Proper Installation AVB/PVB/SVB

Irrigation can introduce several different dangers into the potable water system therefore, it is important to protect the public against any health hazard from these systems.

Backflow prevention assemblies like the pressure vacuum breaker and its corresponding spill-resistant vacuum breaker along with the atmospheric vacuum breaker can all be used.
It is important to note that though all three assemblies are similar, proper installation differs. The proper use of pressure vacuum breakers (PVB & SVB) and atmospheric vacuum breakers (AVB) require that they be installed above all downstream piping and outlets. This is to eliminate the potential of backpressure. If the downstream piping or outlets are above the vacuum breaker then the resulting backpressure may flow back (backflow) through the vacuum breaker. As shown in figure 1, the air inlet valve of an AVB will remain closed should backpressure be imposed on the unit. This happens because the air inlet valve cannot distinguish between pressure in the normal direction of flow or backpressure. Any pressure on the air inlet valve float will keep it closed tightly against the air inlet seat. If this assembly is subject to backpressure, the air inlet will remain closed, and then it simply operates as a pipe fitting with no potential to prevent backflow. The scenario is the same with the pressure vacuum breaker should the check valve leak.

The elevation requirement has been confusing to some people since the AVB must be installed six (6) inches above the downstream piping and outlets, while the requirement for the PVB and SVB is twelve (12) inches.

Many people ask why there is a difference. To explain the basis for this difference, a review of some of the laboratory tests conducted on an AVB, PVB and SVB is needed.

In the Foundation's *Manual of Cross-Connection Control*, *Ninth Edition*, Section 10.2.5.3.5 the AVB must undergo a test which entails fouling the check seat with a specifically sized wire, then applying various vacuum conditions to the inlet of the unit. On the outlet of the AVB is a clear tube, which extends down into a vessel of water. See Figure 2. When the various vacuum levels are applied, the water in the clear tube is permitted to rise no more than a maximum of three (3) inches. Should it rise more than three inches, this is cause for rejection. The establishment of the three-inch level was experimentally derived many years ago as a practical level of performance.

To provide a safety margin for actual field use, this level was then doubled to six (6) inches. This is the elevation requirement now stated in most codes and regulations for the atmospheric vacuum breaker.

The PVB (including the SVB) differs from the AVB in that the PVB or SVB can be used under continuous pressure. The AVB is only designed for non-continuous use (during twelve out of any twenty four hours). Due to the PVB and SVB being under continuous pressure, the safety factor was increased, requiring the field installation height of twelve (12) inches above all downstream piping and outlets. The PVB and SVB must undergo the same suction-rise test as noted above for the AVB.

In considering the six-inch and twelve-inch elevations, it is also important to know from where the measurements are taken. The critical level (i.e., -CL- or C-L) of a vacuum breaker may be shown on the outside of the assembly. The critical level normally is at the level of the check

valve seat inside the assembly. If the critical level is not marked on the unit, then it is recommended that the bottom of the assembly be used as the reference point. This will ensure that the minimum elevation requirements are maintained. It is also important to note that the elevation requirement is above all downstream piping and outlets.

In some older codes wording was used requiring the atmospheric vacuum breaker to be installed above a suitable number of sprinkler heads. The rational was that the water from the higher sprinkler heads would drain out through the lower heads, however, during this draining process the AVB is under backpressure. Current codes use the wording “above all downstream piping and outlets,” or wording to the same effect. This is critical because of the backpressure, which can build up due to the elevation of piping downstream of the assembly. ■

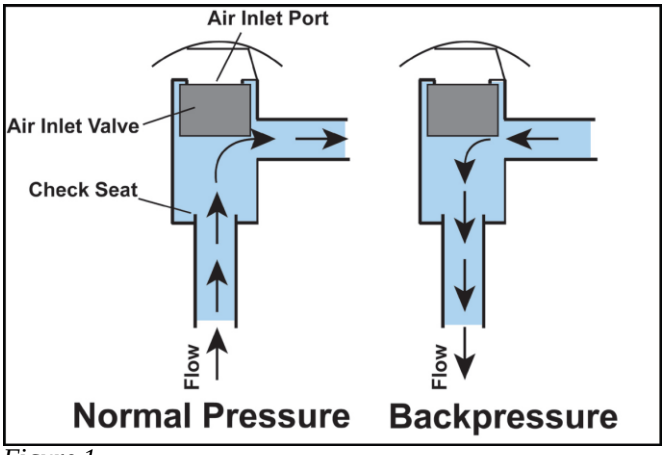

Figure 1

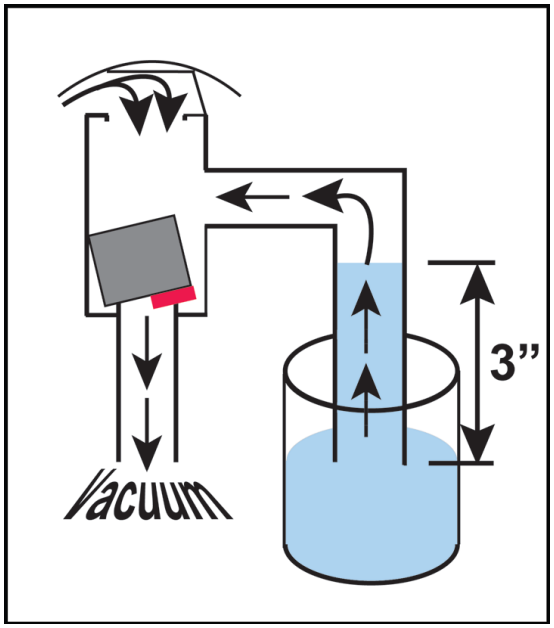

Figure 2

http://www.usc.edu/dept/fccchr/Crosstalks/Spring.2006.pdf