

Vents & Traps

By **BRUCE BARKER, ACT**

ONCE AGAIN, The Word invites you to travel into the dark realm of subjects that are sometimes misunderstood by home inspectors. The Word hopes you will find this trip informative and maybe a little entertaining.

The Word's subject this month is plumbing vents and traps. The Word finds this subject interesting because these components often don't get the full attention they deserve as protectors of our clients' health and safety.

Remember, when reading all The Word columns, that we're discussing general principles. Something you see in the field isn't always wrong just because it doesn't comply with a general principle. Local building codes, manufacturers' instructions and engineered designs trump general principles.

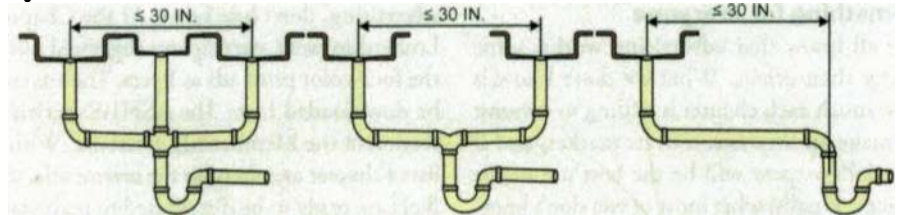
Why traps?

Traps keep sewer gas out of the home. So, what's the big deal about an occasional obnoxious odor? Well, sewers contain all sorts of nasty organisms that make people sick, and a dry trap provides a path for these organisms into the home. This is a health hazard. Sewers also contain methane, the same stuff that flows through the gas meter. Try sticking your combustible gas detector into a sewer pipe; your detector might go off. While unlikely, sewer gas can explode and cause a fire. This is a safety hazard. So, traps are a good thing and protecting them is important. That's where vents come in.

Why vents?

When stuff flows through the drainpipes, the air pressure in the pipes increases in front of the stuff and decreases behind the stuff. The air pressure increase can blow sewer gas through the trap's water seal and even force water out

Figure 1



One Trap Serving Multiple Drain Fixture Outlets

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of the trap. The air pressure decrease can suck the water seal from the trap. Both can happen in homes if the venting system isn't properly installed. Vents admit air into the pipes that helps equalize the air pressure in the pipes to prevent blowback and siphoning of the water seal in the trap.

The trap

All fixtures need one, and only one, trap that is set level. Fixtures with an internal trap, like a toilet, do not need and should not have a separate trap. One trap provides the water seal to keep out sewer gas. Two or more traps impede flow and are more likely to become clogged.

Between the fixture and the trap is the tailpiece. This pipe should be smooth-walled material that is compatible with the trap material. The flexible, ribbed material available at big-box retailers isn't allowed because the ribs hold unsanitary materials, and this material is prone to clogging. The vertical distance between the fixture and the trap should be less than 24 inches. This helps prevent stuff from building enough force to blow out the trap's water seal.

A trap may serve more than one sink, but only if the sinks are less than 30-inches-on-center apart. The horizontal distance between the fixture outlet and the trap inlet also is limited to 30 inches. These limits also help avoid *trap seal blowout*. Figure 1 demonstrates this rule. These distances sometimes are exceeded in bathroom remodels when one sink is replaced with two sinks.

Trap size

The trap serving most sinks and separately-trapped dishwashers should be at least 1½ inches diameter. Bathroom (lavatory) sinks should be at least 1¼ inches diameter. Clothes washing machine standpipes should be at least 2 inches diameter. Bathtub and most shower traps should be at least 1½ inches diameter. This is a recent change for shower traps, which used to be at least 2 inches diameter. Shower traps may need to be up to 4 inches diameter depending on the flow-through multiple shower heads and body sprays. Most of us rarely, if ever, will see this type of shower, so the 1½ inch diameter trap is a good number almost all the time.

Prohibited traps

Several trap configurations that once were allowed no longer are allowed. You may see these traps in older homes. Drum traps were used for bathtubs. You still can get them. The problem with these traps is that they are prone to clogging, and they are less sanitary than the modern P trap. Bell traps were used for floor drains. They also are prone to clogging and are less sanitary. These traps are a reportable deficiency in newer homes. In older homes, The Word just advises clients that these traps are prone to problems and should be replaced if and when it's convenient.

Then there's the S trap. (Cue Darth Vader's theme.) You'd think from all the negative talk about these traps that they are some evil product from the dark side of the force. S traps are used in other parts of the world and there's nothing wrong with an S trap if it is properly installed and vented. Note the caveat. S traps often are not properly vented. The problem with the S trap is its sensitivity to proper installation and venting compared to the P trap; thus, it is more prone to losing its seal. Like drum and bell traps, S traps are a deficiency in newer homes, but can continue to serve in older homes. You might want to make your clients aware of the potential problems. *Figure 2 shows the drum, bell and S traps.*

The fixture arm

The fixture arm (also known as the trap arm) is the pipe that connects the fixture trap to its vent. *Figure 3 demonstrates this.* Most amateur plumbers, and a few professionals it seems, don't realize that the length and slope of the fixture arm is important to avoid siphoning the trap. It makes sense when you think about it. If the fixture arm outlet is below the trap outlet, it's like putting a hose in a gas tank to siphon some of the gas into a can. The trap will be siphoned and lose its seal. *Figure 4 demonstrates this.*

Pipes smaller than 3 inches diameter should slope at least 1/4 inch per foot and ideally not much more. At 1/4 inch per foot, a 1 1/4-inch fixture arm for a bathroom sink will be below the trap outlet after 5 feet. This, coincidentally, is the maximum allowed length for a 1 1/4-inch fixture arm. The maximum length for a 1 1/2-inch fixture arm is 6 feet and a 2-inch fixture may be no longer than 8 feet. Remember, rules may be different in your area.

Vents

Unless you're performing a predrywall inspection, it's unlikely you will be able to inspect most of the vent system. There's no point in going into the details of venting systems, but a quick summary may give you some perspective. There are many ways to configure a vent system to protect multiple traps with one vent pipe. Wet vents protect multiple traps by using one strategically placed vent near the beginning of the vent system and by using an oversized drain/vent pipe to let stuff flow while providing enough air to protect the traps.

Figure 5 shows a horizontal wet vent.

Branch vents are dry vents that connect two or more individual or common vents above the flood-rim level of the highest fixture served and let one vent pipe serve several traps. These are some of the most common vent systems protecting multiple traps.

Air admittance valves are an alternative to extending multiple vents outdoors. Air admittance valves can be used to protect one trap. They also come in types for protecting multiple fixtures. You should see the listing ANSI/ASSE 1051 on single fixture and branch AAV or ANSI/ASSE 1050 on stack AAV. If you don't see this listing information, call for evaluation by a licensed plumbing contractor. You may be looking at a check vent.

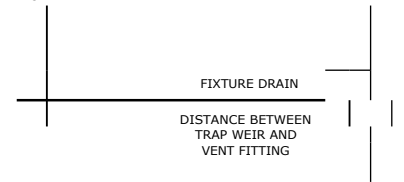
Figure 2

S TRAP DRUM TRAP BELL TRAP

Prohibited Traps

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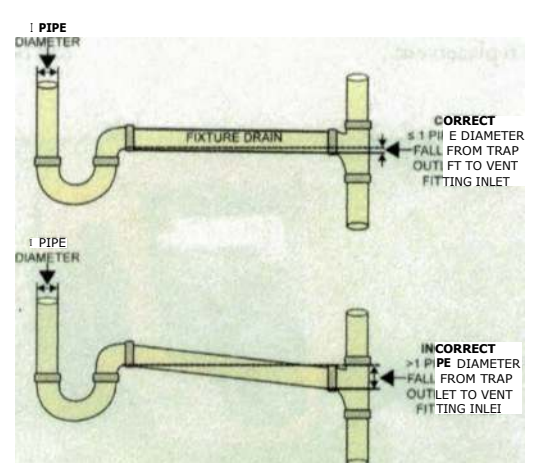
Figure 3



Plumbing Vent Distance from Trap

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Figure 4



Fixture Drain Slope

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Figure 5

HORIZONTAL WET VENT
BEGINS AT INDIVIDUAL
OR COMMON VENT

FIXTURES CONNECTING
VERTICALLY NEED
SEPARATE VENT

FITTING
INSTALLED
HORIZONTALLY

WET VENTED
PIPE —

ALL WET VENTED FIXTURES CONNECT
HORIZONTALLY TO WET VENTED PIPE

WET VENT ENDS AT
LAST WET VENTED
BATHROOM GROUP FIXTURE

Horizontal Wet Vent

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Beware of a device that looks like an air-admittance valve but really is a check vent (also known as a cheater vent). Check vents are approved for use only in manufactured homes and recreational vehicles. You should not see them in site-built homes. They usually don't last as long as air-admittance valves and are more prone to failure. Look at the label on the device.

Air-admittance valves should be installed at least 4 inches above the fixture arm and should be installed within at least 15° of vertical. An air-admittance valve installed too close to the fixture arm might be damaged or leak if the fixture arm backs up. An air-admittance valve that isn't level might not open and close properly. Air-admittance valves should be installed at least 6 inches above the flood rim level of the highest fixture served and at least 6 inches above insulation in attics. Air-admittance valves should be accessible for replacement.

Air-admittance valves are great for situations where extending a vent outdoors is impractical or undesirable, but they have some use restrictions. They are not allowed in some jurisdictions. They should not be used to vent any sump or sewage ejector. They should not be located outdoors. At least one vent in every home must terminate outdoors.

The bottom line

Sewer gas needs to be kept in the sewer for health and safety reasons. But don't assume that a foul smell is evidence of a problem. Frequently, it's nothing more than a trap where the water seal has evaporated due to lack of use. The Word sees this frequently in foreclosed homes and sometimes in his own home where the shower in the hall bathroom is rarely used. Running water in seldom-used fixtures solves that problem.

Fixing real problems with traps and vents can be simple or it can be difficult and costly.

The Word hopes that you now have a better handle on how to inspect the visible parts of these components.

Memo to Poseidon and the other water gods: The Word does not reside on Mt. Olympus (just at its base) and welcomes other viewpoints. Send your lightning bolts or emails to Bruce@[DreamHomeConsultants.com](mailto:Bruce@DreamHomeConsultants.com). The thoughts contained herein are those of The Word. They are not ASH] standards or policies.

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