

# A Primer on PVC Pipe

It's easy to work with, but you've still got to choose the right fittings and follow some basic rules

BY ED CUNHA

My neighbor said in a worried tone, "The tub drain in my bathroom is backing up."

"All the time?" I asked.

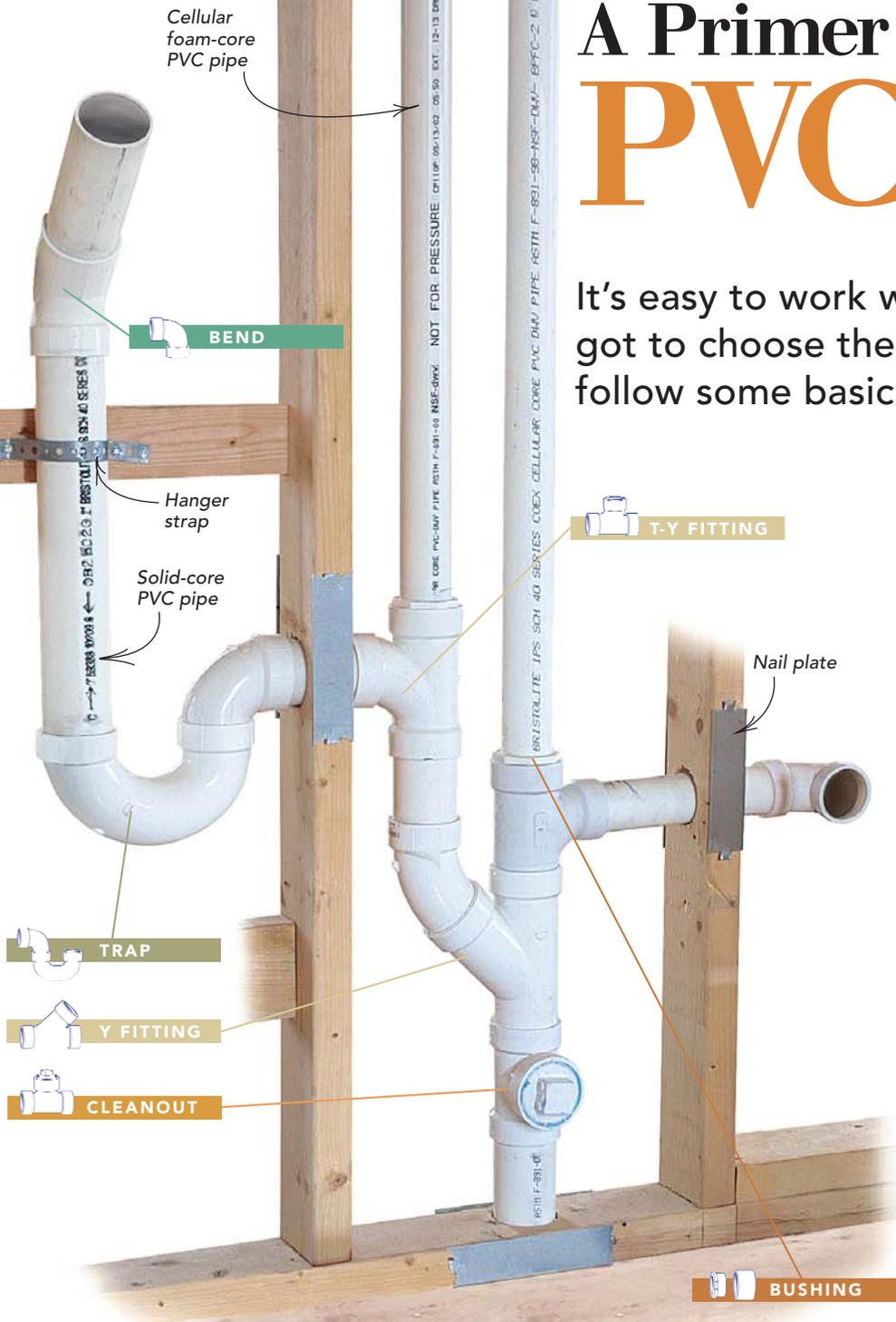
"No, just when we flush the toilet."

I knew instantly this job would be more than just snaking out a clog. An hour and several bucket loads of unspeakable stench later, my suspicions were confirmed. A rough edge that had been left at one of the joints in the PVC drainpipe had snagged a bit of paper, which over time had escalated into a full-blown, nasty clog. The only way to fix the problem properly was to replace the culprit fittings. Prepping the pipe is just one place a PVC installation can go wrong. The first step is choosing the correct fittings (sidebar facing page). Here are some tips to keep things flowing smoothly after that.

## Cut PVC pipe as square as possible

One of the joys of PVC pipe is that it's easy to cut. Just about any saw works fine. If I have the room and I'm cutting a lot of pipe, I set up a chopsaw, which gives me a square cut without a lot of burrs. While a reciprocating saw makes a quick cut, extra care has to be taken to keep it square. As a rule of thumb, I try to keep cuts within  $\frac{1}{8}$  in. of square, which is especially critical for smaller pipe.

A PVC saw also makes a good cut, and its wide blade is easier to keep



## Buying plastic pipe

PVC pipe comes in different thicknesses, or schedules. The thinnest, schedule 20, is primarily for foundation drainage and ground-water removal. Schedule 40 is best for domestic piping systems and comes as foam-core (also called cellular-core) or solid-wall pipe. Foam core is lighter and more flexible, but both types can be used for drain, waste, and vent piping. In some pressurized systems, though, only solid-wall schedule 40 can be used. The thickest, strongest PVC is schedule 80.

Schedule 40 ABS is used the same way as schedule 40 PVC. Lighter and more flexible than foam core, ABS is black and can warp in the sun.

# USERS' GUIDE TO PVC FITTINGS

## BENDS

Bends come as 90° or ¼ bend, 45° or ½ bend, and 22½° or ⅓ bend.

Regular bends have hubs (female couplings) at both ends, and street bends have a hub on one end and no hub or a pipe-size connection on the other. A street fitting can be inserted directly into a regular fitting and takes up less space than two regular fittings connected with a short length of pipe. I put the no-hub end of a street fitting on the downstream side whenever possible.

On a waste line, 90° bends can transition from a horizontal run to a vertical run, or turn out of a wall for a fixture such as a sink. On a vent line, 90° bends can be used anywhere above the fixture rim.

I use 45° bends to offset a drain or vent either horizontally or vertically. To make a 90° horizontal turn in a waste line, combine two 45° bends. If space is at a premium, such as when turning a corner from one wall to another, use a standard 45° bend with a street 45° bend (photo right). When I need just a slight change in direction, I use a 22½° bend or a combination of bends.

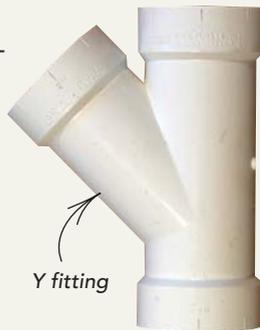


## Ys AND T-Ys

When one line branches off another, either a Y or a T-Y fitting is used.

With a Y fitting, the branch line enters at a 45° angle; the angle is 90° with a T-Y. As with bends, a Y fitting can be used on either a horizontal or vertical line. But a T-Y with its 90° bend should be used only when going from a horizontal line to a vertical line, such as when tying a fixture into a vertical line. A T-Y also can be used upside down to tie into a vent line.

Ys and T-Ys are available with the same-diameter pipe at all three connections, or they can have a smaller-diameter pipe than the branch (e.g., a 3-in. waste line may have a 2-in. line branching off). In this case, a 3x2 Y fitting is needed.



## CLEANOUTS

Cleanouts are an essential part of every waste line. They are strategically placed so that areas most prone to clogs can be accessed and cleared out. PVC cleanouts come in two different configurations: end cleanouts (ECOs) and dandy cleanouts (DCOs).

An ECO is basically a threaded plug in a fitting that fits into a pipe hub. ECOs are installed most commonly in the branch of a Y at the uphill end of a horizontal line (photo top right). When a clog occurs, just back out the plug for access.

The threaded plug in a DCO screws into a T fitting installed in either a horizontal or a vertical run (photo bottom right). What makes a DCO dandy is that you can run a snake either upstream or downstream to access any clogs.



## TRAPS

Traps are U-shaped fittings that are required for every drain. They come either with or without a cleanout (a threaded plug that can be removed to drain and clean out the trap). As the name implies, a trap not only snags mom's diamond ring when it falls down the drain, but more important, it fills with water to seal off the drain and prevent noxious sewer gases from escaping. Traps with cleanouts should be installed only where access is guaranteed, such as under a sink or in an open floor system above a basement. Sealing a trap with a cleanout in a ceiling or wall is just an invitation for leaks and costly repairs.



Trap with cleanout

## COUPLINGS AND BUSHINGS

A coupling joins together sections of the same-diameter pipe, and a bushing fits into a pipe hub to reduce the diameter for a smaller pipe. A coupling adds two connections in a line, meaning two other places for leaks and clogs to form. So try to avoid couplings whenever possible.

Couplings come in handy, though, where a horizontal waste line runs through a line of studs. In this case, I make the hole in the stud slightly oversize. Then I cut a length of pipe equal to the width of about two stud bays. I insert the pipe into the hole at a slight angle. When the end clears the stud, I bring it in line with the other fittings. A coupling connects it to the next piece in the run.

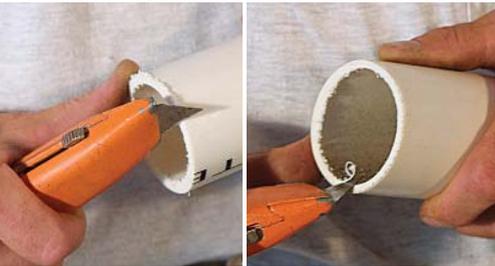




**Two ways to cut PVC pipe.** A PVC-pipe saw has fine teeth that leave minimal roughness along the edges and a wide blade that's easy to keep square. A cable saw is just a length of cable with two handles, but it can cut through any size PVC pipe with almost zero clearance.

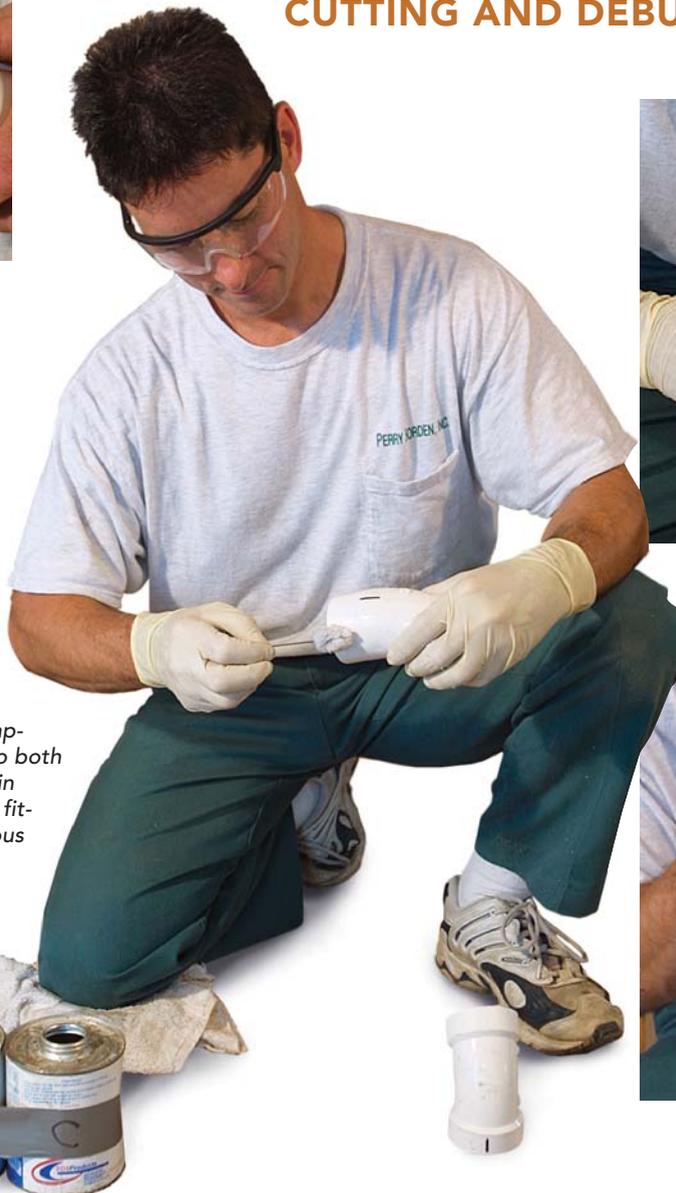
square (photo top left). These saws cost about \$15 and have replaceable blades. In a pinch, you also can use a hacksaw. Its small teeth minimize the amount of burr left on the pipe, but a hacksaw is the toughest saw to keep cutting square.

These options are great when there's room for a saw, but what about in tight quarters or when the pipe that needs cutting is close to other pipes or wires? In these cases, I pull out a cable saw (photo top right), which is a length of thin wire cable with plastic handles at both ends. Just slip one of the handles around the PVC pipe and pull the cable back and forth perpendicular to the pipe with smooth, easy strokes. The friction of the cable on the pipe literally melts through the PVC. Believe it or not, you can do the same



**No rough edges, please.** Cutting PVC pipe with any type of saw leaves burrs along the edges. Removing the burr from the outside edge (photo left) allows the pipe to fit properly in the fitting. Removing the inside burr (photo right) allows waste to run smoothly through the pipe.

## CUTTING AND DEBURRING PVC PIPE



**Clean and glue.** Dry-fit, make index marks, and disassemble the fittings before applying cleaner/primer to both pieces. Then apply a thin coat of PVC glue in the fitting's hub and a generous layer on the pipe.

PVC cleaner and glue cans taped together



**Fit and twist.** Next, push the fittings together and twist until the index marks line up.



**Fill gaps.** When the connection is solid, wipe the top of the hub with a light layer of glue to fill any remaining gaps.

thing with a length of mason's twine, but it takes a lot longer.

### Smooth the edges of the pipe

Cutting PVC pipe always creates burrs on both the inside and outside edges of the pipe. As my neighbor can attest, removing burrs from the inside of the pipe is absolutely necessary to keep waste flowing smoothly to its final destination. Burrs on the outside of the pipe can prevent a proper fit and glue joint.

After making any cut into PVC pipe, I first drag a utility-knife blade around the outside edges to scrape off the burrs (photos center left, facing page). Next, I cut the burr from the inside edge of the pipe with the knife, almost like peeling an apple. I always run my fingers around both edges to feel for any wayward burrs I might have missed. The slightest burr can snag hair or other debris, plugging up the pipe in no time.

### Cleaning the pipe is as important as gluing it

When connecting the fittings and pipe in a PVC line, first align the fittings with the pipe to ensure the proper pitch and angle. Then mark a straight line from the hub on the fitting onto the next fitting or the pipe. I usually use a felt-tipped marker because it's easy to see and doesn't rub off easily.

Clean or prime the glue-joint area before gluing (center photo, facing page). Lazy plumbers might try to get away with using glue alone, but manufacturers make a two-part system for a reason. The primer not only cleans the PVC, but it also starts to melt the PVC slightly. The glue then bonds the softened pipe and fitting together.

To clean the pipe and fittings, I run the dauber attached to the lid of the primer (or a ¾-in. paintbrush if no dauber is provided) around the pipe and fitting two or three times in each direction. Don't try to test-fit after you've cleaned and primed the pieces, or they'll stick together.

Next, I apply a light layer of glue inside the fitting and a generous amount on the pipe. Again, I run the dauber around two or three times to ensure an even spread of glue. I wear disposable gloves and never use a rag to apply cleaner or glue.

### Twist and hold for a tight joint

After applying the glue, I push the fitting onto the pipe, holding both pieces tightly with the alignment marks about 1 in. apart.

I then twist the fitting and the pipe until the marks line up (photo center right, facing page). After holding the joint together for about 30 seconds or until it is completely solid, I give the joint a quick wipe all around with the glue dauber to fill any air pockets I might have missed (photo bottom right, facing page).

### PVC might not be the only type of pipe in your system

I routinely come across situations where PVC has to be tied into other types of plumbing, in both new construction and renovation. In new construction, cast iron is used to keep noise down where plumbing might run through the walls of living spaces.

Here on Cape Cod, many folks want copper for the end of the vent that sticks through the roof. In these cases, PVC is used for all the complicated fittings because it is easy to work with and inexpensive. The PVC then is tied into the metal (top photo).

Whether PVC is connecting to copper, cast iron, or galvanized steel, it's extremely important to start with a good, clean cut. Use a pipe cutter if you have the room to spin it, or use a reciprocating saw with a fresh metal-cutting blade. A file used on the inside edge of the metal pipe smooths it before you make the connection. For the actual connection, I like to use a no-hub clamp (center photo). Stronger than a one-piece rubber clamp, a no-hub clamp has stainless-steel bands with pipe clamps and a rubber sleeve that varies in thickness to fit the materials being joined.

I've had only one occasion where I had to join PVC to a dissimilar plastic. I was connecting the pipe to the septic system in a modular home that had been plumbed with ABS. In this case, I simply applied some all-purpose glue designed to be used with both types of plastic. One word of caution: Make sure you use the appropriate primer for each type of pipe. Just as all glues are not compatible, your PVC primer might not work on ABS.

If there is any doubt about the glue or primer, you can make a tight fit between PVC and ABS with a male and female threaded adapter. Use the appropriate glue to fasten the adapter onto each pipe, and then thread them together. □

Ed Cunha lives in and works out of Brewster, Mass. Photos by Roe A. Osborn.

## COPPER ROOF VENTS

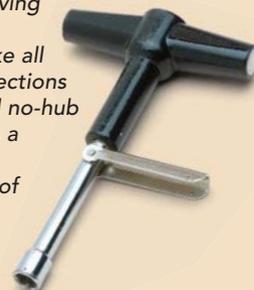


*Don't like the looks of a white vent pipe in that expensive shake roof? Run PVC up to the final vertical run, and then tie in a short piece of copper.*

## CAST IRON FOR SILENCE



*Use it in the walls of living spaces, and use less-expensive PVC to make all the complicated connections at the fixtures. Special no-hub clamps tightened with a ratchet wrench (right) make a tight, leak-proof connection.*



## STUD REINFORCEMENT



*A hole drilled for drainpipe can weaken the stud, so special reinforcement plates may be required. These plates have the added benefit of protecting the pipe from wayward drywall nails and screws.*