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BACKFLOW PREVENTERS, CHAPTER 1, SELECTION

The term backflow preventer is very general and may mean a number of different things to different people. For instance, in the fire industry, an alarm check valve or a single swing check valve may be considered a backflow preventer. To a certified backflow tester, a backflow preventer assembly (BPA) is a minimum of a double check valve assembly with test ports and shut off valves on either end. For certain plumbing requirements, a backflow preventer may mean no valve at all but an air gap between the outlet of a flow to a basin or other pool below. This article will be referring to various forms of a double check valve assembly when discussing BPAs. The subject of backflow preventers may seem a little dry, all puns intended, and a very technically oriented one. This is not all together true. BPAs do have a definite political side that makes the subject very interesting, so don't be too surprised when, on occasion, I slip into the political aspects of backflow preventers.

BPA's are supposed to prevent a reverse flow in a pipe system, speaking as an apolitical engineer. However, some folks think that BPA's are more like a gold mine with no real purpose other than creating wealth where there may not have been any previously. This gold mine may be shrouded in mother and apple pie references to protection of liability and public health scare stories. Oops, looks like we dropped into the politics momentarily.

Specifying the correct BPA requires the specifier to understand the purpose that the BPA must fulfill. This includes an understanding of the hazard associated with the potential backflow that is to be avoided. Make this determination first and then see what the local minimum requirements are. These requirements may be found in such locations as the plumbing code, fire code, local ordinances or State legislation. Doing so brings you back to the basics of the purpose of the device and a fresh perspective for each project. On occasion, you will find that you actually want to use a device that provides a higher level of protection than what is either recommended or required by the local authority(s) having jurisdiction (AHJ). When this occurs, by all means use the device you have selected, remembering that code requirements are the minimum acceptable, not what may actually be needed under special circumstances. The opposite may also occur. You may determine that a certain level of protection is adequate and the AHJ or some guide may attempt to dictate a greater level of protection. Now what do you do? My inclination is to determine the basis on which the AHJ is demanding excessive protection. Is it an ordinance or just a "do it or else" policy? Is it a guide written by a host of backflow advocates or is it a well documented publication? I do not recommend knuckling under to

AHJ pressure on items that cost the owner additional money at the beginning and have continuing higher costs for maintenance and inspection fees later. Of course there are points at which it becomes difficult to pursue this policy. It depends upon the activism quotient of you and your client and how gross the excessive requirements may be. Requirements to install double check valve or reduced pressure backflow prevention assemblies on Class 1 and 2 fire sprinkler assemblies are perfect examples of totally unreasonable requirements that serve no purpose other than the gold mine aspect referenced above.

Once the type of valve is selected for the purpose at hand, it may be necessary to create a specification for the device or you may be in a position to just select it by make and model. Consider these points when making the make and model selection or when describing it in a specification.

- Will the device "see a lot of action" as in a vacuum breaker on an irrigation system or will it sit idle for months if not years, rarely moving at all as in a fire sprinkler system? What difference does it make? It can make a very big difference, especially for the idle system with water containing a fair amount of minerals. Certain valve designs incorporate guides for the clapper assembly. These guides may become covered with slime and mineral deposits when the valve does not operate to its fullest extent very frequently. "So", you say, the valve will just push them off when sufficient demand occurs – No that is not what happens. On occasion, as I have been privileged to observe, the valve may become jammed in either the closed or partially closed position as the clapper attempts to slide on the guide mechanism. This spells serious trouble for life safety systems down stream such as fire sprinkler systems. This jamming condition is not detected by the standard annual backflow certification test. The standard test does not test for full flow; it only tests for sealing against backflow.
- Where is the valve to be located, outside and possibly in the direct sun? In the southwest, this may lead to very high water/valve temperatures for stagnant systems in the summer. Check to be certain that the valve you select will withstand this punishment. Some don't do well in this environment.
- What size is required? If you specify the size based only on the size of the pipe leading to and from the BPA, you may well be spending more of the client's money than necessary. BPA's are very short when compared to the overall length of the rest of a typical piping system which means that the pressure loss across the BPA due to the pipe size is minimal. The pressure drop of concern is due to the type of valve assembly and how frugal the manufacturer has been with the pressure in the design of the system. Selecting a size that is one or possibly even two sizes less than the connecting pipe may work very well. See the pressure drop curves provided by the manufacturer for the devices that you are considering. If

you can read them and have faith that they are accurate, consider using a smaller diameter device. You will save space and money. There are velocity limitations that you will also need to consider with each device. Do not exceed these flow limitations as the pressure drop may increase dramatically thus affecting pressure sensitive systems such as fire sprinkler systems. The flow limitations may not be clearly defined in the literature.

- Cost is an important factor to consider in the selection but not just the initial cost of the assembly. The cost of repair and replacement parts such as seals, seats and springs may be very significant. A set of seals and springs for some devices may be several hundreds of dollars. A dip into the gold mine, again. BPAs fail certification tests. Some makes and models seem to fail more frequently than others. It could be built in obsolescence or poor design for the conditions under which the devices are expected to perform. In any case, the cost of parts for some models is much higher than for others. Check with a local testing company and find out what models fail more frequently in the project area and what the costs of replacement parts tend to be. You may find the difference in costs surprisingly large.
- The last item in selection is a decision as to what third party approving agency you want to reference in the specification. I admit to a bias in this regard, using an ANSI approved consensus based standard such as those promulgated by ASSE is much preferred over information from a University based backflow support organization.

With the device purpose determined, the actual need set forth, the type designated, size selected and all mitigating factors resolved; then a full description of the carefully selected BPA may be set out. Depending upon how the politics affected the process, the design will be one that you may be sure will provide suitable service at a reasonable cost for your client or the whole process has soured your faith in mankind so badly that you may not ever want to see a BPA again.

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