE TRIM	RELIEF VALVE BODY & TRIM	ELASTOMERS	SPRINGS MISC.
150 PSI	32°F to 110°F	½" through 2" Threaded ANSI B2.1	Bronze ASTM B584-78 C84400	NA	NA	NA	NA
300 PSI	32°F to 140°F	½" through 2" Threaded ANSI B2.1	Bronze ASTM B584-78 C84400	NA	NA	Seat Discs Nitrile ASTM D-2000	Stainless Steel 300 Series Spring
350 PSI	32°F to 140°F (Emerg. 180°)	¾" through 2" Threaded ANSI B2.1	Bronze ASTM B584-78 C84400	NA	NA	Seat Discs Nitrile ASTM D-2000	Stainless Steel 300 Series Spring
350 PSI	32°F to 140°F	Flanged ANSI B16.1	Ductile Iron ASTM A-536 (Epoxy coated 8-12 mil)	Bronze ASTM B-61	NA	Seat Discs Nitrile ASTM D-2000	Stainless Steel 300 Series Spring Available with OS & Y Gates
350 PSI	32°F to 140°F	Flanged ANSI B16.1	Ductile Iron ASTM A-536 (Epoxy coated 8-12 mil)	Bronze ASTM B-61	NA	Seat Discs Nitrile ASTM D-2000	Bypass meter: totalizing Size ½" x ¾", Std Brz ASTM B584-78 Shut-off valves: OS & Y UL Listed
350 PSI	32°F to 140°F ④ (Emerg. 180°)	¾" through 2" Threaded ANSI B2.1	Bronze ASTM B584-78 C84400	NA	Bronze ASTM B584-78 Alloy C84400	Seat Discs Nitrile ASTM D-2000 Diaphragms: Nitrile	Stainless Steel 300 Series Spring Integral flanged union adapters
350 PSI	32°F to 140°F ④ (Emerg. 180°)	¾" through 2" Threaded ANSI B2.1	Bronze ASTM B584-78 C84400	NA	Bronze ASTM B584-78 Alloy C84400	Seat Discs Nitrile ASTM D-2000 Diaphragms: Nitrile fabric reinforced	Stainless Steel 300 Series Spring
350 PSI	32°F to 140°F	2½" through 10" Flanged ANSI B16.1	Ductile Iron ASTM A-536 (Epoxy coated: 8-12 mil)	Bronze ASTM B-61	Bronze ASTM B-61	Seat Discs: Nitrile ASTM D-2000 Diaphragms: Nitrile-fabric reinforced	Stainless Steel 300 Series Spring Available with OS & Y Gates
350 PSI	32°F to 140°F	Flanged ANSI B16.1	Ductile Iron ASTM A-536 (Epoxy coated: 8-12 mil)	Bronze ASTM B-61	Bronze ASTM B-61	Seat Discs: Nitrile ASTM D-2000 Diaphragms: Nitrile-fabric reinforced	Bypass meter: totalizing Size ½" x ¾", Std. Brz ASTM B584-78 Shut-off valves: OS & Y UL Listed, FM
350 PSI	32°F to 180°F	¾" & 1" Threaded ANSI B2.1	Bronze ASTM B584-78 C84400	NA	NA	Nitrile ASTM D-2000	Stainless Steel 300 Series Spring
350 PSI	40°F to 210°F (Emerg. 250°)	½" & ¾" Union Connection	Bronze ASTM B584-78 C84400	NA	NA	Ethlene Propylene	Stainless Steel Spring

NA	NA	Screwed	Class B Cast Iron ASTM A-126	NA	NA	Silicone	Sizes: ½" - 2" Standard screen: 40-mesh S.S. 100 mesh screen avail. Sizes: 2½" - 4" Std. screen: ¼" perf. 6"-10": ⅛" perf Stainless Steel
NA	NA	Screwed	Brz ASTM B-62	NA	NA	Silicone	
NA	NA	Flanged	Class B Cast Iron ASTM A-126	NA	NA	Non Asbestos	
NA	NA	1" NPT	Bronze	S.S. Fasteners	NA	NA	NA
NA	NA	2" NPT	Bronze		NA	NA	NA

## Model 710

### Atmospheric Vacuum Breaker (1/2" Thru 2")

Febco's Model 710 atmospheric vacuum breaker provides positive protection against backsiphonage of impure water into the main supply in the event that pressure loss causes vacuum conditions. A floating poppet seals the air inlet when the unit is pressurized. When a backsiphonage condition occurs, the poppet drops to allow air to enter the downstream piping. At the same time the poppet shields the water inlet to prevent foreign materials from entering the upstream piping. Restoration of pressure (flow) lifts the poppet to seal the air inlet. Poppets in the Model 710 are molded plastic and are for use on cold water service.

#### Model 710 SELECTION CRITERIA:

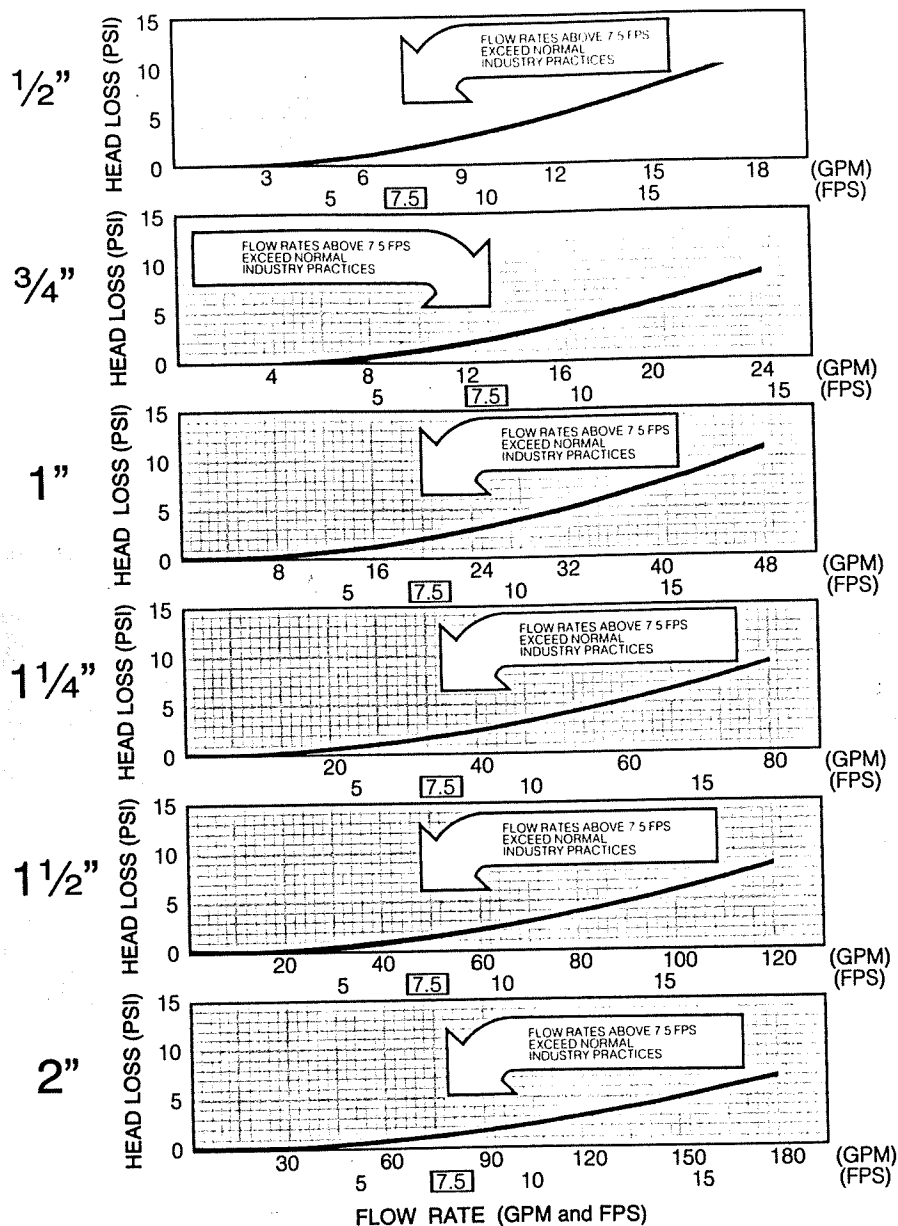
- Non health hazard service.
- No continuous pressure operation.
- No possible backpressure.  
(Consult local codes.)

## Model 730 Hose Bibb Vacuum Breaker

The Hose Bibb Vacuum Breaker protects against backsiphonage through hose connections. While pressurized a disc seals the air inlet ports. At low pressure or under backsiphonage conditions a spring forces an opening. The unit is drainable for freeze protection without removal.

## Model 710 Flow Curves

(Flow Curves as established by the Twinning Labs.)

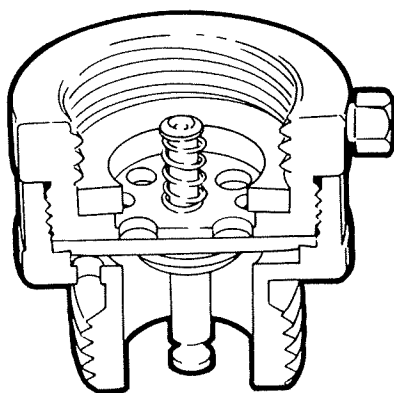


#### NOTES:

1. Velocities are calculated for flows in Schedule 40 steel pipe.
2. Typical water system flow velocities of 0 to 7.5 FPS should be used for head loss efficiency comparisons.

#### Features

ANTI-REMOVAL SET SCREWS  
DRAIN FEATURE BRASS BODY



#### Features of the Model 710

HEAVY DUTY BRONZE BODIES AND BONNETS are standard.

LIGHTWEIGHT MOLDED PLASTIC POPPETS prevent spillage during initial flow and low pressure conditions.

RESILIENT RUBBER POPPET DISCS are designed for positive closure.

DESIGNED FOR COLD WATER APPLICATIONS withstanding water temperatures of 32°F to 140°F.

# Model 765 Pressure Vacuum Breaker Assembly (1/2" Thru 2")

The Model 765 pressure vacuum breaker assembly is used to isolate entire industrial (non-potable) or irrigation lines from the potable water systems. It has the ability to withstand supply pressure for long periods and to prevent backflow of health hazardous and non health hazardous water into the potable water system in backsiphonage conditions.

The Model 765 consists of a bronze body with a double guided spring loaded check valve which closes tightly when the pressure of the assembly drops below 1 PSI or when zero flow occurs. The 765 also includes an air inlet port that opens to break a siphon when the pressure in the assembly drops to 1 PSI. There are two threaded ball valves and two test cocks. This assembly is not to be installed where backpressure may occur.

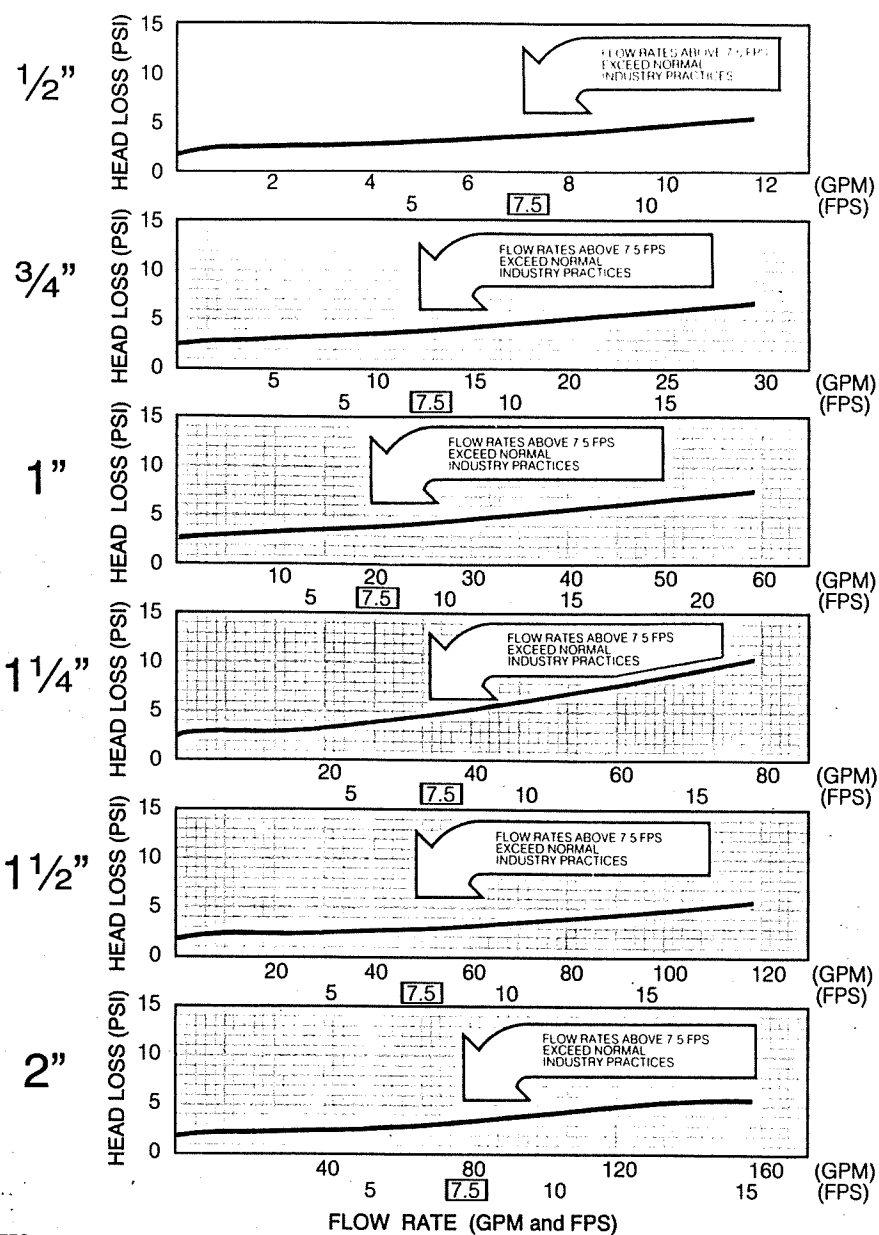
## Model 765 SELECTION CRITERIA:

- Health hazard service.
- Continuous pressure operation.
- No possible backpressure.

See page 3 for applicable approvals.

## Model 765 Flow Curves

(Flow Curves as established by the IBC Foundation for Cross Connection Control and Prevention)



### NOTES:

1. Velocities are calculated for flows in Schedule 40 steel pipe.
2. Typical water system flow velocities of 0 to 7.5 FPS should be used for head loss efficiency comparisons.

## Features of the Model 765 (1/2" thru 2")

**BONNET** is vandal resistant. It cannot be removed by rotating the canopy.

**ENGINEERED PLASTIC AND BRASS INTERNAL MOVING PARTS** are resistant to chemical and mineral deposit build-up.

**FULL PORT SHUTOFF VALVES** minimize head loss through the device.

**ALL BRONZE BODY** provides durability and long life.

**HEAVY DUTY POLYSULFONE POP-PETS** are designed to provide reliable operation and long life.

**TEST COCKS** are vandal resistant reducing damage caused by normal tampering experienced in the field.

**DOUBLE GUIDED CHECK ASSEMBLY** reduces check valve fouling and chattering, thereby providing long life and reliable operation.

**BRASS CANOPY** resistant to damage caused during normal installation or when vandalism occurs in the field.

**CONTROL VALVE EXAMPLE**

**MALE ENDS** are used on the 765 to reduce thread together leak areas.



# Model 805Y Double Check Backflow Prevention Assembly (3/4" thru 2")

## Model 805Y Flow Curves

Flow Curves as established by the USC Foundation for Cross Connection Control and Hydraulic Research

The Model 805Y double check backflow prevention assembly consists of two independently operating check valves with an inlet and outlet shut-off valve and four test cocks. Each check valve is a "Y" pattern, spring loaded, center guided, poppet type. In normal operation the check valves open with flow demand. During no-flow conditions, each check valve will hold 1 PSI in the flow direction.

The Model 805Y consists of a bronze body with bronze caps. All internal parts are of corrosion resistant materials.

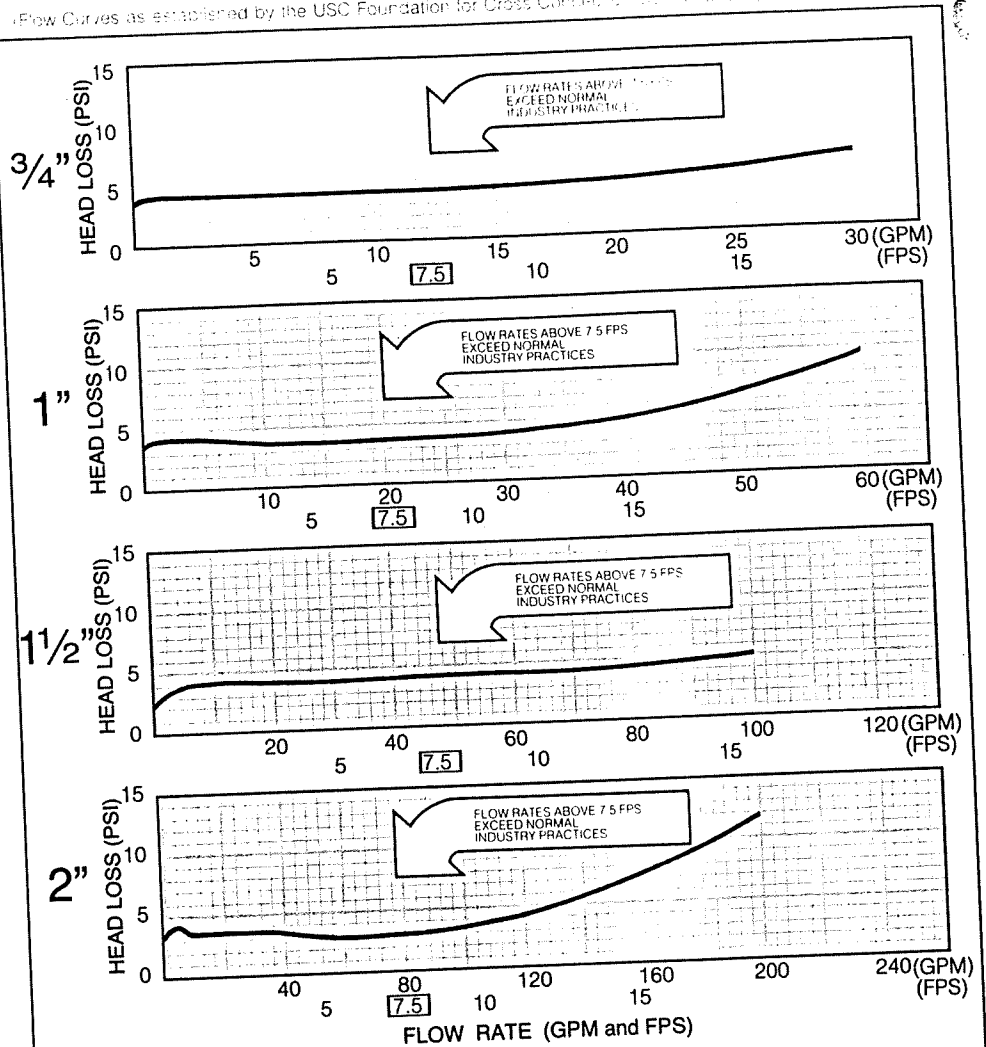
All Model 805Y assemblies are constructed so that all internal parts can be serviced without removing the device from the line. These assemblies are rated to 175 PSI water working pressure and water temperatures from 32°F to 140°F.

Standard features of the Febco Model 805Y include the "Y" body designed to insure (1) low head loss, (2) reliable operation, and (3) easy serviceability.

### Model 805Y SELECTION CRITERIA:

- Non health hazard service.
- Continuous pressure operation.
- Possible backpressure.

See page 3 for applicable approvals.



### NOTES:

1. Velocities are calculated for flows in Schedule 40 steel pipe.
2. Typical water system flow velocities of 0 to 7.5 FPS should be used for head loss efficiency comparisons.

## Features of the Model 805Y (3/4" thru 2")

**MOVING PARTS** of the CENTER STEM GUIDED CHECKS are out of the water flow path which reduces the possibility of check fouling. Also the guided surface on the disc holders is small, keeping the possibility of chemical build-up to a minimum.

**CHECK VALVE CAPS** thread into the valve body which allows easier servicing of both top and bottom checks.

**CHECK GUIDING SURFACE** is located in the device caps. If any problem is experienced with the guiding surfaces, they can be easily cleaned.

**100% FACTORY WATER TESTED** to provide the most consistent quality in the industry.

**STAINLESS STEEL SPRINGS** are standard providing long life and reliable operation

**DISC HOLDER AND STEM** are corrosion and wear resistant acetal.

**TEST COCKS** are vandal resistant to insure that normal tampering experienced in the field will not harm the device or the surrounding area.

**HEAVY DUTY BODY DESIGN** with thick bronze body and caps. Resistant to damage caused by normal installation and normal operating conditions.

The **WORKING PRESSURE** rating on the 805Y is 175 PSI. This rating adds an additional "safety factor" to help compensate for high water hammer pressure often experienced in water systems.

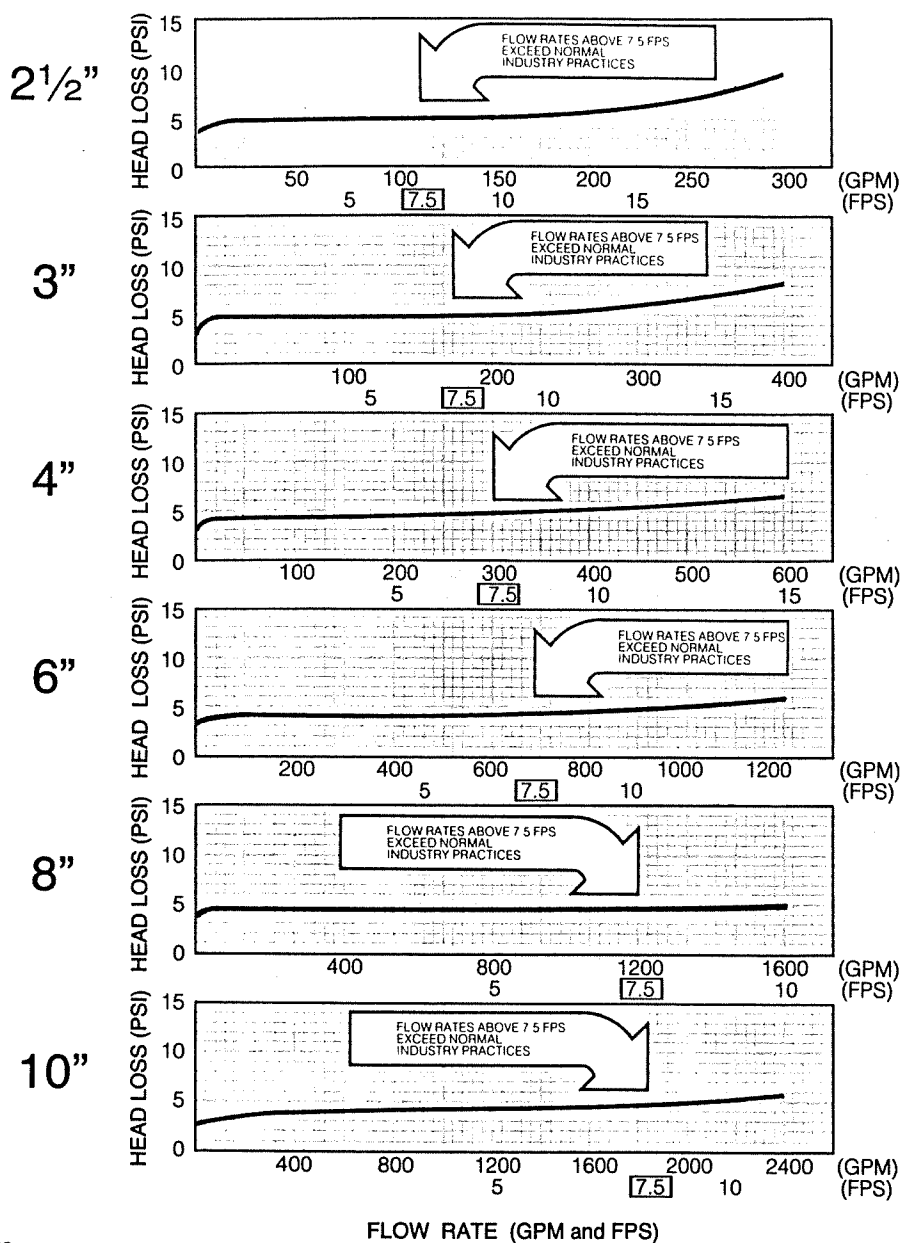
**"Y" PATTERN BODY DESIGN** provides low head loss and ease of servicing of checks in the minimum amount of time with **NO SPECIAL TOOLS NEEDED.**

**MALE ENDS** are used on the 805Y to reduce thread together leak areas.

⊙ DENOTES TEST COCK LOCATION

# Model 805YD Double Check Backflow Prevention Assembly (2½" thru 10")

## Model 805YD Flow Curves



### NOTES:

1. Velocities are calculated for flows in Schedule 40 steel pipe.
2. Typical water system flow velocities of 0 to 7.5 FPS should be used for head loss efficiency comparisons.

The Model 805YD double check backflow prevention assembly (2½" through 10") consists of internal and external fusion epoxy coated ductile bodies and covers. The bodies are a "Y" pattern design incorporating two spring loaded, stainless steel center guided check assemblies with bronze seat rings and stainless steel springs. Flanged inlet and outlet full port shut-off valves and four test cocks are included. All internal parts are of corrosion resistant materials.

In normal operation the check valves open with flow demand. During no-flow conditions, each check valve will hold 1 PSI in the flow direction. End connections are flanged.

All Model 805YD assemblies are constructed so that all internal parts can be serviced without removing the assembly from the line. These assemblies are rated to 175 PSI water working pressure and water temperatures from 32°F to 140°F.

- Ductile iron bodies.
- DuraCheck stainless steel check assembly.
- RW-OS & Y gate valves on all UL/FM assemblies.
- Lifting rings and freeze protection drain plugs.

### Model 805YD SELECTION CRITERIA:

- Non health hazard service.
- Continuous pressure operation.
- Possible backpressure.

See page 3 for applicable approvals.

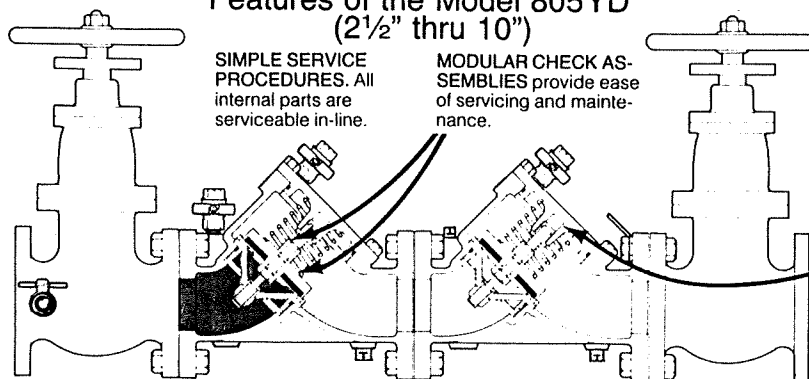
**LIGHTWEIGHT, DURABLE DUCTILE IRON BODY DESIGN** with internal and external fusion epoxy coating. Resistant to damage caused by normal installation and operating conditions.

The **DURACHECK ALL STAINLESS STEEL CHECK ASSEMBLY** resists corrosion, prolongs valve life, and promotes reliable operation.

### Features of the Model 805YD (2½" thru 10")

**SIMPLE SERVICE PROCEDURES.** All internal parts are serviceable in-line.

**MODULAR CHECK ASSEMBLIES** provide ease of servicing and maintenance.



The **WORKING PRESSURE RATING** on the 805YD is 175 PSI. This rating adds an additional "safety factor" to help compensate for high water hammer pressures often experienced in water systems.

**CENTER GUIDED CHECKS** resist chemical build-up and provide reliable operation in harsh water environments. Delrin bushing is replaceable and facilitates check operation.

# Model 806YD DCDA Double Check Detector Assembly (3" thru 10")

The Model 806YD DCDA Assembly is designed to prevent contamination of potable water by backflow from the fire protection system and detects leaks and unauthorized water uses.

The Model 806YD main line unit consists of two independent, "Y" type spring loaded ductile check valves, two shut-off valves and four test cocks. The spring loaded, stainless steel center guided checks with soft elastomer discs provide drip tight closure against backflow. The "Y" pattern valve design provides low pressure loss at the high flow rates. The shut-off valves are OS & Y type, UL listed, FM approved for fire sprinkler service.

All low flow demands up to a minimum of 3 GPM (0.189 L/s) are to pass through the by-pass meter and meter-size double check valve assembly and be accurately recorded. All flows above that of 3 GPM will pass through both the line-size double check valve assembly and by-pass without accurate registration by or damage to the meter.

- DuraCheck stainless steel check assembly.
- RW-OS & Y gate valves are standard.
- Ductile iron bodies.

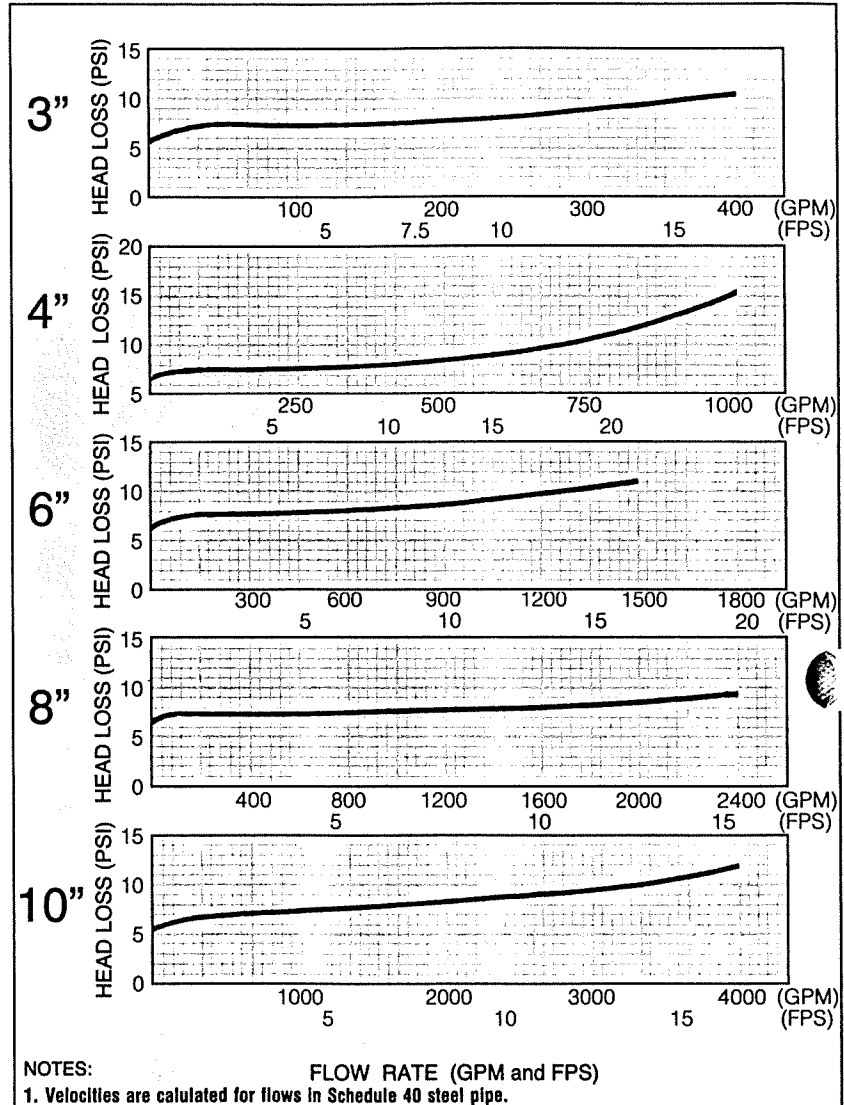
## Model 806 YD DCDA SELECTION CRITERIA:

- Non health hazard fire sprinkler service.
- Continuous pressure operation.
- Possible backpressure.

See page 3 for applicable approvals.

## Model 806YD DCDA Flow Curves

(Flow Curves as established by the USC Foundation for Cross Connection Control and Hydraulic Research)



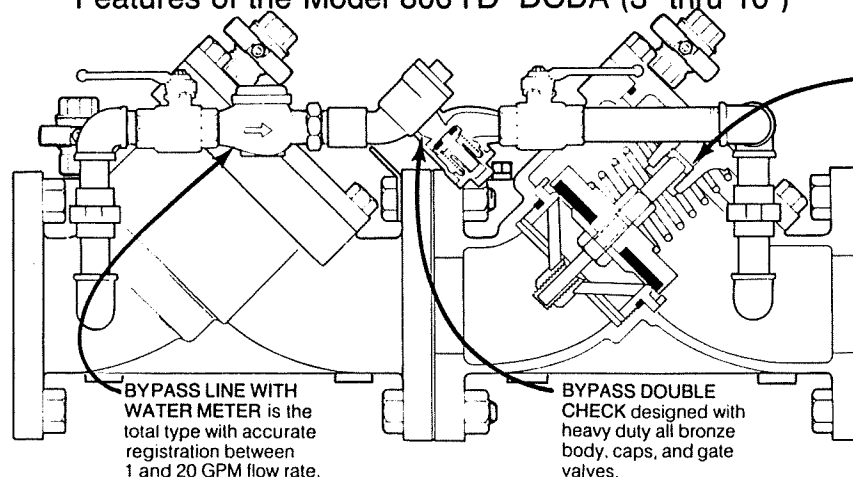
## Features of the Model 806YD DCDA (3" thru 10")

**LIGHTWEIGHT, DURABLE DURACAST DUCTILE IRON BODY DESIGN** with internal and external fusion epoxy coating. Resistant to damage caused by normal installation and operating conditions.

The **DURACHECK ALL STAINLESS STEEL CHECK ASSEMBLY** resists corrosion, prolongs valve life, and promotes reliable operation.

**SIMPLE SERVICE PROCEDURES:** all internal parts on main line and by-pass double checks are serviceable in line.

**SHOWN LESS GATES**



**BYPASS LINE WITH WATER METER** is the total type with accurate registration between 1 and 20 GPM flow rate.

**BYPASS DOUBLE CHECK** designed with heavy duty all bronze body, caps, and gate valves.

**SPRING LOADED CENTER GUIDED CHECKS** with soft elastomer discs provide tight closure against backflow. Delrin bushing is replaceable and facilitates check operation.

**"Y" PATTERN VALVE DESIGN** insures low head loss at high flow rates.

The **WORKING PRESSURE** of the Model 806YD DCDA is 175 PSI. The rating adds an additional "safety factor" to help compensate for high water hammer pressures often experienced with water systems.

# Model 825YA Angle Pattern Reduced Pressure Backflow Prevention Assembly (3/4" thru 2")

The Model 825YA angle pattern reduced pressure backflow prevention assembly consists of two independently operating, center guided, spring loaded, "Y" pattern check valves, one hydraulically dependent differential relief valve, and two integral flanged unions. The assembly automatically reduces the pressure in the "zone" between the check valves to at least 5 PSI lower than the inlet pressure.

If the differential between upstream and the zone of the unit drops to 2 PSI, the differential relief valve will open and maintain the proper differential.

Standard features of the Model 825YA include easy on site conversion to four different configurations to allow installation flexibility and reduce labor costs and materials; compact design simplifies new and retrofit installations and eliminates fittings; modular relief valve and check valve internal components for ease of maintenance; "Y" body design for low pressure loss, reliable operation, and easy serviceability.

- Replaceable relief valve seat ring
- Internal components interchangeable with Model 825Y

## Model 825YA SELECTION CRITERIA:

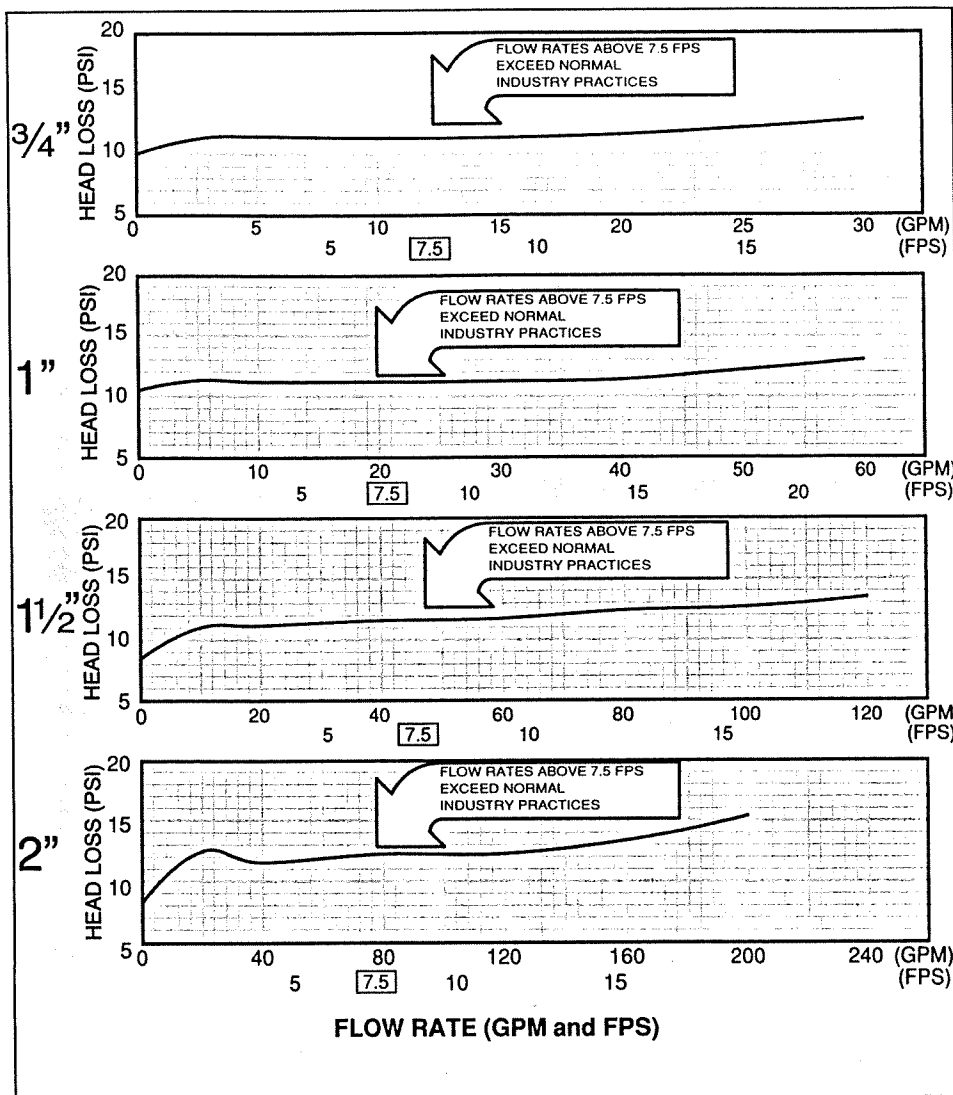
- Health hazard service
- Continuous pressure operation

- Possible backpressure

See page 3 for applicable approvals

## Model 825YA Flow Curves

(Flow Curves as established by the USC Foundation for Cross Connection Control and Hydraulic Research)



## Features of the Model 825YA (3/4" thru 2")

**EASY ON-SITE CONVERSION TO FOUR DIFFERENT CONFIGURATIONS** to allow installation flexibility and reduce labor costs and materials. Eliminates need for pipe elbows, nipples and unions.

**COMPACT DESIGN SIMPLIFIES RETROFIT** and reduces size of protective enclosures for freeze and vandalism protection.

**MODULAR RELIEF VALVE AND INTERNAL CHECK COMPONENTS** are interchangeable with Model 825Y for ease of servicing and reduced spare parts inventory. Because no special tools are required, ease of service and repair is insured.

TEST COCKS are vandal resistant.

THE INTERNAL PRESSURE SENSING PORTS are positioned to resist the clogging of the passages by dirt and debris.

REPLACEABLE RELIEF VALVE SEAT RING for extended valve life.

CHECK VALVE CAPS thread into the valve body for ease of service.

CHECK GUIDING SURFACES are located in the relief caps. If any problem is experienced with the guiding surfaces they can be easily cleaned.

GUIDING SURFACES OF THE CENTER STEM GUIDED CHECKS are out of the water flow path reducing the possibility of check fouling.

THE WORKING PRESSURE RATING on the 825YA is 175 PSI, adding a "safety factor" to help compensate for high water hammer pressures often experienced in water systems.

# Model 825Y Reduced Pressure Backflow Prevention Assembly (3/4" Thru 2")

The Model 825Y reduced pressure backflow prevention assembly consists of two independently operating, center guided, spring loaded, "Y" pattern check valves and one hydraulically dependent differential relief valve. The assembly automatically reduces the pressure in the "zone" between the check valves to at least 5 PSI lower than the inlet pressure.

If the differential between upstream and the zone of the unit drops to 2 PSI, the differential relief valve will open and

maintain the proper differential.

Standard features of the Model 825Y include the "Y" body design for low pressure loss, reliable operation, and easy serviceability. At the typical design flow rates of 7.5 feet per second, the 825Y has one of the lowest head losses in the industry.

Febco publishes flow charts obtained from independent laboratories.

The elementary yet efficient design of the Model 825Y provides consistent

operation in the harshest water environments.

Operational tests are performed on 100% of the 825Y assemblies before delivery to the field.

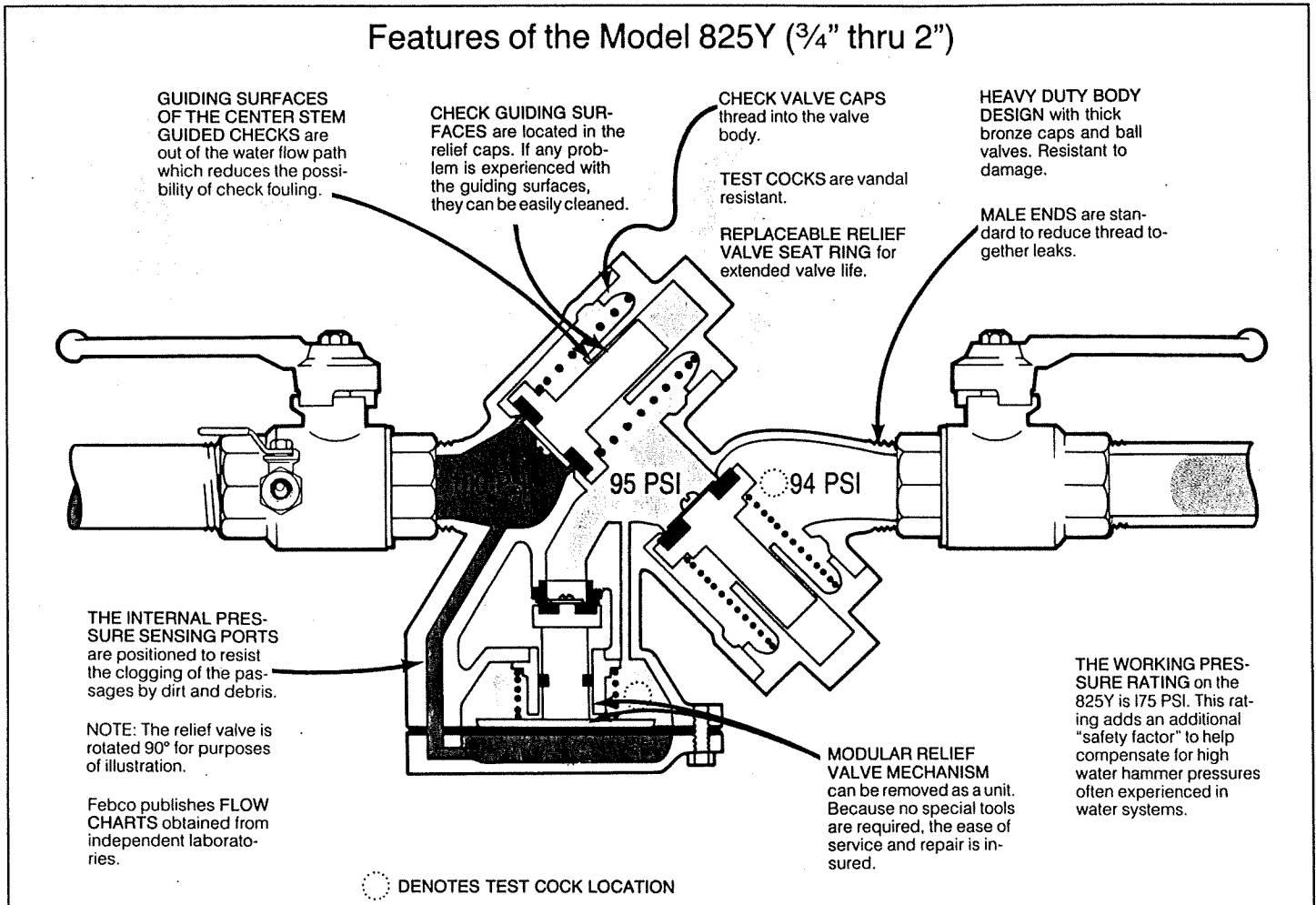
- Low head loss.
- Replaceable relief valve seat ring.
- Available with air gap drain.

## Model 825Y SELECTION CRITERIA:

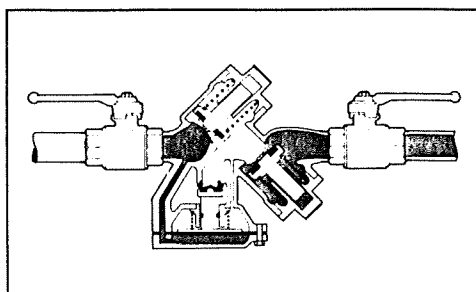
- Health hazard service.
- Continuous pressure operation.
- Possible backpressure.

See page 3 for applicable approvals.

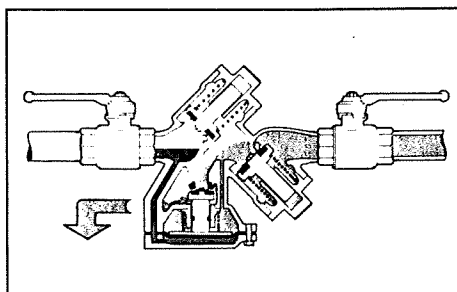
## Features of the Model 825Y (3/4" thru 2")



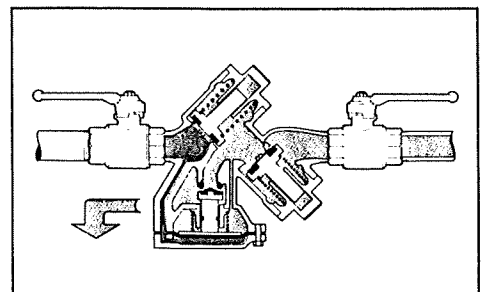
## HOW THE MODEL 825Y WORKS: OPERATION UNDER VARIOUS WATER SYSTEM CONDITIONS



Normal Flow Condition



Backsiphonage Flow Condition  
(Both Check Valves Fouled)

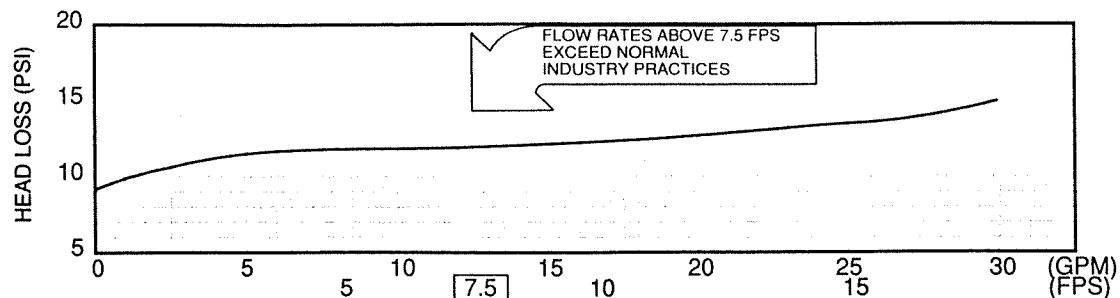


Backpressure Flow Condition  
(Second Check Valve Fouled)

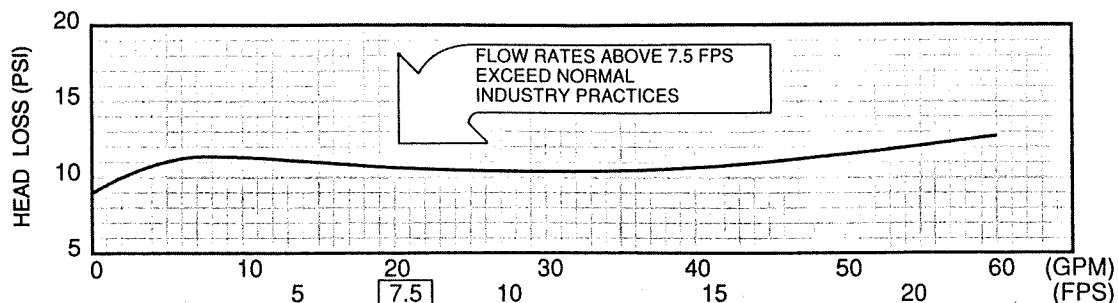
# Model 825Y Flow Curves

Flow Curves as established by the JSC Fluid Laboratory, 2101 Columbia Drive, Houston, Texas 77058

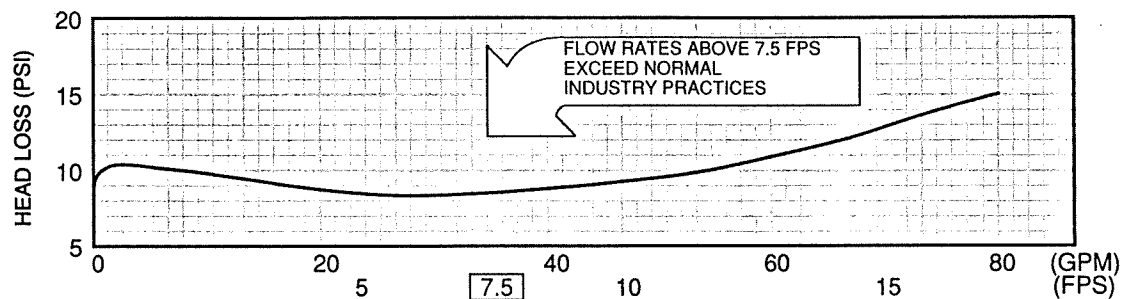
3/4"



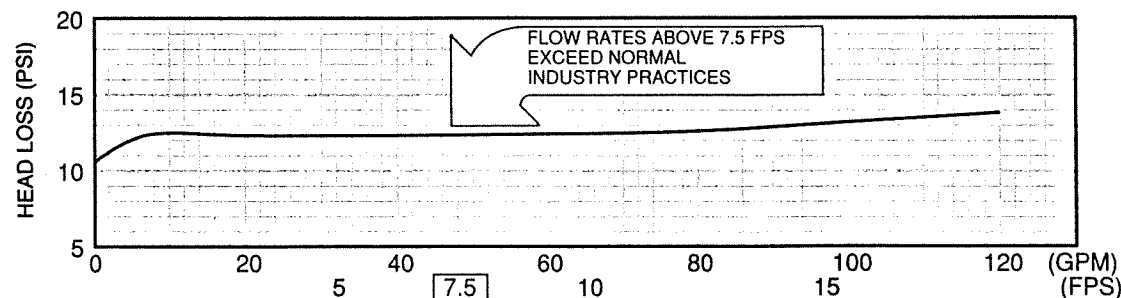
1"



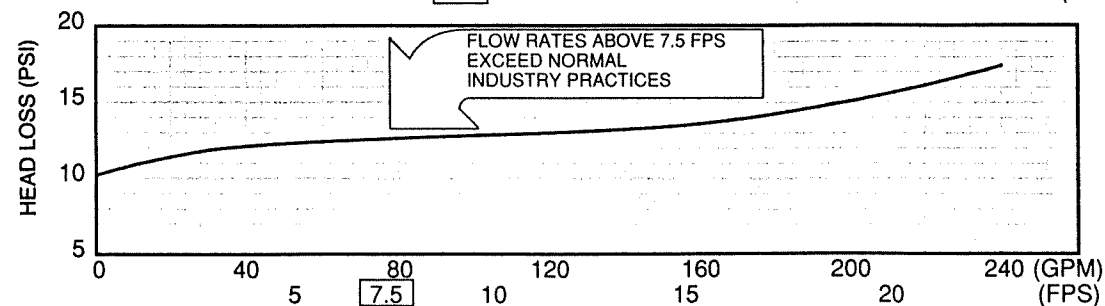
1 1/4"



1 1/2"



2"



FLOW RATE (GPM and FPS)

## NOTES:

1. Velocities are calculated for flows in Schedule 40 steel pipe.
2. Typical water system flow velocities of 0 to 7.5 FPS should be used for head loss efficiency comparisons.

# Model 825YD Reduced Pressure Backflow Prevention Assembly (2" Thru 10")

The Model 825YD reduced pressure assembly consists of two independent, "Y" type spring loaded check valves, a differential pressure relief valve mounted between the two checks, and three test cocks. An inlet test valve with a fourth test cock and an outlet shut-off valve are added to make a complete and serviceable assembly. In normal operation, the check valves are open with the pressure between the checks, called the zone, being maintained at least 5 PSI lower than the inlet pressure.

The relief valve is maintained closed. Should abnormal conditions arise under backflow, the differential relief valve will open and discharge to maintain the zone at least 2 PSI lower than the inlet pressure; thus preventing contamination of the supply.

The elementary yet efficient design of the Model 825YD provides consistent operation in the harshest water environments.

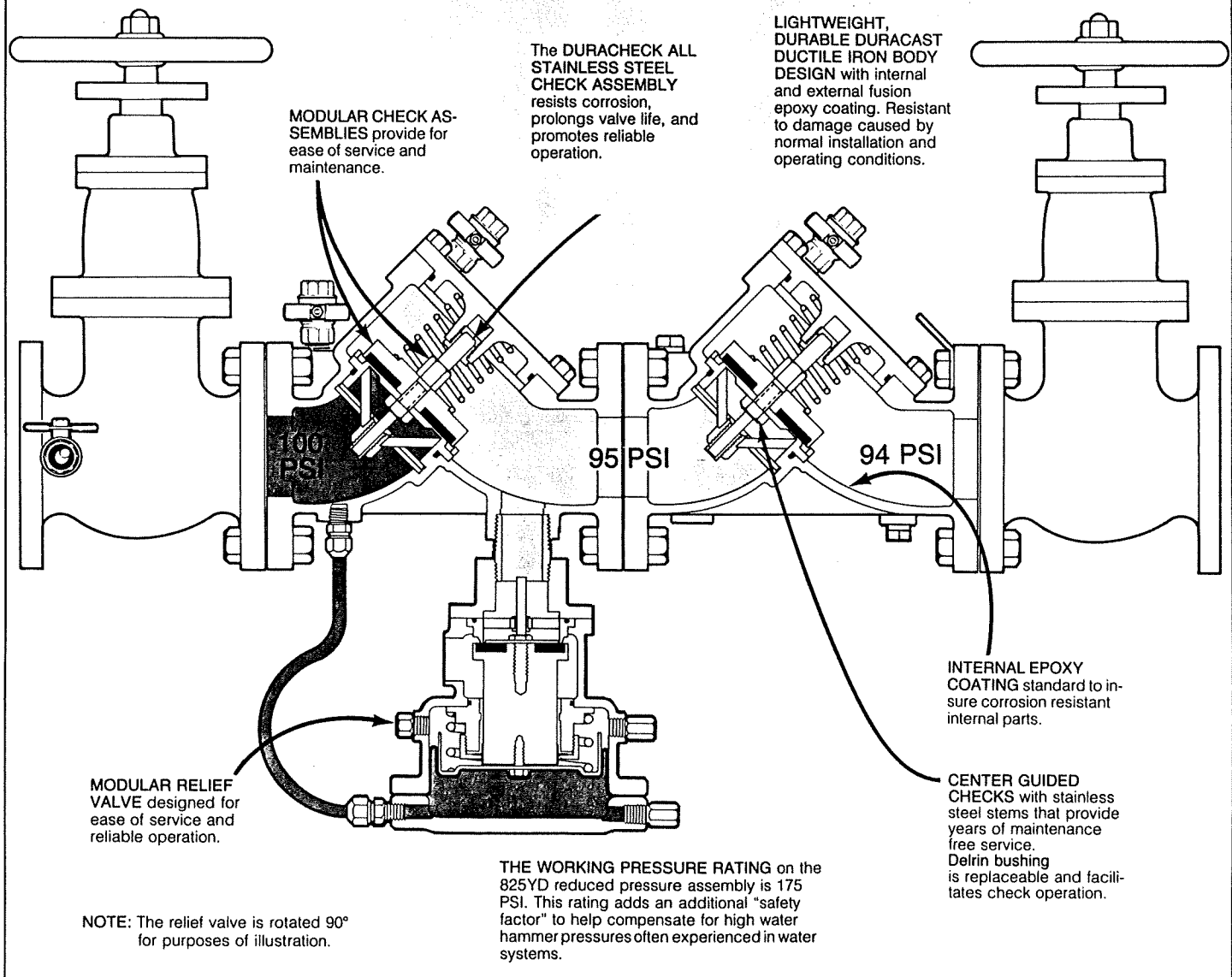
- Ductile iron bodies.
- DuraCheck stainless steel check assembly.
- Modular relief valve.
- RW-OS & Y gate valves on all UL/FM assemblies.
- Lifting rings and freeze protection drain plugs.

## Model 825YD SELECTION CRITERIA:

- Health hazard service.
- Continuous pressure operation.
- Possible backpressure.

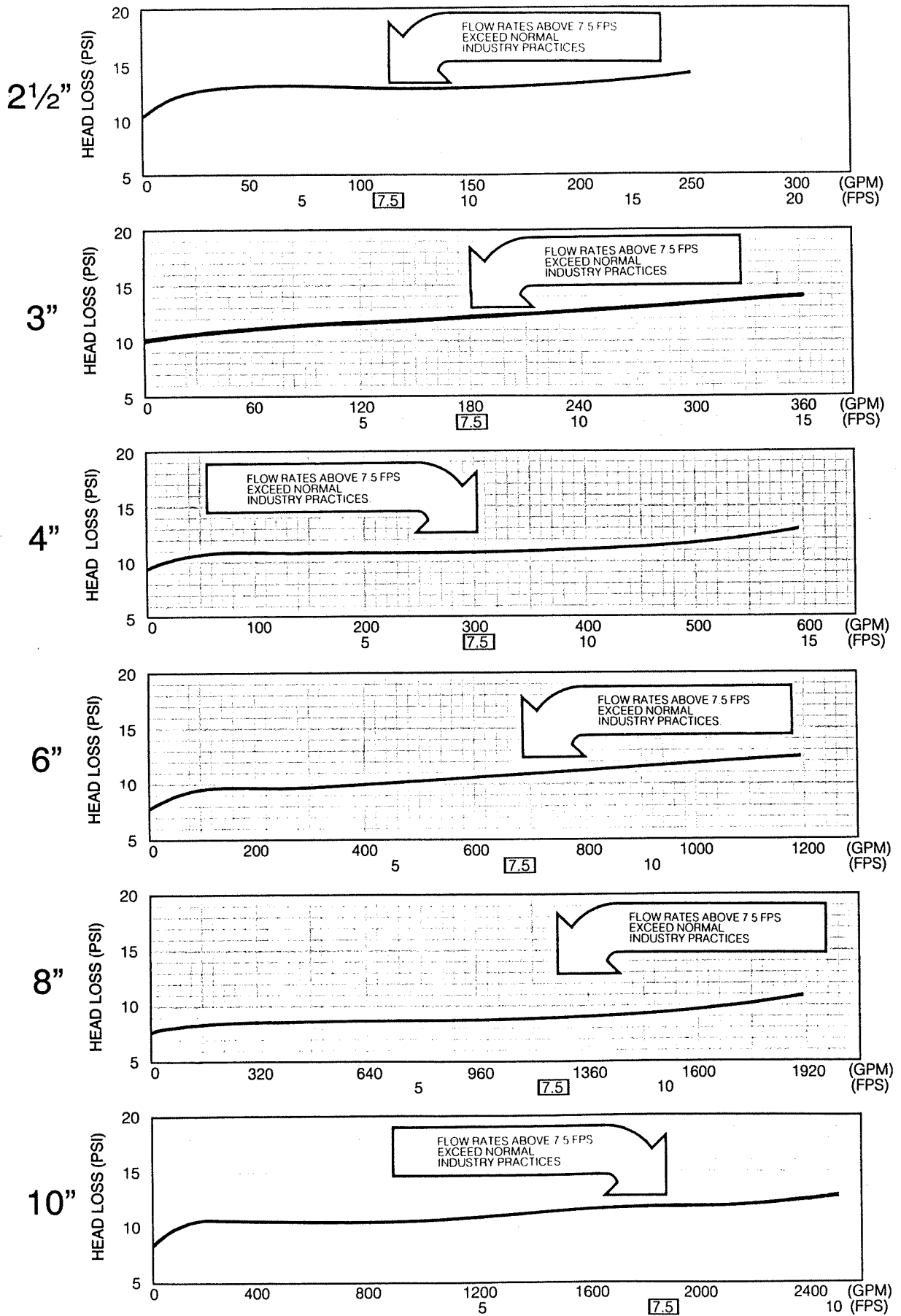
See page 3 for applicable approvals.

## Features of the Model 825YD (2½" thru 10")



# Model 825YD Flow Curves

Flow Curves as established by the USC Foundation for Cross-Connection Control and Hydraulic Research



## NOTES:

1. Velocities are calculated for flows in Schedule 40 steel pipe.
2. Typical water system flow velocities of 0 to 7.5 FPS should be used for head loss efficiency comparisons.



# Model 826YD (2" - 10") Reduced Pressure Detector Assembly

The Model 826YD reduced pressure detector assembly consist of two independent mainline "Y" pattern center guided, spring loaded check valves. All low flow demands up to a minimum of 3 GPM (0.189 L/s) are to pass only through the by-pass meter and meter-size reduced pressure assembly and be accurately recorded. All flows above that of 3 GPM will pass through both the line-size double check valve assembly and by-pass without accurate registration by or damage to the meter.

The Model 826YD RPDA is designed for ease of service and long valve life.

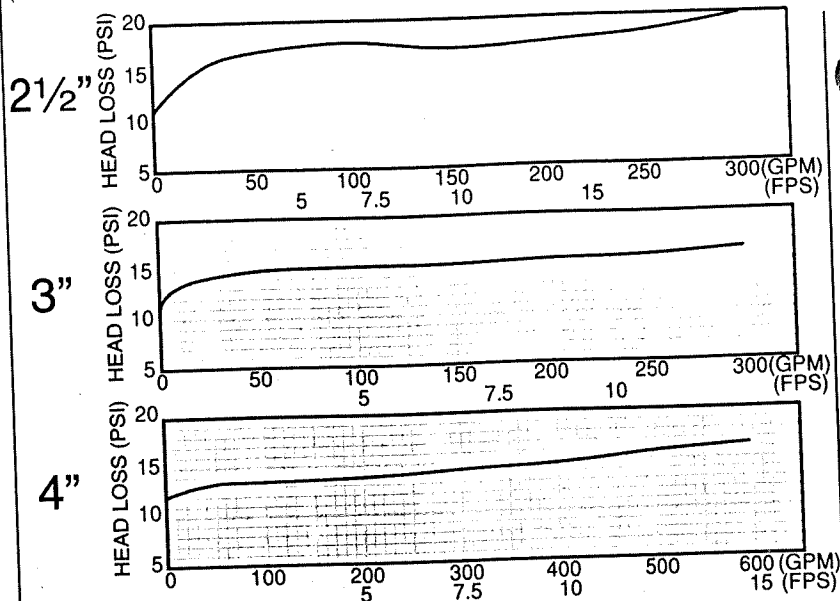
- Ductile iron bodies
- DuraCheck stainless steel check assembly
- Modular relief valve
- RW-OS & Y gate valves UL/FM

## Model 826YD RPDA SELECTION CRITERIA:

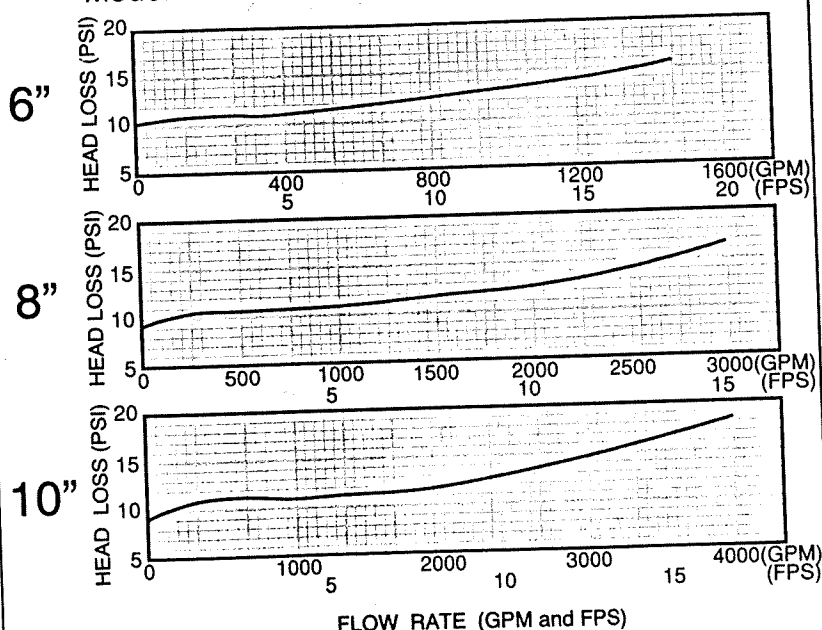
- Health hazard fire sprinkler service
- Continuous pressure operation
- Possible backpressure

See page 3 for applicable approvals

Model 826YD Flow Curves (2½", 3", 4")  
(Flow Curves as established by the USC Foundation for Cross Connection Control and Hydraulic Resear



Model 826YD RPDA Flow Curves (6", 8", 10")



NOTES:  
1. Velocities are calculated for flows in Schedule 40 steel pipe.

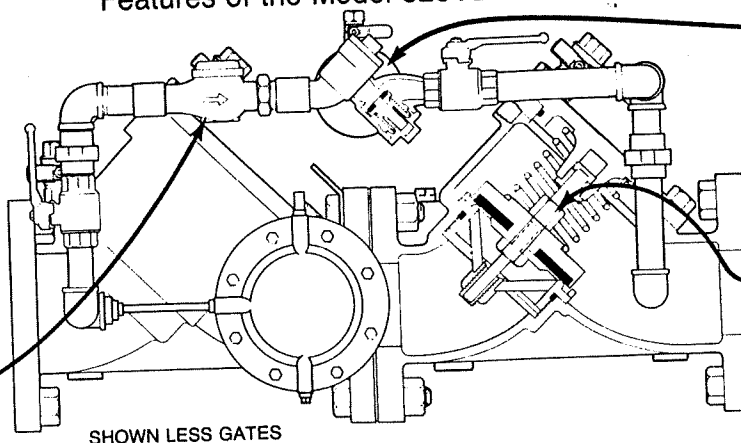
## Features of the Model 826YD RPDA

MODULAR RELIEF VALVE for ease of service and reliable operation.

LIGHTWEIGHT, DURABLE DURACAST DUCTILE IRON BODY DESIGN with bronze trim and internal and external fusion epoxy coating. Resistant to damage caused by normal installation and operating conditions.

The DURACHECK ALL STAINLESS STEEL CHECK ASSEMBLY resists corrosion, prolongs valve life, and promotes reliable operation.

BYPASS LINE WITH WATER METER is the total type.



SHOWN LESS GATES

BY-PASS REDUCED PRESSURE ASSEMBLY designed with heavy duty all bronze body, caps and gate valves.

"Y" PATTERN BODY design to provide minimum headloss.

MODULAR CHECK ASSEMBLIES provide for ease of service and maintenance.

SPRING LOADED CENTER GUIDED CHECKS with soft elastomer discs provide tight closure against backflow. Delrin bushing is replaceable and facilitates check operation.

## Model 810 Dual Check

### Backflow Prevention Assembly (3/4" & 1")

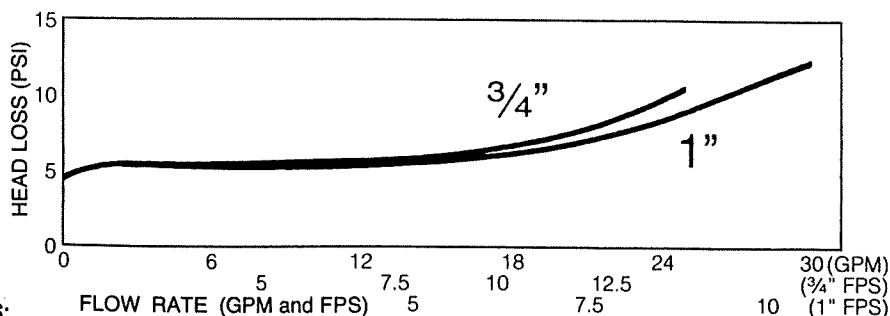
The Model 810 dual check backflow prevention assembly is designed to be installed downstream from the house water meter to reduce the potential backflow of pollutants from the house or yard into the water mains.

The Model 810 consists of two in-line, spring loaded, poppet type cartridges. The bronze body is constructed with a union connection for easy servicing. In normal operation the checks open with flow demand. During no-flow conditions, each check is designed to hold 1 PSI in the direction of the flow.

See page 3 for applicable approvals.

NOTE: 5/8", 3/4" & 1" meter connections also available.

## Model 810 Flow Curves



#### NOTES:

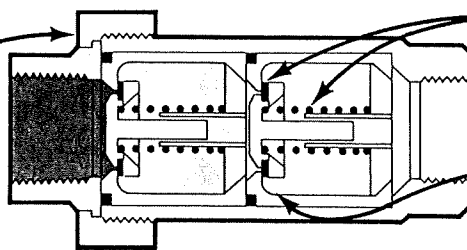
1. Velocities are calculated for flows in Schedule 40 steel pipe.
2. Typical water system flow velocities of 0 to 7.5 FPS should be used for head loss efficiency comparisons.

## Features of the Model 810

UNION CONNECTION DESIGN provides for easy installation.

ALL BRONZE BODY for durability and reliable operation.

THE WORKING PRESSURE RATING on the 810 is 175 PSI. This rating adds an additional 'safety factor' to help compensate for high water hammer pressures often experienced in water systems.



RUBBER SEATS with stainless steel springs provide durable seals against backflow.

THE MODEL 810 withstands water temperatures of 32°F to 180°F.

ACETAL PLASTIC INTERNAL PARTS for exceptional corrosion resistance.

TWO IN LINE POPPET TYPE CHECK CARTRIDGES insure minimum head loss.

## Model 815 DCAP Dual Check with Atmospheric Port (1/2" & 3/4")

The Model 815 DCAP dual check with atmospheric port is designed to protect against backsiphonage and backpressure in cold and hot water continuous pressure applications. The device can be used in low hazard applications such as boiler feed lines, non-toxic laboratory equipment installations, sterilizers, and other low hazard applications.

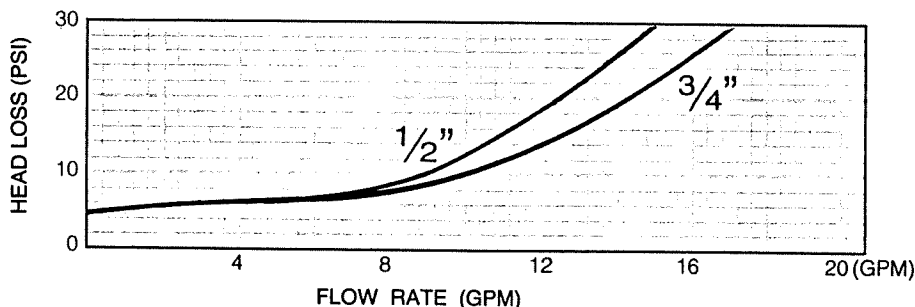
The Model 815 consists of two independently operating check valves with an intermediate atmospheric port. In normal operation the checks open with flow demand. During no-flow conditions, each check is designed to hold 1 PSI in the direction of flow.

When a backsiphonage condition occurs the atmospheric port opens to permit air to break the siphon. In the event of backpressure and a fouled second check, leakage is vented through the atmospheric port.

See page 3 for applicable approvals.

## Model 815 DCAP Flow Curves

(Flow Curves as established by the Twining Labs, Inc.)



#### NOTE:

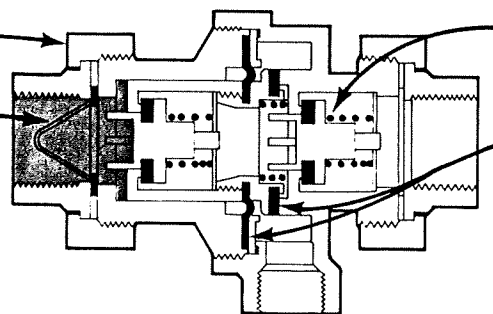
1. Velocities are calculated for flows in Schedule 40 steel pipe.

## Features of the Model 815 DCAP

UNION CONNECTION for easy installation and maintenance.

BUILT-IN STRAINER

WORKING PRESSURE 175 PSI, withstanding normal flow temperatures of 40°+ to 210°F (4°C to 99°C) and maximum, backflow temperature of 250°F (121°C).



STAINLESS STEEL SPRING

BRONZE BODY

ALL RUBBER PARTS of temperature-resistant ethylene propylene.

DESIGN FOR low head loss.

CSA model outlet port not threaded.

# "Y" Strainers

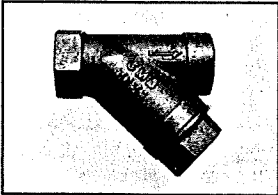
## Uses of "Y" Strainers:

Strainers are designed to protect equipment from damage due to dirt, scale, debris, and other foreign materials. The strainer should be installed before backflow prevention devices, control valves, pumps, meters, and other equipment.

## Typical Applications

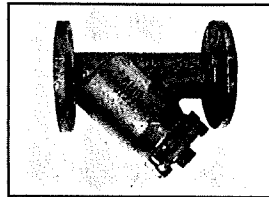
- Backflow prevention devices
- Control valves
- Pumps
- Motors
- Air lines
- Irrigation systems
- Water Heating Supply
- Industrial Process Equipment Supply

## Model 3131 Bronze "Y" Strainer



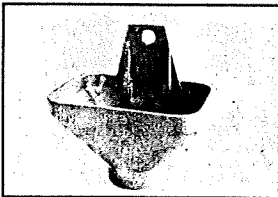
The Model 3131 consists of a bronze body and cover and a stainless steel screen. The Model 3131 has IPS threaded ends and is available with optional screen sizes. Working pressures—non shock: Water, oil, and gas 300 PSI (100°F). Available in 1/2" through 2".

## Model 3132 Cast Iron "Y" Strainer



The Model 3132 consists of cast iron body and cover and a stainless steel screen. The strainer includes body, cover gasket, screen, cover and nuts. The model 3132 has flanged ends, self-cleaning blow off plug and is available with optional screen sizes. Working pressures—non shock: Steam 250 PSI (400°F); Water, oil and gas 400 PSI (100°F). Available in 2 1/2" through 10".

## Model AGD Air Gap Drain

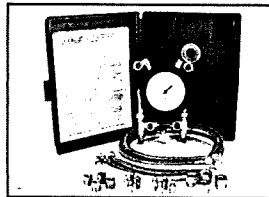


The air gap drain Model AGD-Y is designed to be installed with the 825Y (3/4" through 2") and the Model AGD-L is designed for installation with the 825 (2 1/2" through 10"). The device catches minor relief valve discharge due to pressure fluctuations and/or minor check valve fouling.

The drain may be either installed with support straps attached to the relief valve or for approved air gap installations, threaded on top a fully supported drain pipe.

**NOTE:** The air gap drain is not designed to catch the maximum flows possible from the reduced pressure devices. Water line pressure affects the amount of water discharged, the size of the drain and the length of drain piping limits the amount of water handled by the AGD system.

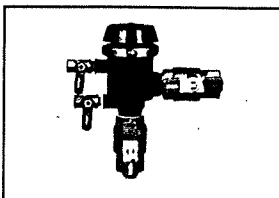
## Model RPTK1 Test Kit



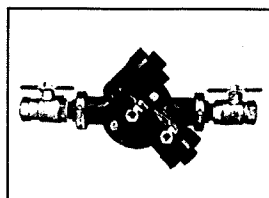
The Model RPTK1 Test Kit includes gauge complete with hoses, fittings, adapters and laminated instructions in a compact plastic case. The RPTK1 Test Kit is used to perform all certified tests requiring a differential pressure gauge, including all tests specified in ASSE Series 5000 Qualifications Standard.

## Engineered Plastic Products

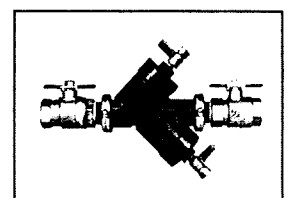
Febco manufactures 3/4" and 1" products in special engineered plastics for aggressive water conditions requiring corrosion resistance and other special applications. Consult your local Febco representative for further information.



**Model 745  
Pressure  
Vacuum Breaker**



**Model 845  
Reduced  
Pressure Assembly**

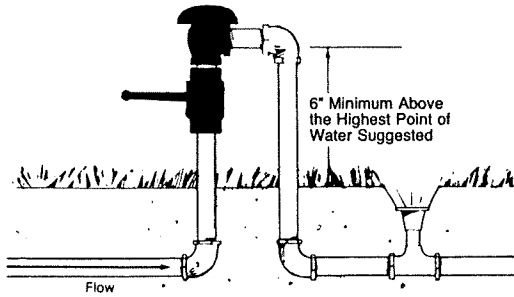


**Model 865  
Double  
Check Assembly**

# Standard Installation Information for the Field

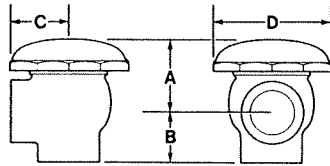
## ATMOSPHERIC VACUUM BREAKER Model 710 1/2" through 2"

Install on the discharge side of the last shut-off valve. Install a minimum of 6" above the highest overflow level, with the air inlet in a level position.



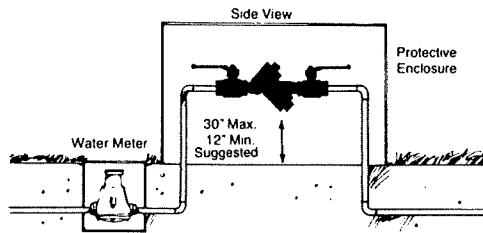
### Dimensions and Weights

SIZE	A	B	C	D	WT. (LBS.)
1/2"	1 1/4"	1 1/4"	1 1/4"	2 1/2"	3/4
3/4"	1 1/2"	1 3/8"	1 3/8"	2 1/2"	1
1"	2 1/8"	1 3/8"	1 1/2"	3 1/4"	1 3/4
1 1/4"	2 1/4"	1 5/8"	2"	4"	2 1/2
1 1/2"	2 1/2"	2 1/8"	2 1/8"	4 1/2"	3 3/4
2"	3 1/4"	2 1/8"	2 1/8"	5 1/2"	5 1/4



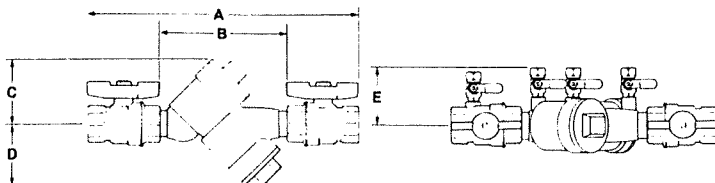
## DOUBLE CHECK BACKFLOW PREVENTER Model 805Y 3/4" through 2"

Install with adequate clearance and easy accessibility for testing and maintenance purposes. Protect from freezing. Install horizontally with flow up.



### Dimensions and Weights (with Ball Valve Shut-offs)

SIZE	A	B	C	D	E	WT. (LBS.)
3/4"	11 3/8"	6 7/8"	3 3/4"	3 3/4"	2 1/2"	7
1"	12 7/8"	6 7/8"	3 3/4"	3 3/4"	2 1/2"	7 1/2
1 1/2"	17 7/8"	10 1/4"	5 1/8"	4 7/8"	3 3/8"	17 1/2
2"	18 5/8"	10 1/4"	5 1/8"	4 7/8"	3 3/8"	20

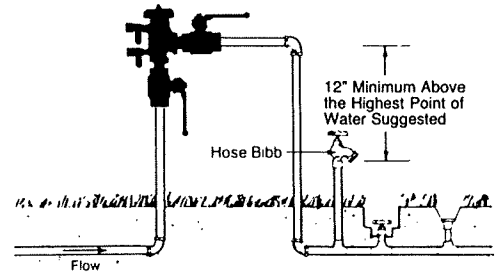


## PRESSURE VACUUM BREAKER ASSEMBLY Model 765 1/2" through 2"

Install at least 12" above the highest piping or outlet downstream of the device and in a manner to preclude backpressure. Install for easy accessibility for testing and maintenance purposes. Locate where discharge will not be objectionable. Must not be installed where backpressure may occur. Discharge

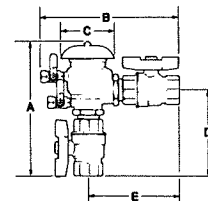
pressure should be maintained above 3.0 PSI on the 1/2" through

1 1/4" sizes and above 5.0 PSI in the 1 1/2" and 2" sizes.



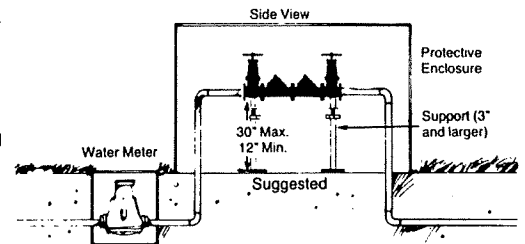
### Dimensions and Weights (with Ball Valve Shut-offs)

SIZE	A	B	C	D	E	WT. (LBS.)
1/2"	6 1/4"	6 3/4"	2 1/2"	3 3/4"	4 1/4"	2.6
3/4"	6 1/2"	7"	2 1/2"	4"	4 1/2"	2.9
1"	8 3/4"	9"	4"	5 1/4"	6"	5.9
1 1/4"	9 1/4"	10"	4"	6 1/4"	7"	7.0
1 1/2"	11 3/4"	11 1/2"	6 1/2"	7 1/4"	7 3/4"	14.8
2"	12 1/2"	12 1/4"	6 1/2"	8"	8 1/2"	16.5



## DOUBLE CHECK BACKFLOW PREVENTER Model 805YD 2 1/2" through 10"

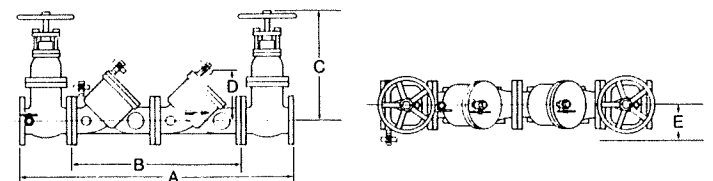
Install with adequate clearance and easy accessibility for testing and maintenance purposes. Protect from freezing. Install horizontally with flow up. Larger sizes should be installed horizontally for ease of service, and should have support blocks to prevent flange damage.



### Dimensions and Weights

SIZE	A	B	C*	D	E	WT. (LBS.)
2 1/2"	37 3/16"	22 1/16"	12 1/2"	7 1/2"	5 1/4"	230
3"	41 1/16"	25 1/16"	14"	8 1/16"	6"	240
4"	50 7/16"	32 1/16"	17 3/8"	11"	6 3/4"	390
6"	59 1/16"	38 9/16"	21 1/4"	14"	8 1/4"	675
8"	69 3/16"	46 1/16"	26"	18"	9 1/2"	1130
10"	84 3/16"	58 1/16"	30"	22"	10 1/2"	1530

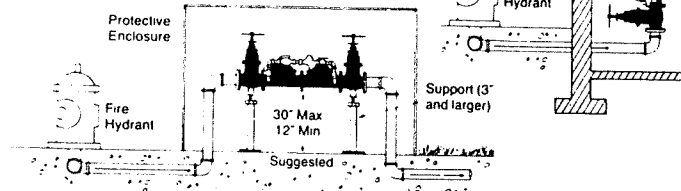
\* Dimensions apply to NRS gate valve only.



# DOUBLE CHECK DETECTOR ASSEMBLY Model 806YD DCDA 4" through 10"

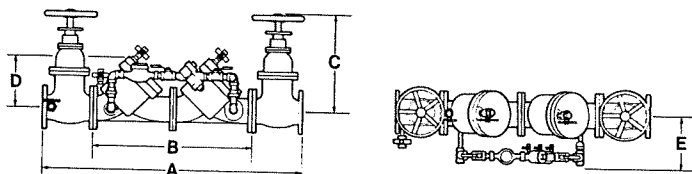
Install with minimum clearance of 12" between device and floor or grade. Install where easily accessible for testing and maintenance. Protect

from freezing. Use support blocks to prevent flange damage. Consult local codes for acceptable installation.

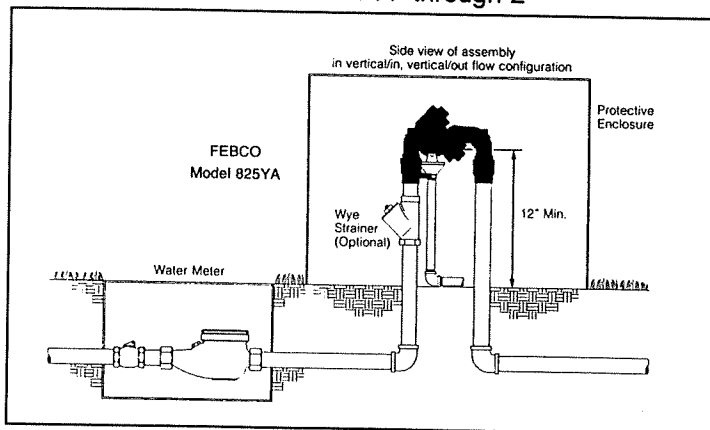


## Dimensions and Weights

SIZE	A	B	C	D	E	NET WT.(LBS.)	NET WT.(LG.)
4"	50 <sup>1</sup> / <sub>16</sub> "	32 <sup>3</sup> / <sub>16</sub> "	23 <sup>3</sup> / <sub>4</sub> "	11"	15"	499	196.3
6"	59 <sup>1</sup> / <sub>16</sub> "	38 <sup>9</sup> / <sub>16</sub> "	32 <sup>5</sup> / <sub>8</sub> "	14"	16"	812	308.3
8"	69 <sup>3</sup> / <sub>16</sub> "	46 <sup>1</sup> / <sub>16</sub> "	41 <sup>1</sup> / <sub>8</sub> "	18"	17"	1307	492.9
10"	84 <sup>3</sup> / <sub>16</sub> "	58 <sup>1</sup> / <sub>16</sub> "	50 <sup>1</sup> / <sub>2</sub> "	22"	20"	1767	651.5

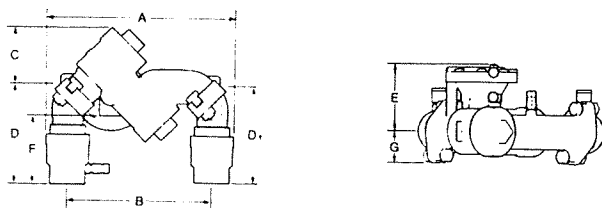


## ANGLE PATTERN REDUCED PRESSURE BACKFLOW PREVENTER Model 825YA 3/4" through 2"



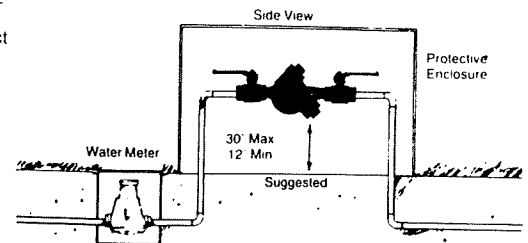
## Dimensions and Weights

SIZE	A	B	C	D	D <sub>1</sub>	E	F	G	NET WT. (LBS.)
3/4"	10	8 1/2	4 1/8	4 7/8	4 5/8	4 1/8	3 1/2	1 5/8	15
1"	10 1/4	8 1/2	4 1/8	5 1/4	5	4 1/8	3 3/8	1 5/8	16 1/2
1 1/2"	14 1/4	11 1/2	5 1/4	6 7/8	6 1/2	5	4 5/8	2 5/8	38
2"	14 7/8	11 1/2	5 1/4	7 1/2	7 1/8	5	5 1/4	2 5/8	41



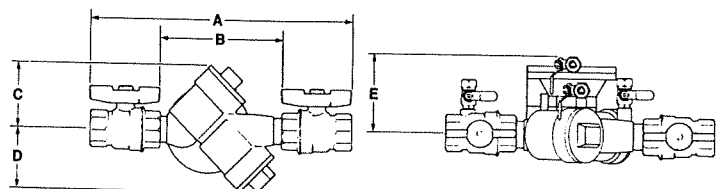
# REDUCED PRESSURE BACKFLOW PREVENTER Model 825Y 3/4" through 2"

Install with minimum clearance of 12" from the port, floor, or grade. Install for easy accessibility. Protect from freezing. Majority of local codes restrict pit installations.



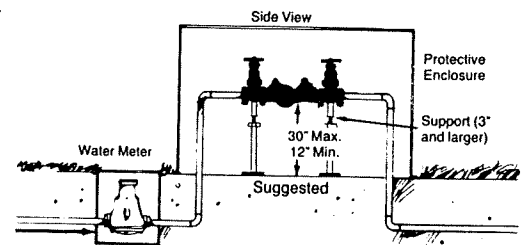
## Dimensions and Weights (with Ball Valve Shut-offs)

SIZE	A	B	C	D	E	WT. (LBS.)
3/4"	12 1/4"	7 3/4"	4 1/8"	3 1/4"	4 1/8"	11 1/2
1"	13 5/8"	7 3/4"	4 1/8"	3 1/4"	4 1/8"	12 1/2
1 1/4"	14 1/4"	7 3/4"	4 1/8"	3 1/4"	4 1/8"	14
1 1/2"	18 1/4"	10 5/8"	5 1/4"	4 1/2"	5"	26 1/2
2"	19"	10 5/8"	5 1/4"	4 1/2"	5"	29



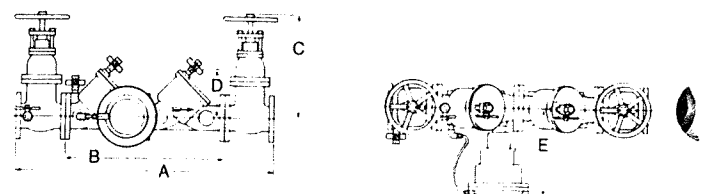
## REDUCED PRESSURE BACKFLOW PREVENTER Model 825YD 2 1/2" through 10"

Install with minimum clearance of 12" from the port, floor, or grade. Install for easy accessibility. Protect from freezing. Use support blocks to prevent flange damage. Majority of local codes restrict pit installation.



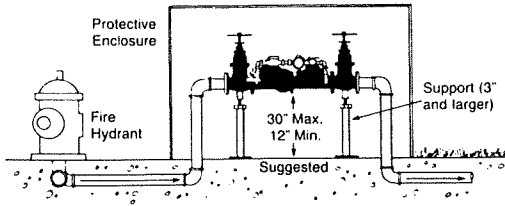
## Dimensions and Weights

SIZE	A	B	C	D	E	WT. (LBS.)
2 1/2"	37 <sup>3</sup> / <sub>16</sub> "	22 <sup>1</sup> / <sub>16</sub> "	12 <sup>1</sup> / <sub>2</sub> "	7 <sup>1</sup> / <sub>2</sub> "	11"	260
3"	41 <sup>1</sup> / <sub>16</sub> "	25 <sup>9</sup> / <sub>16</sub> "	14"	8 <sup>1</sup> / <sub>16</sub> "	12"	295
4"	50 <sup>7</sup> / <sub>16</sub> "	32 <sup>3</sup> / <sub>16</sub> "	17 <sup>3</sup> / <sub>8</sub> "	11"	13"	460
6"	59 <sup>1</sup> / <sub>16</sub> "	38 <sup>9</sup> / <sub>16</sub> "	21 <sup>1</sup> / <sub>4</sub> "	14"	15"	800
8"	69 <sup>3</sup> / <sub>16</sub> "	46 <sup>1</sup> / <sub>16</sub> "	26"	18"	16"	1150
10"	84 <sup>3</sup> / <sub>16</sub> "	58 <sup>1</sup> / <sub>16</sub> "	30"	22"	17"	1570



## REDUCED PRESSURE DETECTOR ASSEMBLY Model 826YD (2½" - 10")

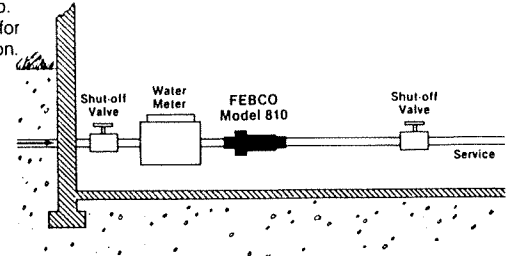
all with adequate clearance and easy accessibility for testing and maintenance purposes. Protect from freezing. Install horizontally. Larger sizes should have support blocks to prevent flange damage.



## DUAL CHECK VALVE Model 810 ¾" and 1"

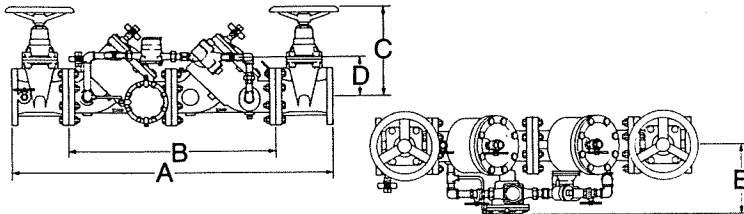
Thoroughly flush service line before installing in any position.

Install horizontally or vertically with flow up. Consult local codes for acceptable installation. Allow adequate distance from grade or floor for maintenance and testing. Protect from freezing.



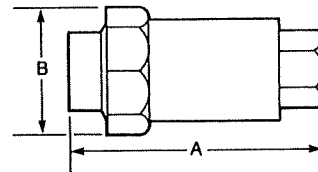
### Dimensions and Weights

SIZE	A	B	C	D	E	NET WT.(LBS.)	NET WT.(LG.)
4"	50 7/16"	32 5/16"	23 3/4"	11"	13"	469	194
6"	59 11/16"	38 9/16"	32 5/8"	14"	15"	752	397
8"	69 3/16"	46 1/16"	41 7/8"	18"	16"	1207	537
10"	84 3/16"	58 1/16"	50 1/2"	22"	17"	1617	957



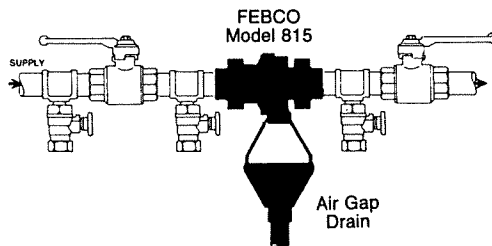
### Dimensions and Weights

SIZE	A	B	WT. (LBS.)
¾", ¾" & 1"	4 3/8"	2 3/8"	1 1/2



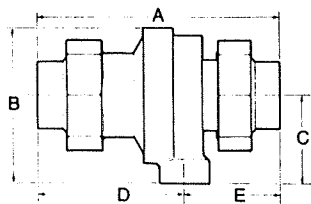
## DUAL CHECK with ATMOSPHERIC PORT Model 815 DCAP ½" and ¾"

Install with minimum clearance of 12" between device and floor grade. Install where easily accessible for testing and maintenance. Should not be installed where discharge from port will be objectionable.



### Dimensions and Weights

SIZE	A	B	C	D	E	WT.(LBS.)
½" & ¾"	5"	3 1/8"	1 3/4"	3"	1 7/8"	2 1/2"





## Febco... Backflow Prevention Assemblies designed to minimize head loss.

Febco is committed to provide engineers, architects, contractors and backflow device users the clearest information possible regarding product performance.

Our flow curves are designed to help you evaluate the performance of our products in water systems typical of your applications. That's why we publish head loss amounts at water flow rates typically used in the plumbing, irrigation, and city waterworks markets.

Febco publishes the "typically used" flow rates because of feedback from the field that the qualifying "Rated Flow" headloss amounts, established years ago in the development of the backflow industry, do not have any relationship with the actual water flow rates utilized in the various applications for backflow.

"Rated Flow" head loss amounts for Backflow Preventers were based on the maximum allowable flow rate in gallons through a similar sized water meter. The rate of flow through the water meter determined the standard, not the performance of the backflow device in the water system itself.

Typical water flow velocities utilized within the various applications range from 0 to 7.5 FPS. The maximum of 7.5 FPS was established because of possible damage from water hammer that can occur to the water system components.

Febco is hopeful that the design of our flow curves is helpful to you in your work. They are obtained from *independent* laboratories.

Febco produces the widest selection of Backflow Prevention Assemblies approved by the University of Southern California Foundation of Cross-Connection Control and Hydraulic Research and by the American Society of Sanitary Engineering. When using a Febco product, you are ensured not only of Febco's standard of excellence, but of standards set by independent testing groups.

In the flow curves below, *50 GPM in a 1" pipeline is a velocity of 18 FPS*. Rated Flow as established by USC in a 1" backflow preventer is *50 GPM* which *exceeds industry practices of 7.5 FPS*.

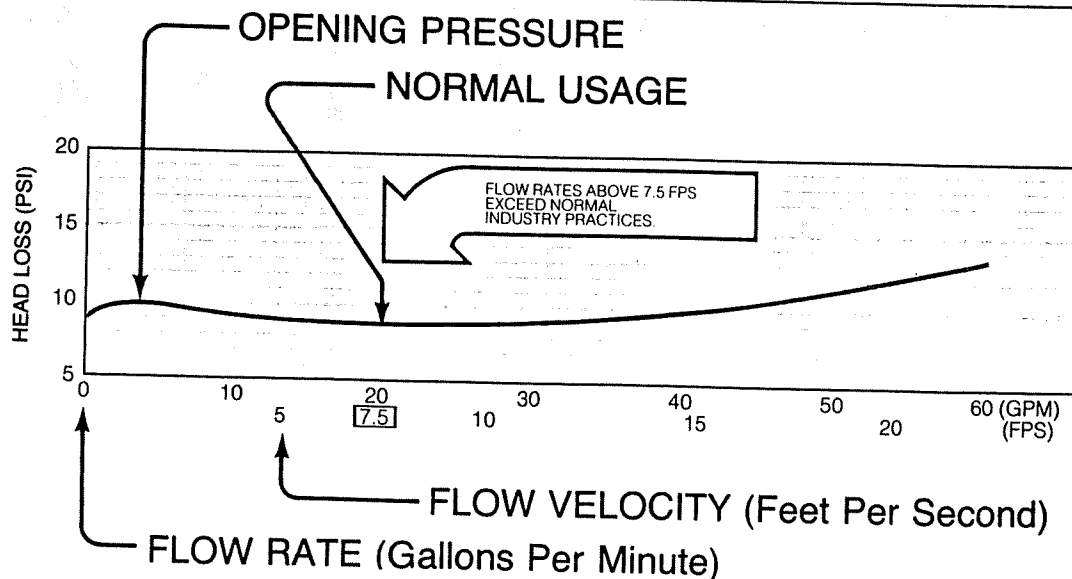
Features of the Febco Flow Curves (Sample Curve)

PIPE MANUFACTURERS DO NOT RECOMMEND EXCEEDING 7.5 FPS because of possible damage from water hammer. Febco flow charts specify the exact location of 7.5 FPS on each curve.

FEBCO FLOW CURVES indicate the typical flow velocity for each specific device.

FLOW CURVES ARE ESTABLISHED BY INDEPENDENT LABORATORIES, either USC Foundation for Cross-Connection Control and Hydraulic Research or the Twining Laboratories, Inc.

Graph illustration both FEET PER SECOND (FPS) and GALLONS PER MINUTE (GPM).



NOTES:

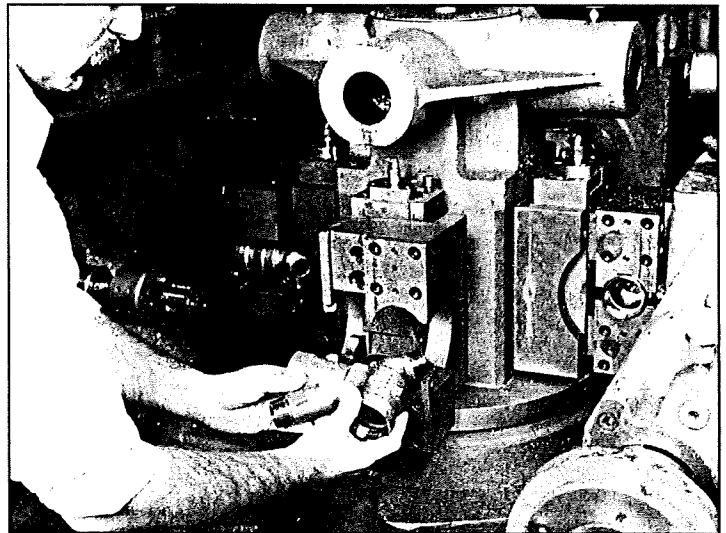
1. Velocities are calculated for flows in Schedule 40.
2. Typical water system flow velocities of 0 to 7.5 FPS should be used for head loss efficiency comparisons.

### Engineered Products that Perform

Febco produces thousands of backflow prevention assemblies each year. Computerized production systems, precise inventory control technique, sophisticated engineering and design, strong, responsive management, expert craftsmen, and well-planned assembly methods all combine to produce backflow prevention devices of superior quality.

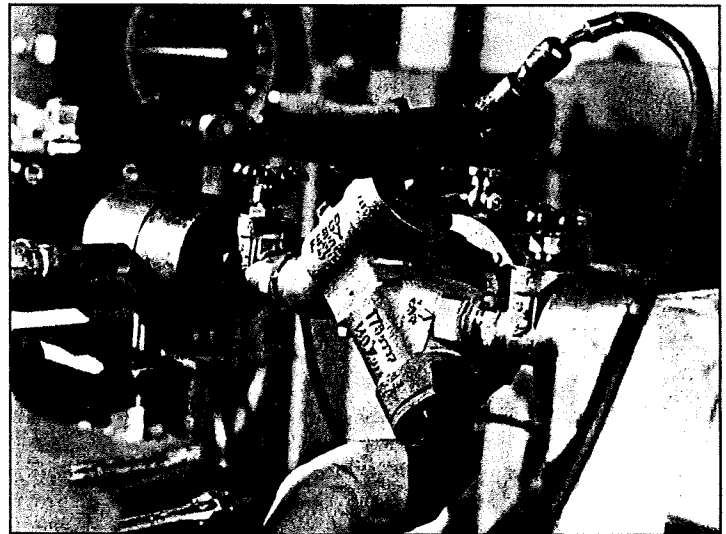
Febco engineers continually upgrade present products and design new products to keep current with the needs of the marketplace. They readily convert the recommendations of the sales force to the manufacture of backflow assemblies that meet customer demands. This translates to products that provide:

- Low head loss
- Reliable operation
- Easy serviceability



### Quality Assurance

100% testing is performed before any Febco product is shipped from the factory. The actual tests performed utilize the same criteria established by approving agencies. Febco's continuous in-process quality assurance inspections help provide the reliable operation of all Febco backflow prevention assemblies. All parts purchased from outside vendors are inspected in accordance with Military Standard 105D, requiring 100% non-destructive testing as well as random sampling of all lots for further inspection.

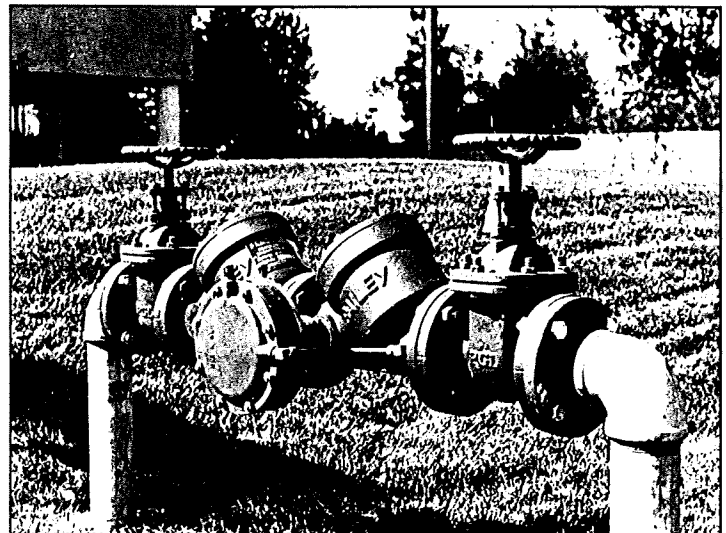


### Serviceability

Febco's efficient yet simple designs provide easy to maintain assemblies for trouble-free service, eliminating troublesome call backs in the field. All internal parts can be serviced without removing the assemblies from the line.

### Approved Devices

Febco has the widest line of approved backflow prevention assemblies in the industry. Approving agencies include the University of Southern California Foundation for Cross Connection Control and Hydraulic Research, the American Waterworks Association, the American Society of Sanitary Engineering, the Canadian Standard Association, the Southern Building Code Congress, Underwriters Laboratory, and Factory Mutual.





# U.S. Sales Representative Listing

<b>WESTERN REGION</b>	<b>Location</b>	<b>Phone</b>	<b>Fax</b>
Controlled Water Sales	Fresno, CA	(209) 435-5600	(209) 435-5625
Frank Products, Inc.	Portland, OR	(503) 248-0541	(503) 248-0753
KKW, Inc.	Hayward, CA	(510) 785-0735	(510) 782-1621
PMR Associates	Chatsworth, CA	(818) 998-0083	(818) 998-3985
Stone-Drew / Ashe & Jones, Inc.	Seattle, WA	(206) 763-2850	(206) 763-0842

<b>CENTRAL REGION</b>	<b>Location</b>	<b>Phone</b>	<b>Fax</b>
Bill Boehnlein Sales	Lakeland, MN	(612) 436-8851	(612) 436-1887
Brown-Miller, Ltd.	Hillside, IL	(708) 544-7500	(708) 544-7553
Dillon Company, Inc.	Denver, CO	(303) 399-5566	(303) 399-2114
PMR Associates	Phoenix, AZ	(602) 243-6075	(602) 268-2980
Donahue-McGuire Sales Agency, Inc.	St. Louis, MO	(314) 664-2122	(314) 664-0767
Dworkin Company, The	Kansas City, MO	(816) 531-2505	(816) 756-0326
Mid-America Sales Group, Inc.	Grimes, IA	(515) 986-9446	(515) 986-3552
OK! Sales, Inc.	Norman, OK	(405) 360-6161	(405) 360-0092
Peak Sales, Inc.	New Berlin, WI	(414) 782-1232	(414) 782-5590
Vemco Sales, Inc.	Great Falls, MT	(406) 727-5335	(406) 727-5997
Woodruff Sales, Inc.	Salt Lake City, UT	(801) 972-3023	(801) 975-9135

<b>NORTHEAST REGION</b>	<b>Location</b>	<b>Phone</b>	<b>Fax</b>
C & C Marketing, Inc.	Binghamton, NY	(800) 333-0977	(607) 773-1637
Closter Bros., Inc.	Bohemia, NY	(516) 563-3900	(516) 563-3937
De Broka & Assoc., Inc.	Sterling Heights, MI	(313) 979-5980	(313) 979-1757
Hosking Assoc., Inc.	Milford, CT	(203) 877-5841	(203) 877-8042
Kerr Marketing Agency	Cleveland, OH	(216) 582-1720	(216) 582-1842
Chesapeake Marketing	Lanham, MD	(301) 577-2164	(301) 577-7189
Mitchell Love Company	King of Prussia, PA	(215) 337-1500	(215) 962-5490
Technical Marketing	Louisville, KY	(502) 425-8051	(502) 425-8170
Shadco, Inc.	Indianapolis, IN	(317) 251-9045	(317) 251-9301

<b>SOUTHEAST REGION</b>	<b>Location</b>	<b>Phone</b>	<b>Fax</b>
C.A. Riner Company, Inc.	Little Rock, AR	(501) 834-1400	(501) 834-1407
Coleman-Russell & Assoc., Inc.	Birmingham, AL	(205) 833-0700	(205) 836-6528
Crouch Sales Company	Antioch, TN	(615) 834-7556	(615) 833-6690
Grant & Associates	Harahan, LA	(504) 733-2999	(504) 733-9485
Colonial Sales Agency	Tampa, FL	(813) 621-3470	(813) 622-7863
Colonial Sales Agency	Pompano Beach, FL	(305) 785-4005	(305) 785-4006
Manufacturers Agents, Inc.	Atlanta, GA	(404) 351-2074	(404) 355-3969
Otto Sales Company	Ashland, VA	(804) 798-2600	(804) 798-1356
SPC Marketing	Monroe, NC	(704) 283-8554	(704) 283-8010
WWIP Corp.	Houston, TX	(713) 699-5778	(713) 699-0842
WWIP Corp.	Dallas, TX	(214) 243-3633	(214) 243-3632



A division of CMB Industries  
P.O. Box 8070 Fresno, Calif. 93747  
Fax: (209) 453-9030  
GPC 7/92

**EQUIPMENT SUPPLY CO.****CORPORATE OFFICE****3558 S. PROCYON AVE. • LAS VEGAS, NV 89103  
(702) 873-2468**

February 8, 1994

Mark Hirschey  
Professor of Business  
Faculty Suite  
Summerfield Hall  
Lawrence, Kansas

Dear Professor Hirschey:

Per our telephone conversation yesterday, I'm sending you this note to substantiate the following facts:

I am Larry Kennedy of Turf Equipment Supply Co., a leading irrigation supplier.

Surprise freezes can expose above-ground backflow devices and cause damage to the devices.

In December, 1990; a hard freeze hit Las Vegas and above-ground backflow devices, even the ones that were properly wrapped with tape, were damaged.

Turf Equipment has no way of knowing how many devices were damaged in the area. We supplied replacement parts that exceeded 1,000 units.

There were five other irrigation suppliers that participated in the repair of the above-ground backflow devices.

I hope this information is helpful.

Sincerely,

Larry Kennedy  
Secretary/Treasurer

LK:mm

**TURF WEST (702) 367-2267**  
6555 W. Sahara • Las Vegas, NV 89102

**TURF EAST (702) 456-4620**  
32 Commerce Center Dr. • Henderson, NV 89014

**TURF NORTH (702) 656-8150**  
8164 W. Alexander • Las Vegas, NV 89108

FEB 8 '94 16:10

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Senate Energy & Natural Resc.  
February 9, 1994  
Attachment 5

=== COVER PAGE ===

TO: \_\_\_\_\_

FAX: 19138645328

FROM: TURF EQUIPMENT

FAX: 7028730648

TEL: 7028732468

COMMENT:

FEB '8 94 16:10 7028730648 PAGE.001

# THE CITY OF WICHITA



WATER & SEWER DEPARTMENT  
WATER DISTRIBUTION DIVISION  
CITY HALL - EIGHTH FLOOR  
455 NORTH MAIN STREET  
WICHITA, KANSAS 67202  
PHONE: (316) 268-4908

2/2/1994

Mark Gerard  
Kansas Department of Health and Environment  
Bureau of Water Protection  
Forbes Building 283  
Topeka, Kansas 66620

RE: Senate Bill 611

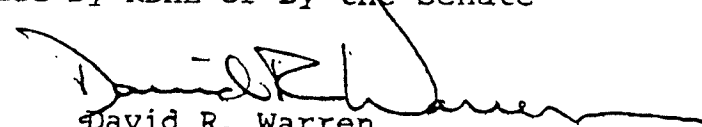
Dear Mr. Gerard:

The City of Wichita Water & Sewer Department wishes to register its opposition to Senate Bill 611, an act relating to water pollution; concerning lawn irrigation systems.

SB 611 proposed to define lawn irrigation systems as low hazard water systems. If passed, double check valve assemblies would be allowed as backflow prevention on lawn irrigation systems, in place of the vacuum breakers now required.

It is the City of Wichita's opinion that double check valve assemblies are not adequate protection against the types of contaminants that can be siphoned into a citizen's plumbing or into a municipal water system from a lawn irrigation system. Many lawn irrigation systems rely on spray heads which are below ground level when not in use. When below ground level, spray heads often are submerged in water. If incoming water pressure should drop, these spray heads would allow water carrying soil, fertilizer, pesticides, herbicides, animal excrement, bacteria and viruses into a citizen's plumbing or into a municipal water system. In October, 1991, nematodes (worms) were backsiphoned into a water system through a sprinkler system in Wayne County, Michigan. These substances threaten public health and therefore must be considered high hazards.

I urge the Kansas Department of Health and Environment to recommend against adoption of Senate Bill 611. I will be glad to provide any additional information needed by KDHE or by the Senate committee considering the bill.

  
David R. Warren  
Water & Sewer Director  
City of Wichita

Senate Energy & Nat'l Res.  
February 9, 1994  
Attachment 6