

# Ten Common Plumbing Mistakes

A building inspector reviews the most frequent violations of the plumbing code

BY REDWOOD KARDON

**T**here is a very old joke that claims the plumbers' rule book has just two entries: The first rule is that you-know-what flows downhill; the second rule is don't bite your nails.

The lowly plumber has been the butt of jokes for years, so it's easy to overlook how important a plumber's job is. Call it excrement, night soil, poop or doo-doo if you prefer, but modern civilization would become extremely uncivil if the stuff ever stopped flowing downhill.

The actual rule book that plumbers have to follow is a complicated document known as the plumbing code. The book is so unwieldy, in fact, that veterans and newcomers alike

often stumble over its vagaries and nuances. Soon after I became a building inspector in Oakland, California, I found myself writing the same correction notices day after day and getting the same reactions from recipients: "Is this rule something new?" "But I've been doing it like this for years." "Where does it say that?"

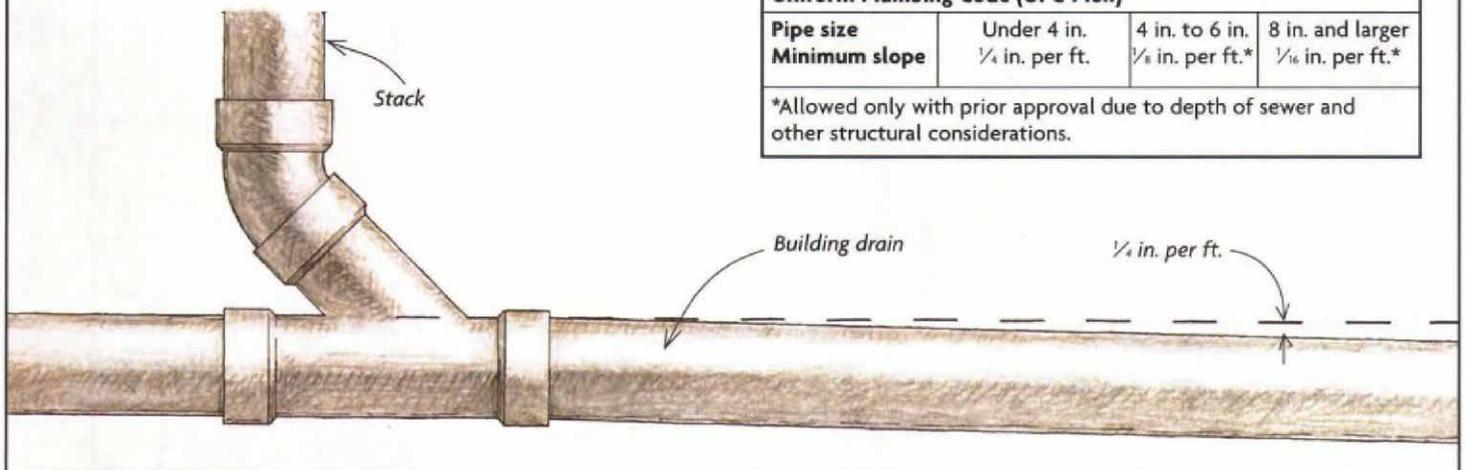
Reciting facts, figures and code numbers from memory is not one of my strong points, so I started making my own crib sheets for these frequent code violations. Eventually, I'd make multiple copies and pass them out to contractors and homeowners before they got themselves into trouble. The following is my top-ten list of plumbing-code violations.

As you read on, please note: Codes vary. Today, there are essentially two plumbing codes, and the one that affects you depends on where you live. The International Plumbing Code (IPC) is a new organization vying with the older, more widely recognized Uniform Plumbing Code (UPC). Check with your local building department to see which code it has adopted and whether any local modifications have been made. **D**

Redwood Kardon was a building inspector in Oakland, California, for 12 years. This article is adapted from his book *Code Check Plumbing* (The Taunton Press, 1999), which he cowrote with Jeff Hatcher, a veteran plumbing inspector for the city of Oakland.

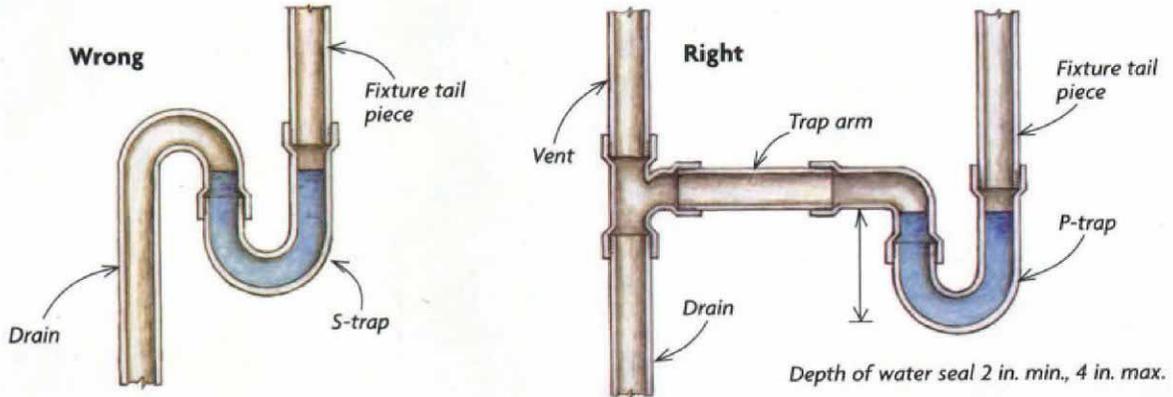
## Common code violation 1: Inadequate drain slope

Although the codes may allow as little as  $\frac{1}{16}$  in. per ft. of slope in some cases, the ideal slope for any drain is  $\frac{1}{4}$  in. per ft. This much slope allows the waste-bearing water to move slowly enough to carry solids along with the flow but swiftly enough to scour the side walls of the drain pipes. Oversloped pipes (greater than  $\frac{1}{2}$  in. per ft.) are as likely to clog as undersloped ones because the liquids move too fast and leave the solids behind.



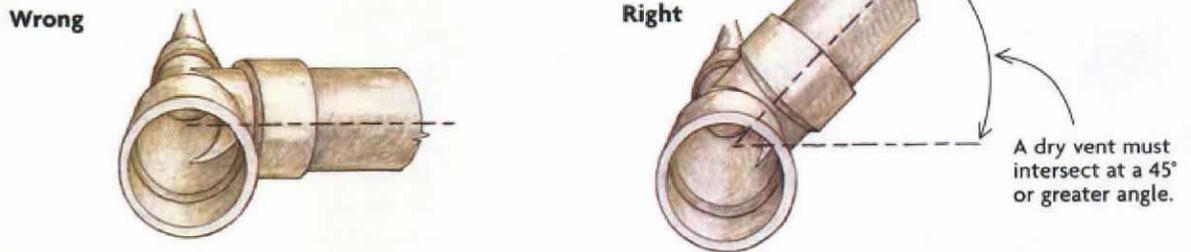
## Violation 2: Unvented traps

Traps and vents are among the most misunderstood concepts in plumbing. The primary function of both is to maintain a sanitary barrier between living spaces and the sewage system. Without a trap to seal off plumbing fixtures, nasty things such as explosive methane gas and vermin can creep into the house. Without proper venting, water in the trap can be siphoned out, leaving the trap dry and useless.



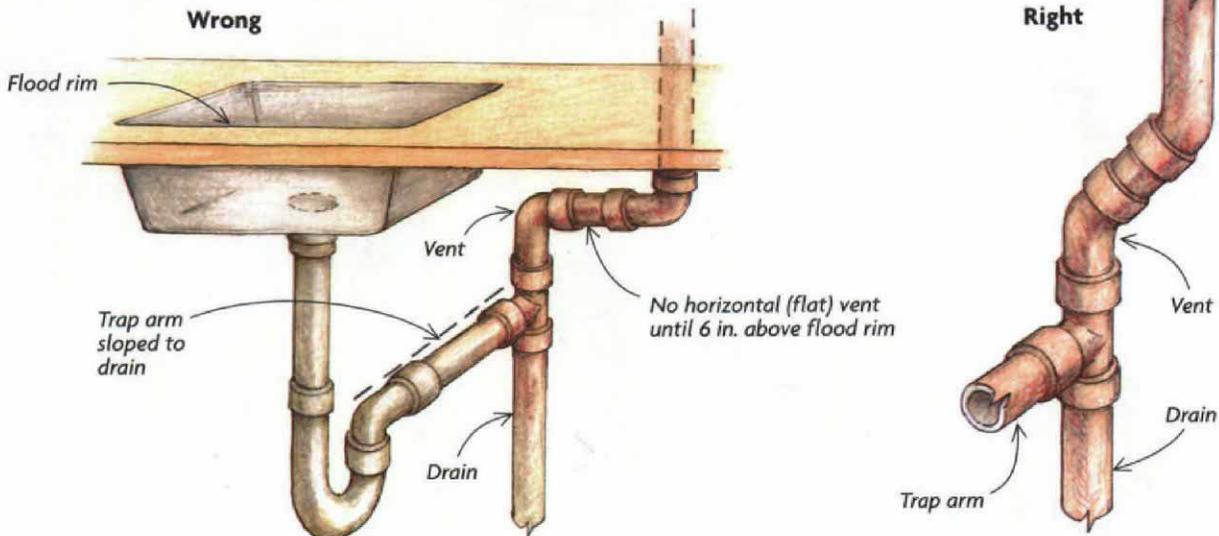
## Violation 3: Flat venting

All the various methods for venting a trap break down into two categories: wet and dry. A wet vent is an oversize drain pipe that also serves as a vent. A dry vent is a pipe whose only function is to provide air to the system. Either type will fail if it fills up, but wet vents are kept clear by wastewater washing downstream. Water that washes into an improperly installed dry vent, however, can become trapped along with whatever sediment it may be carrying.



## Violation 4: Horizontal vent below flood rim

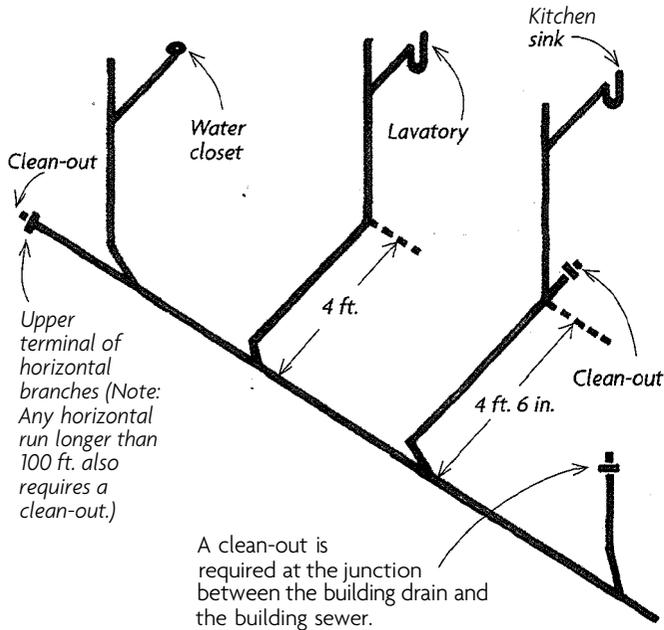
Any portion of a vent that is below the flood rim of a fixture must be able to drain after it becomes flooded by a clogged drain.



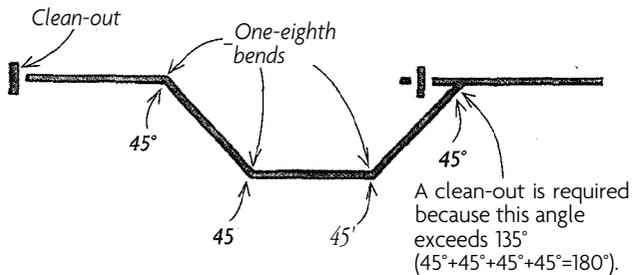
## Violation 5: Inadequate clean-outs

No matter how well designed or carefully installed they are, drains can still become clogged. Access for cleaning them out must be provided in specific locations, which vary depending on which code is in force.

### Where clean-outs are required (UPC 707)



### Clean-outs are required for any horizontal change of direction exceeding 135° (see plan view below)



### Where clean-outs are not required

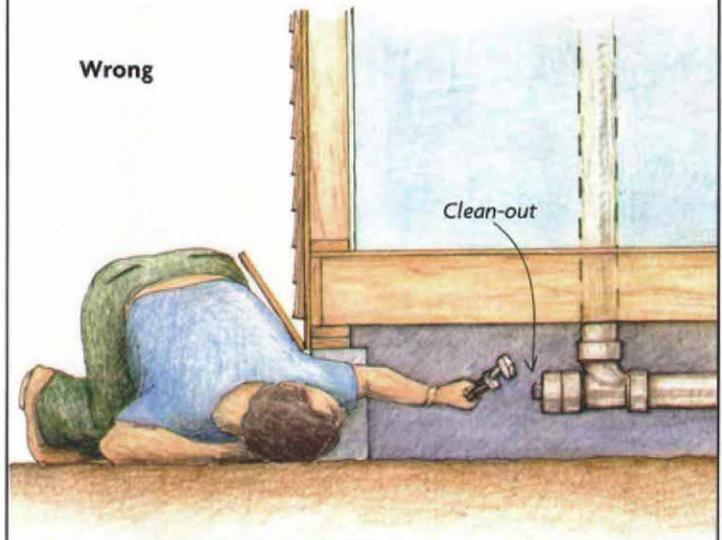
- Above the first floor
- Branches 72° or less from the vertical (one-fifth bend)
- Horizontal branches shorter than 5 ft. long (unless branch serves kitchen sink)

### Where clean-outs are required (IPC 708)

- Horizontal branches not more than 100 ft. apart
- Horizontal change of direction exceeding 45° (if more than one change of direction in a run of pipe, only one clean-out every 40 ft. required)
- At the base of each stack
- Within 10 ft. of connection between building drain and sewer
- P-trap connections with slip joints can be used as clean-outs as long as they are not more than one pipe size smaller than the drain size

## Violation 6: Inaccessible clean-outs

It may sound obvious, but a clean-out that a plumber can't get to isn't much good. Adequate clearance must be maintained to permit service people to access clean-outs and also have room to work.



### Access to clean-outs

Allow 18-in. clearance in front of each clean-out. (UPC allows 12-in. clearance for 2-in. and smaller pipe.)

#### UPC 707

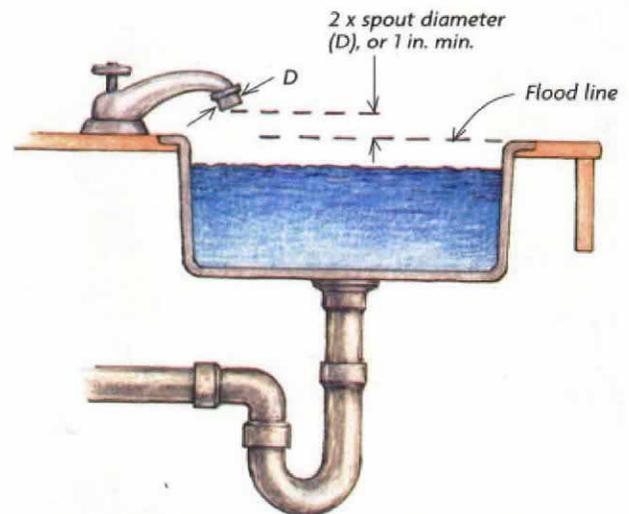
Clean-outs in underfloor piping must have 18-in. vertical and 30-in. horizontal clearance from the means of access. Clean-outs in underfloor piping must not be more than 20 ft. from the access to the underfloor area.

#### IPC 708

Clean-outs in concealed piping, or underfloor piping with less than 24-in. vertical clearance, must be extended above floor or to outside of building.

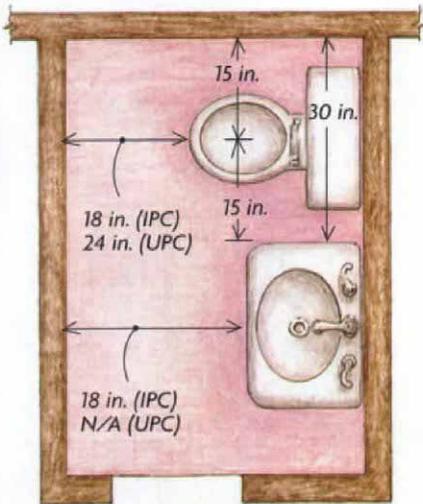
## Violation 7: Inadequate air gaps

To ensure that wastewater cannot be siphoned back into fresh water lines, a minimum air gap must be maintained between water spouts and basin flood lines. This violation can occur when tubs are built on site or when imported fixtures are used with domestic sinks. But the most common violation is a hand sprayer that does not contain a vacuum breaker or automatic antisiphon valve.



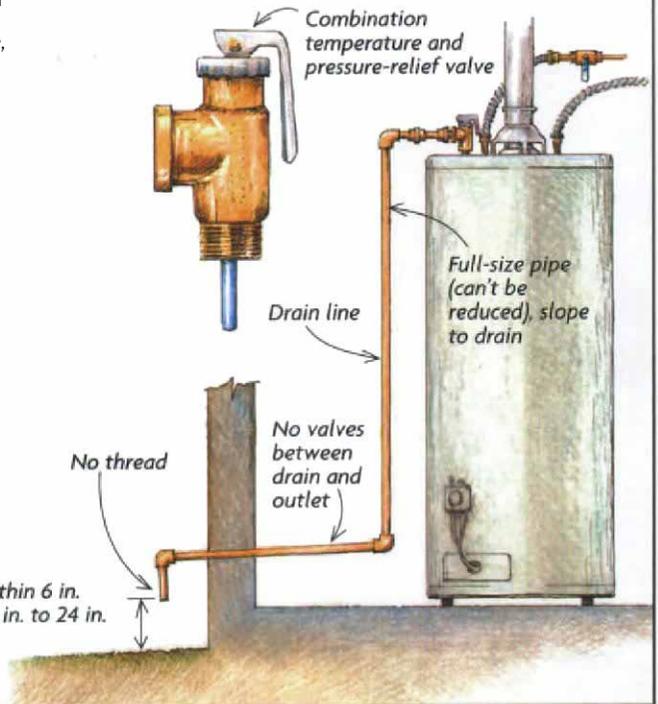
### Violation 8: Inadequate space around toilets and basins

Enough space must be provided so that large people can use toilets and basins without discomfort (clearances listed below are minimums).



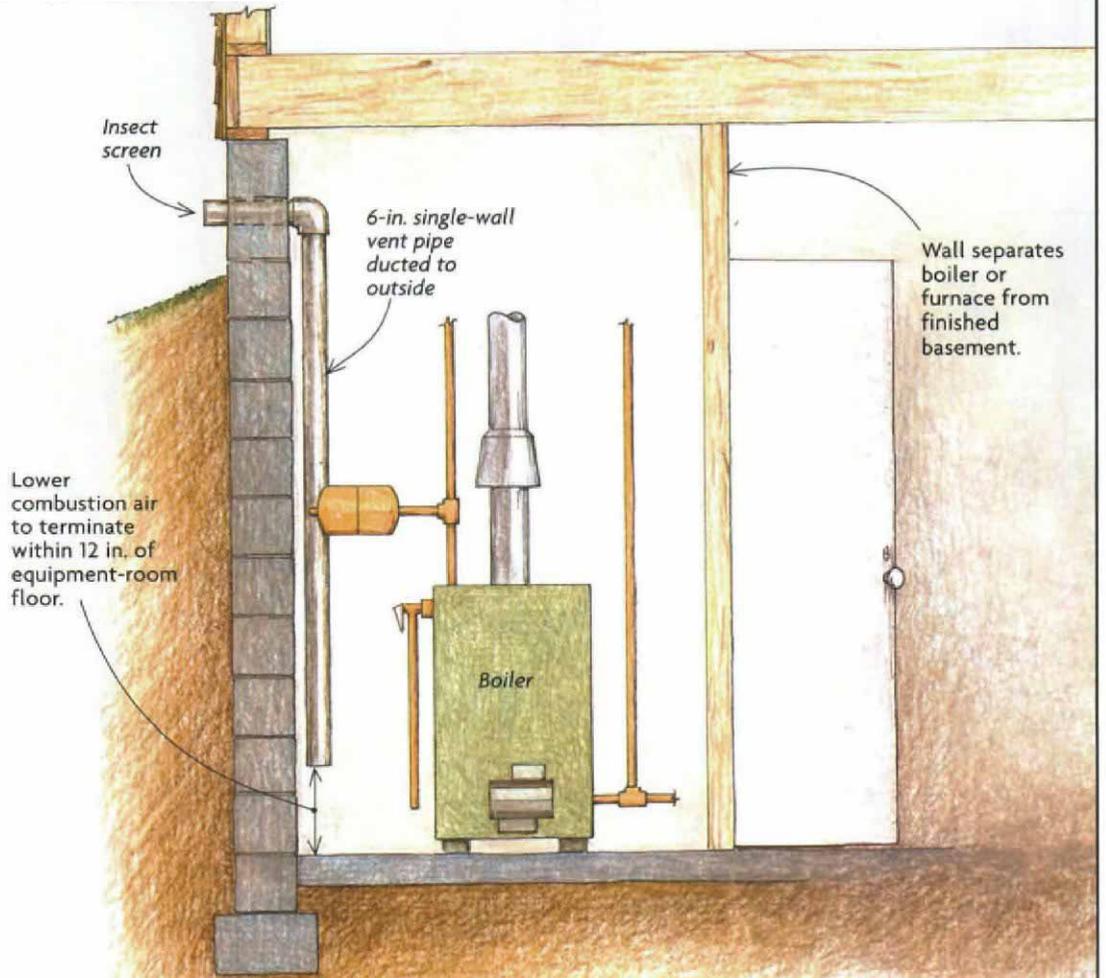
### Violation 9: Pressure and temperature relief of water heaters improperly installed

If it had no protective device, a domestic water heater whose thermostat failed would see a continuous rise in temperature and pressure. When the pressure exceeded the capacity of the tank (300 psi), the tank would burst, expelling superheated water and shrapnel with explosive force. To prevent such catastrophic failures, water heaters are required to be protected against both extreme temperature and extreme pressure. This is most often done with an integral temperature and pressure-relief valve, which is designed to open if either condition becomes dangerously high.



### Violation 10: Inadequate combustion air

Gas-burning and oil-burning appliances require a specific volume of airflow for safe combustion. Restricted airflow can cause incomplete combustion and poor drafting of exhaust gases. When this happens, energy is wasted, the life of the appliance is shortened, and the lives of the house's inhabitants are endangered. I most frequently encounter this violation during a basement remodeling project, when a furnace or water heater has been enclosed in a small mechanical room with no provision for makeup air. Supplying combustion air can be as simple as placing a vent in the wall or as complicated as running multiple fresh-air ducts to each appliance. In this area, it's wise to consult with the appliance manufacturer in addition to the local building officials.



**Erratum: Combustion  
appliances require two  
sources of combustion air**

Ironically, we made a mistake in a drawing for Redwood Kardon's article "Ten Common Plumbing Mistakes" (*FHB* #126, pp. 70-73). The bottom drawing on p. 73 should have included an upper combustion-air source in addition to the lower combustion-air supply shown. According to code, the upper combustion-air source must be located within the top 12 in. of the room, ducted to the outside and protected by an insect-screen cover.