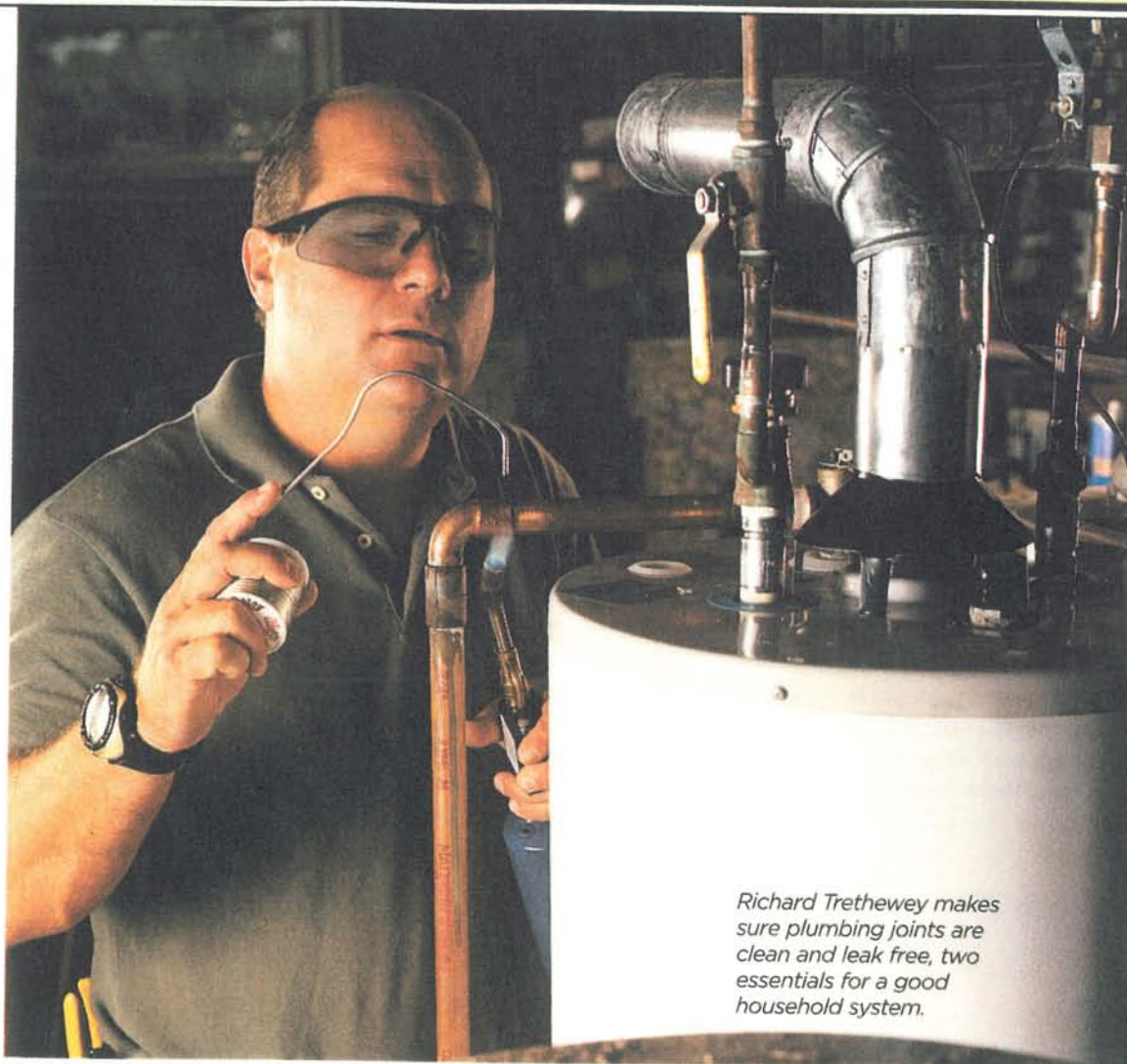




From the Ground Up: 25 Years of Building Experience

In this special year-long series celebrating the 25th anniversary of *This Old House* we highlight each of the different systems in a house, from the foundation to the roof. You'll learn best building practices from an experienced *TOH* team member and discover some new materials and technologies we've got our eye on. By year's end, you'll know how to build the *This Old House* way.



Richard Trethewey makes sure plumbing joints are clean and leak free, two essentials for a good household system.

Go With the Flow

A plumbing primer from *This Old House* expert Richard Trethewey

BY MAX ALEXANDER

Once, state-of-the-art in plumbing was cast-iron drains and brass supply pipes. Now, those materials have been supplanted (for the most part) by PVC plastic, copper, and flexible cross-linked polyethylene, known as PEX. But whether the pipes are plastic, metal, or a combination of the two, it's the plumber's skill that determines how well the system works. A lot is at stake: One leaky joint can cause thousands of dollars worth of damage. An undersize, improperly sloped drain will continually clog. And supply pipes that aren't anchored every 6 feet or so will rattle and thump every time a faucet is turned off.

There's more to proper plumbing than just following the codes and rules. Planning and installing a system that's quiet, efficient, and leak free is something of an art. You'll see it in the way a good plumber arranges pipes and valves for ease of maintenance, avoids wasting material or weakening framing, and takes care to wipe joints clean. "Too bad so much of our good work gets buried," Richard laments. Turn the page for a look at a system that meets his exacting standards.

BY THE NUMBERS

100 Gallons
Amount of water used per person per day in the U.S.

Biggest Water Users

WASHING MACHINE
35-50 gallons per load

TOILETS
27 gallons per person per day

SHOWERS
15-20 gallons every 5 minutes

HANDWASHING DISHES
up to 20 gallons per day

DISHWASHER
9-12 gallons per load

PHOTO: SHAFFER SMITH PHOTOGRAPHY; HOUSE ICON: IAN WORPOLE

Dream Pipes

Clean water enters a house at a pressure of 50-60 psi through the supply lines. Dirty water, pulled down by gravity, exits through the drainpipes, while air coming through the vents keeps the drains flowing smoothly. It's a wonderfully simple and durable setup. Valves may wear, hoses may break, and appliances will fail, but the underlying network of pipes should last as long as the house itself.

KEY TO PIPES

- Hot-water supply lines
- Cold-water supply lines
- Drain lines: (sched. 40 PVC or ABS)
- Vent pipes: (sched. 40 PVC or ABS)

SHOWER VALVE
Mixes hot and cold water; diverts water to showerhead or tub spout. Use only pressure-balanced valves, which guard against scalding when the toilet is flushed.

P-TRAP
Holds a slug of water to prevent sewer gases from entering the home through the main drain.

BRANCH DRAIN
(min. 2-in. dia.) Slope horizontal runs at least 1/8 in. per foot; 1/4 in. per foot is better.

STOP VALVES
Shut off water supply to individual fixture or appliance.

SINK DRAIN
(min. 1 1/2-in. dia.)

VENT STACK
(min. 3-in. dia.) Exhausts sewer gases and equalizes air pressure in the drains. Without vents, a toilet flush could suck water out of the traps.

BRANCH VENT
(min. 2-in. dia.) Connects P-trap to vent stack.

CLOSET FLANGE
Anchors a toilet to its drain.

TOILET DRAIN
(min. 3-in. dia.)

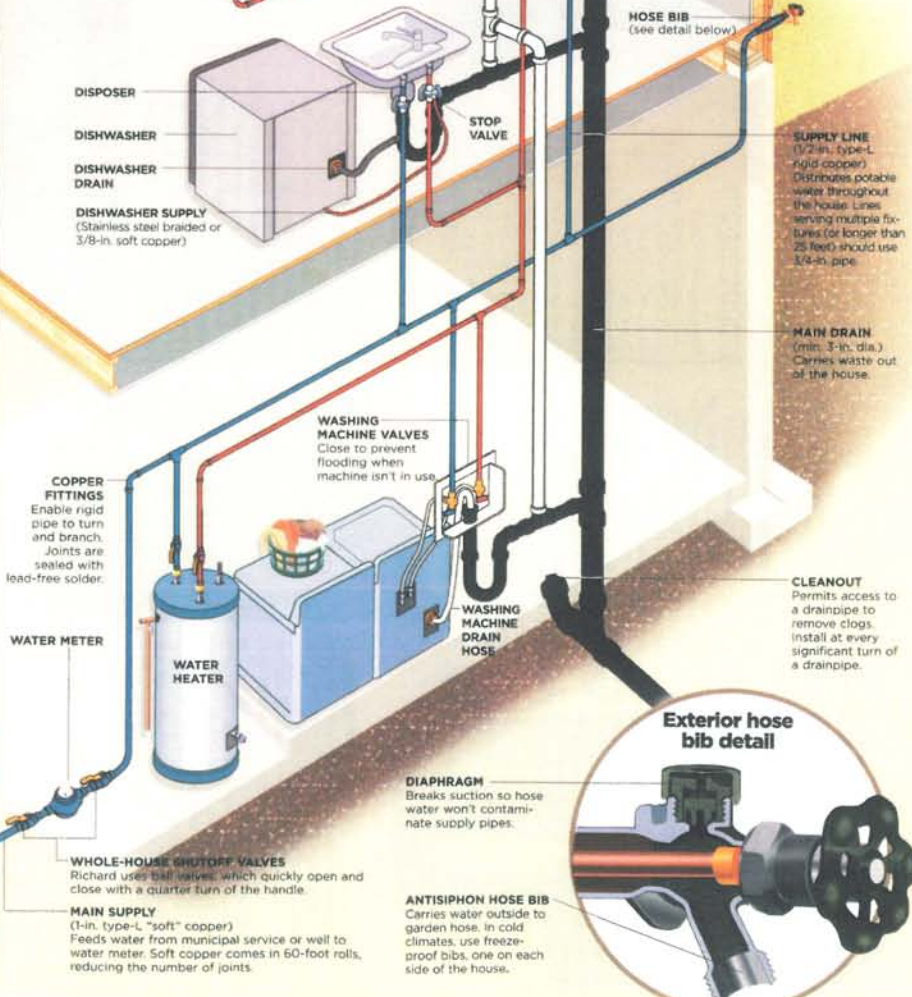
MIXING VALVE
Delivers warm water to toilet tank to prevent condensation on humid days.

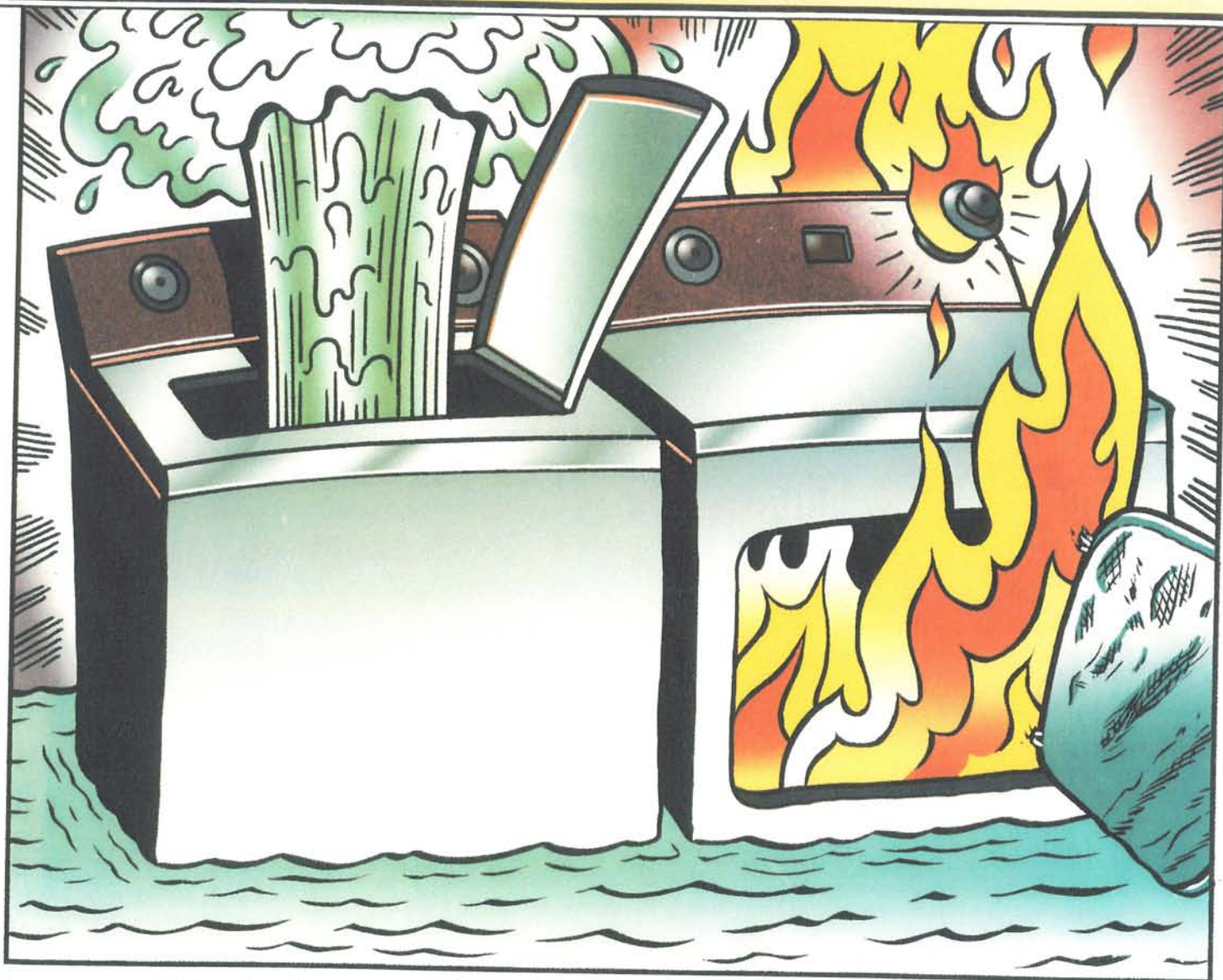
TURN OFF THE TAPS

Modern plumbing has made it easier than ever for us to get clean water—and to waste it. “We have to change the mind-set that we can just turn on the water and let it run like Niagara Falls,” Richard says. He considers the 1994 law mandating low-flow, 1.6-gallon toilets and 2.5-gallon-per-minute faucets and showerheads a step in the right direction. What about those pre-’94 water-wasters? Refitting them with dams, flow restrictors, and aerator devices can make them as water-efficient as a new fixture, or even more so.

BEYOND THE CODE: RICHARD'S RULES FOR BETTER SYSTEMS

- 1 SHUTOFF VALVES FOR EVERY FIXTURE AND APPLIANCE**
Individual shutoffs allow you to quickly isolate a problem without cutting the water supply to the rest of your house. After plumbing a house, Richard always leads the owner in a guided tour of all the shutoff valves, most notably the main shutoffs.
- 2 DON'T SKIMP ON VENTS**
Codes dictate the proximity of vents to drains, and the rules should never be ignored. If the vent is too far away, it won't be able to break the vacuum and allow fast drainage. “When you pull the plug on a bathtub,” says Richard, “you've got 40 gallons of water that want to scream down that pipe. If there's a vacuum, it can pull the water out of all the traps in the house.”





Low-Risk Laundry Room

Some of the greatest potential for flood and fire comes from your washer and dryer. Here's how to cut the odds

BY SCOTT H. SCHILLING ILLUSTRATION BY MARK ZINGARELLI

Left unattended, a burst washing-machine hose can spill hundreds of gallons of water an hour. Likewise, a dryer can erupt in flame if lint is allowed to build up inside the machine or its ducts. In 1999 (the most recent data available), dryers caused 14,600 fires, 20 deaths, and \$86.8 million in property damage in the United States.

Preventing such mishaps is as easy as replacing a washer's old rubber hoses, ideally with steel-jacketed ones that can't split open. Or discarding the dryer's flimsy—and flammable—vinyl duct and putting a metal one in its place. (Regular lint-trap cleaning, while necessary, won't keep lint from collecting in the duct.) Once you've made those two major upgrades, as shown on the following pages, get in the habit of checking hoses and cleaning ducts every six months or so. Hoses should be replaced every five years; tag them with the date you installed them so you won't forget. Your appliances will last longer, run better, and use less energy. And you'll reduce the threat of flood and fire. On the following pages, Richie Isaacson of Affordable Appliance, in Randolph, Massachusetts, shows how to keep a washer and dryer running safely and efficiently.

[continued]

REPLACING A WASHING MACHINE HOSE

Any rubber hose that is cracked, blistered, soft, or has corroded fittings needs to be replaced. Here's how to install a new one that has a braided stainless steel jacket, as well as add a drip pan to stop small leaks from doing major harm.



1. REMOVE THE OLD HOSES

Turn off the hot and cold water valves, unplug the washer's power cord, and remove the drain hose from the drain. (If the drain hose has cracks, replace it with the same type of hose.) Put a towel or tarp under the supply hoses to catch any water, then remove the hoses with a pair of grooved-joint adjustable pliers.



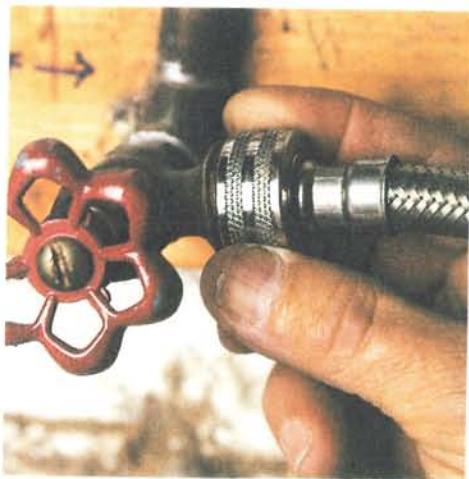
2. CLEAN THE FILTER SCREENS

Debris and sediment will slow the flow of water into the machine. Check the filters, and clean out any buildup with a bristle brush.



3. INSTALL NEW, BRAIDED HOSES

Use your fingers to screw the hose fittings onto the machine's threaded nipples, then tighten gently with pliers. Make sure the hose is long enough to allow you to move the machine if necessary; 60 inches is convenient for most installations.



4. HOOK UP THE WATER SUPPLY

Connect the other ends of the braided hoses to the water-supply bibs as in Step 3. Make sure to match the hot hose with the hot-water supply and the cold with the cold supply. Open the valves and check for leaks. Reconnect the drain hose to the drain. But if you're installing a drip pan (Step 5), reconnect the drain hose after the pan is in place.



5. ADD A DRIP PAN

A drip pan under the washer will catch any leaks (and is required in second-floor laundry rooms). Look in plumbing-supply stores or home centers for a pan with a drain so any water that collects can be diverted to a floor drain. You'll need a helper and perhaps a dolly to lift the washer gently onto the pan so as not to crack it. Then, each time you run a load, make sure no water has leaked out.

FLOOD STOPPER

Leaving a washing machine's valves open all the time greatly increases the chance of a catastrophic hose burst. That's why manufacturers and insurance companies plead with homeowners to close the valves when a machine is not being used. But most people don't bother. Fortunately, there are devices that will do it for you. The **Intelliflow** (about \$150), above, senses when the washer is turned on and automatically opens the water-supply valves. At the end of the cycle, it shuts them down. A floor-mounted sensor also closes the valves if it detects water pooling at the washer's base.



CLEANING DRYER DUCTS

Before working on your dryer, unplug it or trip its circuit breaker; if it's a gas-fired unit, shut off the gas valve. You'll need aluminum tape, a snorkel brush, a vent brush, and, if the vent duct needs replacing, new 4-inch round steel ducting.



1. CLEAN THE LINT TRAP

Pull out the lint screen and push a snorkel brush straight down into the trap. Twirl the brush to fish out any globs of lint at the bottom of the trap. (A long crevice tool on a shop vac also works.) Shine a flashlight down the trap to make sure it's clean.



2. CLEAN THE DUCTWORK

Disconnect the ductwork from the dryer exhaust and from the exterior vent. If the duct is plastic or ribbed metal, toss it out. If the duct is smooth-wall metal, as shown here, take it outside and clean all the parts with a round dryer-vent brush.



3. CLEAN THE OUTSIDE VENT

Working from inside, spin the vent brush a few inches into the duct leading outside, then pull it back and clean off the bristles. Repeat until the bristles reach as far as the exhaust hood on the outside wall. (Don't try to shove the lint out with the brush; you may create a clog.) Then go outside and make sure the vent hood isn't plugged. If need be, remove the hood, clean it out, and then put it back.



4. REATTACH THE DUCT

Reassemble the metal ductwork and seal the joints with aluminum tape. (Don't connect the sections with screws, which snag lint.) The ends of the ductwork should fit snugly onto the dryer's exhaust and vent hood; no tape or hose clamps needed.

For help with all your home-maintenance projects, go to www.thisoldhouse.com or America Online Keyword: This Old House and select Repair & Maintenance in the Know-how section.

GET YOUR DUCTS IN A ROW

You can't be too careful about how you vent a dryer. Flexible vinyl ducting (below) is flammable, traps lint, restricts airflow, and no longer meets building codes. Ducts made out of shiny aluminized Mylar are more fire-resistant but just as likely to catch lint. And flexible ribbed aluminum ducts, while fire-proof, are also notorious lint traps.

Four-inch round steel ducts are the best way to go. The ducts' smooth walls won't collect lint as quickly, they're easier to clean, and they can't burn. When installing rigid duct, keep the runs as straight and short as possible. According to Richie Isaacson, the overall length with two elbows should not exceed 20 feet. (Each 90-degree bend is equivalent to 5 feet of straight duct.)

Venting to the outside is the only correct way to exhaust a dryer, says Isaacson. Products that allow electric dryers to vent inside a house pump out gallons of excess moisture, which can lead to sweating windows, peeling paint, mold growth, and wood decay. "That type of trap doesn't collect all the lint anyway," Isaacson says. "You'll end up breathing it in."

