
Backflow Industry- What is this Phenomenon Backflow?

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The term “backflow” has many meanings and might conjure up old memories of actions from your youth. However, for the water distribution system and this article, backflow has a very simple and understandable definition: ***the Unwanted Reversal of Flow in the Potable Water System.***

Boy, that was simple I just solved this dilemma. All we have to do is keep the water flowing in one direction. If this solution is as simple as it sounds, why do plumbing, mechanical and civil engineers spend 4+ plus years in college and plumbers spend 3 to 5 years as an apprentice learning to make water flow in one direction? After all isn't that what it wants to do naturally? Since we live in a world affected by gravity we all know that water flows downhill, therefore, we merely need to live or work downhill from the water source. Oops! I forgot that our water distribution system, in most cases, flows through pipes buried from 2 to 4 feet or more underground and our buildings are built above ground in most cases.

As we have improved our water delivery systems over the years from that of the Greeks and Romans, with their aqueducts and sheepskins, we have added factors that nature never intended. Water can be made to run uphill and backwards. Air-conditioning was the wind blowing across the lake, now we have huge mechanical monsters with water cascading down louvers cooling itself then to be circulated through a complex series of pipes. We have huge pumps pressuring fire systems. We use chemicals and filters to take nature and man's impurities from our water. We use water to flush waste materials in sanitary systems. The list of how we, with all our wisdom, have managed to foul the water so badly and contaminate it at times to make it deadly if consumed by man or beast goes on and on.

One of our primary concerns in the plumbing industry is assuring the water consuming public that the water delivered to them through the public and private distribution systems remains free from pollutants and contaminants. That is what backflow prevention and cross-connection control is all about. We know that things go wrong, accidents and mistakes happen. Because of this we have learned to identify many real or potential areas where our potable water may come in contact with or be *cross-connected* with those pollutants or contaminants and have subsequently invented mechanical devices called *backflow prevention assemblies* to protect against them.

There is only one true and fail safe method of protection; a proper *air gap*. Of course within our complicated and extensive

distribution system, this is not only nearly impossible, but in most cases impractical. Because of this we have invented the various mechanical devices now found on our piping systems; Reduced Pressure Backflow Preventers (RPBP), Double Check Valves (DCV), Pressure Vacuum Breakers (PVB), and Spill Resistant Vacuum Breakers (SVB) all of which are testable and can be installed where they will be under constant pressure. Added to this list are the various non-testable type devices; atmospheric vacuum breakers, pipe applied vacuum breakers, hose bibb vacuum breakers, lab faucet vacuum breakers, vented dual check valves, dual check valves, etc., which in most cases, but not all, are not designed or intended for continuous use under pressure.

Generally speaking, the testable assemblies RPBP, DCV, PVB and SVB are designed to protect against the higher hazard commonly referred to as contaminants; those which can cause a health hazard or even death. The RPBP and DCV can be used to protect against a backpressure or back siphonage, whereas the PVB and SVB may only be used to protect against back siphonage.

Now I've gone and done it; back siphonage, back pressure, what the heck are they? Backpressure is rather simple. When the pressure downstream from the supply becomes greater than the supply pressure we have a backpressure. This situation can be caused in any number of ways; loss of pumping capabilities at the treatment plant, a water main break, any loss of supply pressure at the base of a water riser pipe in a building, a pump running wild in a high rise system, a fire pumper truck hooking up to a building and supplying excessive pressure. The list of possibilities is almost endless.

Back siphonage, on the other hand, is a little more difficult to define or explain. I recently read an article which stated a back siphonage could not occur in a plumbing system since once there is an “open” in the distribution system it goes to atmospheric and a negative pressure was required. I am sure that the learned person who wrote the article is much smarter than I, however I vividly recall my teenage years when my Chevy was out of gas and the “old man's” Buick was in the garage next to it, a small can, a short section of garden hose, everything at atmospheric pressure, a small suction on the hose, and “surprise” enough gas in the Chevy for an evening of cruising. But that's another story for another time. Let's get back to the plumbing system.

A back siphonage can occur if there is a loss of supply pressure while your garden hose is left lying in the pool or attached to a canister of fertilizer. It can occur when there is a fire in the area and tremendous amounts of water are being used by the fire depart-

ment. It can occur due to a falling column of water in a building due to complete loss of supply pressure such as a water main break. It can occur because of the venturi effect of water in a larger diameter pipe flowing past a smaller diameter pipe feeding an unvalved or open valved and unprotected pipe feeding a submerged inlet.

The last couple of paragraphs only scratch the surface of the many and varied ways in which cross-connection can occur. We will never eliminate all actual cross connections or prevent any further potential cross connections. Many of us, our public officials included, think with a mind set that the place to start and intensify our protection efforts is with the buildings most commonly thought to create the highest hazard or potential for hazard, the hospitals, the manufacturing plants, mortuaries, chemical plants, etc., In fact, nothing could be farther from the truth.

The most dangerous building connected to the public water system is your house, my house, your neighbor's house or any house in any neighborhood. The vast majority of industrial and commercial buildings are built and maintained within the guidelines of our codes. The maintenance personnel and tradesmen are generally trained and knowledgeable. Now, on the other hand, let's look at the private home. Once the house is built and the final inspections complete, the mad scientist, the home owner takes control.

It is the homeowner who installs the multiple splitter heads on the outside hose bibb and adds the chemical feeder to one, a soaker hose to another and fills the swimming pool with another. When the toilet continues to run, it is the homeowner who goes to the local hardware and purchases the cheapest ballcock on the shelf because the sales person tells him the only difference is the price. It is the homeowner who puts the short piece of hose on the

laundry tub faucet and leaves it lying in the tub full of soapy water. It is the homeowner who installs his own irrigation without benefit of the backflow preventer. It is the homeowner who installs the water powered backup siphon pump in the storm sump in the basement. Are you beginning to see an ugly picture here?

Cross connection control is every person's responsibility. This is not to say that the trained professional is without blame or should be looked on as our guardian angel. After all it is this same trained professional who attends the different code adoption hearings and often times votes to approve a change that saves money not lives. It is this same trained professional who votes to allow foreign standards to be listed in our codes as equals to our ASSE standards, thereby allowing the installation of items and equipment into our plumbing systems that, although they are less expensive to manufacture or to get standard approval, they do not afford the same protection for the user.

I haven't missed anyone's toes; I've stepped on everybody's. I realize that with this article being printed in *Plumbing Standards Magazine* I am, in many ways, preaching to the choir. I do hope though that this article causes you to think about backflow prevention and cross connection control as a little more of a personal problem. If you take it personally you may be more inclined to notice more potential or unprotected cross connections and become more proactive in their prevention or protection.

By the way, who caught the misstatement several paragraphs back? We all know- don't we- that unlike an RPBP, PVB or SVB, a DCV (Double Check Valve Assembly) cannot be used to protect against a high hazard as it has no outwardly visible indication of failure. That is strange, why do some jurisdictions allow them on outside irrigation systems? Darn, I thought Cross Connection Control was easy. L