Waste System Venting

One of the least understood sections of a waste plumbing system is the venting. For water to drain freely out of a house waste system there must be adequate venting. The venting performs three functions. It allows air in front of the water rushing through the waste pipe to be pushed out of the way, and it also allows air to be reintroduced to the waste piping after the water has gone by.
Lastly, it allows sewer gases to escape outside through a vent stack.

The second function is the most important. The trap at each plumbing fixture provides a water seal which prevents sewer odors from entering the house. After a fixture is used, there should be enough water left in the trap to provide a good seal. If a waste system is not properly vented, when the water runs through the drain line it will siphon the last bit of water out of the trap. As a column of water runs through a pipe, it is difficult to separate that column of water into two pieces (leaving the last part in the trap) because the space in the middle forms a vacuum. The water in the trap is siphoned out and down the drain.

It is important to have a vent connection just downstream of the trap. This allows air into the pipe, preventing a vacuum between the water which runs down the drain pipe and the water which remains in the trap. With the exception of floor drains under some circumstances, all fixtures should be vented.

As a rough rule, any fixture within five feet of the main stack does not need a separate vent. Where fixtures are more than five feet from the main stack and do require a separate vent, the vent must extend above every other fixture in the house. At this point it may join the main stack. It is; therefore, possible for a house to have several bathrooms, and only one vent stack going up through the roof.

Inadequate venting is typified by a siphoning or gurgling noise when water is drained out of a plumbing fixture. A sewer odor at a fixture usually indicates a trap or venting problem. The venting system is almost always concealed from view, except in a few small areas.

Vents should terminate at least 3 feet above and 10 feet (12 feet in Canada) in any other direction from any door or window openings. Vents should extend at least 6 inches above the roof and be at least 12 inches away from a wall.

The vent pipe should extend at least six inches up through the roof of the house. In some cases, the vent terminates in the attic which may allow odors to find their way into the house. Also, in cold weather, this can add very moist warm air into a cold attic, leading to condensation and frost damage of the wooden attic members.

The vent should extend only about twelve inches above the roof line. Vents which are very long may be subject to frost closure in the winter. The warm moist air passes up through the vent, and the air is cooled as it contacts the cold walls of the outdoor section of the vent pipe. The moisture in the air condenses and freezes on the walls of the vent pipe. In a prolonged spell of cold weather, this frost can build up to a point where it closes off the top of the vent. This, of course, negates the effectiveness of the venting system. Vents should be at least three inches in diameter where they penetrate the roof system in order to avoid frost closure.

Vents which extend more than twelve inches above the roof should be watched for frost closure problems. In some cases, the vents can simply be cut shorter. In other cases, where the vent is extended to carry odors up past a window, it may be necessary to use a larger diameter vent. A frost closure problem can usually be solved temporarily by pouring a kettle full of just boiled water down the vent from the top.

Since the venting system only carries air, leakage is usually not a big problem. Deterioration of the piping is also very unusual, although poor connection or poor pipe support is a possibility. The vent piping is usually exposed in the attic, and it is here that it may be vulnerable to mechanical damage.

Wet vents (vents that also serve as drains) can become clogged or deteriorate as a result of the waste flowing through them.

Roof leakage around the vent stack flashing (where the stack penetrates the roof) is often mistaken for plumbing leakage. A vent stack passing through the roof membrane creates an inherently weak spot in the roofing system. If leakage occurs here, the water may run down the outside of the vent stack, and appear near a plumbing fixture in the house. It is possible to look for a long time for intermittent leaks in the waste plumbing system which do not exist. By paying careful attention to when the leak occurs, it may be found that the apparent plumbing leakage occurs only during or after a rain.

When a basement bathroom is added to a home, it is difficult to run a vent pipe up through the house and roof. Often, a vent is run out through the wall and up the outside of the building. This is acceptable although not attractive, and frost closure problems are more likely with this arrangement.

Where an individual fixture has been installed without appropriate venting, it is expensive to break into walls and ceilings to add proper venting. Mechanical devices which simulate conventional venting are available, although not approved by many plumbing authorities. These devices, known as automatic air vents or air admittance valves (AAV), are essentially vacuum valves which allow air to be drawn into the waste plumbing system when negative pressure exists, but prevent any air escaping from the plumbing system under positive pressure. These devices provide a low cost alternative to conventional venting (See Figure 16) for all fixtures except toilets. Again, some plumbing authorities will not allow these. The AAV should be installed higher than the drain in an accessible and ventilated area.