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Home sprinkler systems: backflow prevention devices

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Quick Facts

- Backflow prevention devices must be installed on all sprinkler systems (including sprinklers attached by means of hoses) using potable (drinking) water.
- Backflow prevention devices are designed to prevent contamination of the potable water system from pesticides, feces and other hazardous materials.
- Hose connection backflow prevention devices may provide protection for the system when insecticides, other pesticides and fertilizers are applied by means of a hose-end spray attachment.
- Atmospheric vacuum breakers (AVB's) must be installed on each zone *downstream* of a shutoff valve.
- Permits are usually required by building departments prior to installation of sprinkler systems requiring backflow preventers.

Backflow prevention devices protect the drinking water system from contamination due to backflow of non-potable (contaminated) water into the potable (drinking) water supply. Backflow is of two types, back-siphonage and back-pressure.

Any drop in pressure in the main city water line can result in back-siphonage backflow of fertilizers, pesticides, manures and other contaminants through sprinkler heads and the irrigation piping system into the potable water supply. This same contamination may occur through a hose-attached sprinkler, spray nozzle or pesticide sprayer. This presents a serious threat to public health. This drop in pressure can result from a break in the line, or by lowered mainline pressure due to high water withdrawal, as may occur during fire fighting operations.

The improper installation of a lawn sprinkler pump or injector system also may force contaminates back into the potable water supply. In this case, the pressure exerted by the pump is greater than the pressure in the potable water system. This is known as back-pressure backflow.

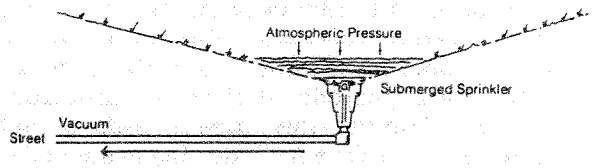

Figure 1: Back-siphonage backflow.

If properly installed, an approved backflow prevention device will prevent back-siphonage and/or back-pressure backflow. Not all preventers are designed to handle both types of backflow.

Backflow prevention devices are designed for installation on sprinkler systems connected to potable (drinking) water supplies only. Sprinkler systems connected to irrigation water (ditch systems) do not require backflow protection.

An approved device has passed tests conducted by the Foundation of Cross Connection Control. The device selected must be the proper device for the degree of hazard. These devices must be tested upon installation and at least annually to insure continued backflow prevention. Testing should be done by a certified tester.

Permits normally are required for systems that require backflow preventers prior to the installation of a sprinkler system. The installation design, to include the type and placement of backflow prevention devices will be verified during the permit review process. Permits are available from city/county building departments.

Types of Prevention Devices

A mechanical backflow prevention device is a device that allows water to flow in only one direction. Of the three different types, vacuum breakers, double check valve assemblies (DCVs) and the reduced pressure principle device (RPDs), the first is most commonly used in residential sprinkler systems. DCVs and RPDs are designed for use under more hazardous back-pressure situations. Further information on DCVs and RPDs is available from irrigation and plumbing specialists.

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Vacuum breaker devices are effective only against back-siphonage. These mechanical backflow preventers are not to be used when backpressure problems may exist.

Vacuum breaker devices for the home sprinkler system are of two types, atmospheric and pressure. These are to be installed in an accessible location at least 6 inches above the highest sprinkler head preventing the vacuum breaker from backpressure or drainage.

The atmospheric vacuum breaker (AVB) is gravity operated and must be installed in a vertical position. The disc float assembly tends to stick in the closed position if under continuous water pressure for long periods of time. It, therefore, must be installed on the downstream side of each sprinkler zone valve. One AVB device is needed in each zone.

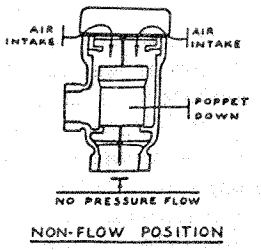

Figure 2: Atmospheric vacuum breaker.

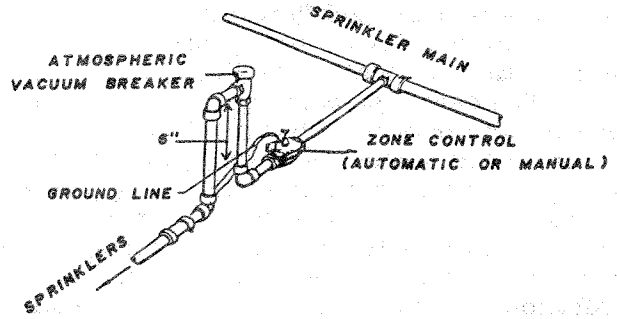

Figure 3: AVB installation diagram.

Combination AVB and sprinkler valves are available. In these units, a single-valve body combines both a control valve and an atmospheric vacuum breaker. When used, these combination devices must be installed in a vertical position on each zone, with the AVB side downstream of the control side of the unit. These units must be installed as shown in Figure 3.

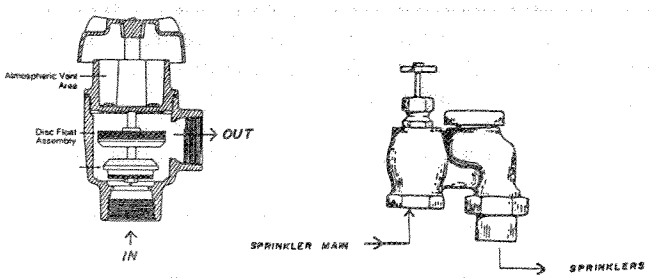

Figure 4: Combination units (two types).

The pressure vacuum breaker (PVB) is designed to open after long periods of continuous water pressure. This type of device may be installed under a constant pressure upstream of all control valves. As with the AVB, this device must be installed in a vertical position.

While more expensive than the AVB or combination device, only one PVB is needed for an entire sprinkler system. The PVB is equipped with test cocks and should be tested yearly by a qualified individual.

Sprinklers, spray nozzles and other attachments to hoses connected to the potable water supply (Figure 5) may be protected by the use of an approved **hose connection vacuum breaker.** These devices are designed for hose threaded outlets (sill cocks, hose bibs).

Backflow prevention is critical when using a hose-end sprayer connected to the potable water supply. Backflow can easily suck an insecticide or other chemical back into the domestic water system. A hose connection vacuum breaker should be used as minimum protection when fertilizers, insecticides or pesticides are applied by means of a hose-end sprayer.

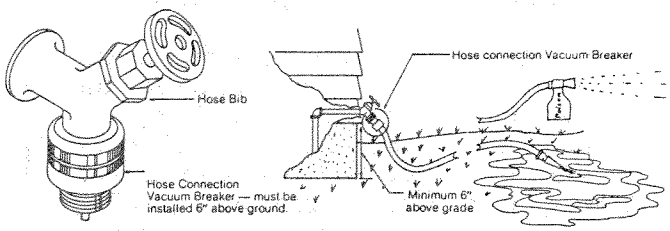

Figure 5: Hose connection vacuum breaker.

Additional Notes

Backflow prevention devices are designed with the degree of health hazard in mind. A lawn sprinkler system using potable water can use a AVB or PVB unless a higher degree of hazard exists. The injection of fertilizers, insecticides or other contaminants through the irrigation system is a higher degree of hazard and requires the use of a device such as the reduced pressure principle backflow assembly to ensure safety.

Whenever there is a connection with potable and ditch water or any other water supply (e.g. private well) it is mandatory that a reduced pressure principle device (RPD) is installed to prevent contamination of the potable supply.

Information regarding other hazardous cross connections and the backflow prevention device needed is available from city/county building offices and county health departments.

Winterizing Systems

Backflow prevention devices will be damaged by freezing during the winter unless blown out by compressed air. This is best accomplished while blowing out the total system prior to winter. Hose connection vacuum breakers are best removed, drained and stored for the winter.

The use of automatic drains and/or opening a valve at the lowest point of the system may not be sufficient to drain all the water out of backflow preventers. Compressed air is recommended for freeze prevention.