The Word: Backflow Prevention

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Once again, The Word invites you to travel into the dark realm of terms that often are misused or misunderstood in home inspection reports. The Word hopes you will find this trip informative and maybe a little entertaining.

The Word's term today is backflow prevention. The Word finds this term interesting because people are endlessly creative about connecting their drinking water to contaminant sources and because many of these connections appear normal, until you think about them.

Backflow and cross-connection defined

An important part of the design and use of a home's plumbing system is protecting the drinking water from contamination. Contamination can occur when drinking water is connected to a contaminant source. A cross-connection occurs when drinking water and a contaminant source are connected so that the drinking water could be contaminated. Backflow occurs when contaminants flow from the contaminant source to the water supply. Cross-connections are not always bad, and, in some cases, are necessary. It's backflow that's bad. Backflow prevention is required by plumbing codes.

Examples of necessary cross-connections include: toilet fill valves, swimming pool fill valves, and connections to lawn irrigation systems. Examples of unintended cross-connections include a garden hose connected to a chemical sprayer and a hand-held sprayer connected to a long hose. In all of these examples, contaminated material could backflow into the water supply. If the contaminant were poison or harmful bacteria, the result could be illness or death for those drinking the contaminated water.

Backflow occurs by backpressure or by siphoning. Backpressure occurs when the pressure at the contaminant source exceeds the pressure in the water supply. An example is when the contaminant source is at a higher elevation than the water supply or when the contaminant source is connected to a pump. Contaminated material may flow into the water supply if water supply pressure falls below the pressure of the contaminant source. Siphoning occurs when pressure in the water supply falls below atmospheric pressure. Contaminated material can be drawn by suction into the water supply.

Cross-connection example

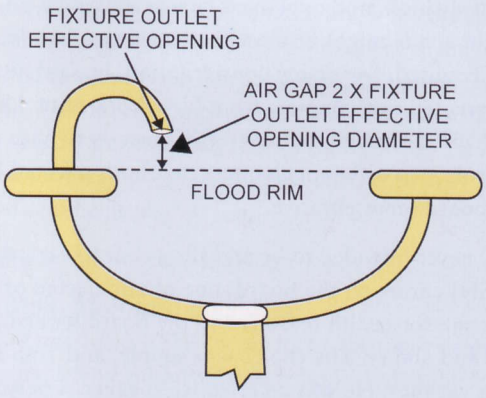
A common problem with water softener installations in Phoenix illustrates how a cross-connection easily can be overlooked. When water softeners recharge, they often discharge the waste water through a ¾-inch diameter tube that is supposed to empty through a 1-½-inch air gap into a receptor such as a sink, a floor drain or a standpipe. In Phoenix, some installers drill a hole through the garage wall, run the tube through the wall, and terminate it into the ground. From there, who knows where it goes, but wherever it goes, there is an unprotected cross-connection.

Likely termination points include a dry well, a French Drain or a tap into the building sewer pipe. These termination points are sources of contaminants. Contaminants could backflow into the drinking water supply if contaminated water were to fill the termination point at the same time as a loss of water pressure or a malfunction of the water softener created suction in the discharge tube. You should call for evaluation when a water softener discharge tube does not discharge into a waste receptor through an air gap.

Air gaps

Backflow prevention occurs in two ways. The simple way is physical separation, an air gap, between drinking water and potential contaminants. The other way is a mechanical backflow prevention device. An air gap is appropriate, where physically possible, in almost all cross-connections. Different types of backflow prevention devices exist and each has its use depending on the contamination risk.

The physical separation distance of an air gap between the water supply fixture and the waste receptor usually is twice



Air Gap Measurement

the effective opening size of the fixture. So, if a sink faucet effective opening (measured at the inside of the opening without any aerator attached) is ½ inch, the air gap distance between the fixture opening the flood rim of the receptor should be at least one inch.

The air gap is why sink faucets and tub spouts are shaped and located where we usually see them. But what if someone installs a device that changes the air gap distance, such as a hand-held sprayer with a long hose? A cross-connection occurs if the sprayer is left hanging in a tub, shower pan or laundry sink. Backflow could occur if the receptor were full and a loss of water pressure occurs. During your inspection, look for any device or hose that could reach a waste receptor and which does not have an attached valve or an integrated backflow prevention device. If a device could connect a water supply fixture to a waste receptor, it could be an unprotected cross-connection.

Backflow prevention devices

Backflow prevention devices may be integrated into other devices or may be installed as a separate device. Some, but not all, devices with integrated backflow prevention devices are labeled as such. It's sometimes difficult to tell if a device has integrated backflow prevention, so The Word prefers to err on the side of caution and recommends evaluation when uncertain. Look for backflow prevention on hose and landscape irrigation connections and on swimming pool, spa and water feature fill systems. You also should find backflow prevention on the water supply connection to boilers and on evaporative coolers.

Toilet fill valves, including any attached hoses, usually should have the fill opening at least one inch above the overflow tube. Fill valves with all parts below the water line may be an unprotected cross-connection.

Most hose connections should have built-in backflow prevention or a hose connection vacuum breaker at the hose connection. The water heater drain connection is exempt, as are clothes washing machine connections, because the machine should have an integrated backflow prevention device. A laundry sink faucet with a threaded connection is usually exempt, but interpretation varies and some jurisdictions may require a vacuum breaker.

Annual testing of backflow prevention devices is usually recommended by manufacturers and is required by code, but it is out of the scope of a home inspection. Leaks at test ports and unusual staining around the device may indicate a malfunction that needs attention.

The bottom line

Backflow requires an unusual sequence of events to occur in the right order, so it occurs very infrequently. Low probability is not a good reason to ignore backflow prevention. If it occurs, people could get sick or die. Best case, costly cleaning of the affected water supply pipes may be required.

Memo to the plumbing Gods and other authorities: The Word does not reside on Mt. Olympus (just at its base) and welcomes other viewpoints. Send your lightning bolts or e-mails to inspectorbruce@cox.net. The thoughts contained herein are those of The Word. They are not ASHI standards or policies. ■

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