

DIY RADON REDUCTION

**You can save \$1,000 in a weekend!
Here's what you need to know before
you begin. By Jason White**

If you've tested for radon and found you've got a problem, your next question is probably "Can I fix it myself?" This story will help you answer that question. And if you decide to go for it, we've got some great tips from professional installers to help you get it done.

In most cases, pros charge about \$1,500 to install a radon mitigation system, but you can do it yourself for only about \$500 in materials. So if you're fairly handy and have some carpentry, plumbing and electrical skills, you can install your own system in a weekend and save yourself a thousand bucks!

WHAT IS RADON?

Radon is an invisible, odorless radioactive gas that seeps out of the soil and into the atmosphere. It's almost everywhere. In fact, you're probably breathing in tiny traces of it right now. But when it's trapped inside a home and reaches high levels, radon can cause lung cancer. Your house can have high levels of radon even if your house is new and your neighbor's house doesn't have any. The highest levels are normally found in basements, but it's possible for radon to reach other parts of your house too.

Seal holes and cracks first

If the radon levels in your home are only slightly elevated, try sealing holes and cracks in concrete walls and floors and test again. In most cases, sealing doesn't solve the problem. But you'll have to seal before you install a mitigation system anyway, so it's worth a try. Sealing is usually simple; caulk small openings and fill larger gaps with expanding foam or hydraulic cement.



HOW A RADON REDUCTION SYSTEM WORKS

A fan pulls radon gas from beneath the floor and exhausts it outside. In cold climates, it's better to run the pipe inside the house rather than outside as shown here.



TEST FOR RADON

It's important to fix the radon problem in your house if a test shows a concentration of 4 picoCuries per liter (pCi/L) or higher, so buy a test kit. You can get one at a home center for about \$10—plus a \$40 lab fee—and perform the test yourself. You just let the tester sit in your house for a few days and then mail it to a lab for analysis. Electronic radon monitors that monitor continuously for radon are available online for about \$130 and don't require a lab.

PVC Pipe

Shallow Pit

PLANNING YOUR SYSTEM: 7 QUESTIONS TO ANSWER

More than most projects, a radon mitigation system requires detailed planning. The planning process will also help you decide whether you're willing and able to tackle the job yourself. Here are seven questions you must answer before you charge ahead:

1. What does your building inspector require?

Make a quick phone call to your town's building department to ask about local code requirements, permits and inspections. In some areas, only licensed pros are allowed to install systems.

2. Where will the pipe begin?

In most cases, you'll want to locate the PVC pipe that sucks radon from under your concrete floor near an exterior wall so it's out of the way and easy to route outside. This is also where sump pump basins and footing drainpipes (aka "drain tile") are located in some homes—perfect places from which to suck radon. If you don't have a sump basin, you'll have digging to do (see p. 47). If you use the sump basin as your suction point, be sure to seal around any pipe and wire penetrations in the lid. Special supplies for dealing with sump basin lids are available online at indoor-air-health-advisor.com, or do an online search for "radon sump lid."

3. Run the pipe indoors or out?

It's much easier to route the pipe outside the house, but that can cause a problem in cold climates. Condensation can form inside, causing ice to build up and stop the fan from working.

4. What's the pipe path?

If you'll be routing your pipe outdoors, it's no big deal. Just run it up along an exterior wall. But running pipe indoors can be a real nightmare. Most professional installers in cold-weather areas try to avoid condensation problems by routing the pipe up through a closet or finished garage and to a fan in the attic that blows the radon out above the roof. Be ready for a big, dusty mess if you have to route your pipe indoors. Also keep in mind that the pipe has to terminate 12 in. above the roof and be at least 10 in. away (horizontally) from any dormer windows. Ask your city's building department about any additional requirements.



5. Where will you put the fan?

If you'll be mounting the fan outside, put it in a place where you can get electricity to it easily. If it's indoors, the fan *must* be located in an unfinished attic. Never install the fan in your basement or any living space because, if there's ever a leak, the fan could pump highly concentrated radon right into your home.

6. How will you get power to the fan?

The toughest part of any electrical job is getting cable from point A to point B. If there's a junction box nearby that you can extend the circuit from, you're golden. If not, you might be spending lots of time fishing cable to where you need it. Fans draw very little power—usually less than 100 watts—so you can tap any nearby circuit. You can also hardwire a fan or plug it into an outlet. In an attic, it's best to install an outlet because it makes replacing the fan easier. Outside, it's best to hardwire the fan using water-tight conduit.



TIPS FOR INSTALLING YOUR SYSTEM

Find the footing

If you'll be installing your PVC pipe close to a basement wall, drill a test hole in the floor and feel around for the foundation's footing. Concrete slabs are typically about 4 in. thick, so use a masonry bit that's a couple of inches longer than the thickness of the floor (our installers use a 12-in. one) to see if the footing under the foundation walls will be in the pipe's way. If you do hit the footing, try again a couple inches farther from the wall. You can patch the test holes later with patching cement.

Help for Cutting & Gluing Pipe

Cutting and gluing PVC pipe for a radon system is done the same way as for any regular plumbing job. For tips, go to tfhmag.com/joinplasticpipe





7. What's under the slab?

You may not know what kind of base material you have under your concrete slab until you punch a hole in the floor. (See "Make a Big Hole with Several Small Ones," below.) Soil conditions affect how readily radon flows underneath the slab, so don't buy a fan until you know what you're dealing with. You'll need to provide this information when you buy a fan. (See "Buy Your Fan from an Expert" at right.)

BUY YOUR FAN FROM AN EXPERT

Radon fans cost \$140 to \$250, depending mostly on size. Some radon mitigation systems require a big, powerful fan. Others work fine with a smaller model. Sizing a fan requires expertise, so we strongly recommend that you buy from an expert who will ask questions and supply you with the best fan for your situation, as well as exchange the fan for a bigger one if the smaller one doesn't fix your radon problem. One such expert is Val Riedman, a professional radon system installer who runs a website where you can get more DIY information and buy supplies. *The Family Handyman* editors have purchased fans from him. Visit <http://www.indoor-air-health-advisor.com/radon.html> for more information. Val also contributed to this article.



Make a suction pit

Creating a shallow pit underneath the hole gives the radon a place to collect before getting sucked up the pipe. You'll need to remove several gallons of whatever base material is under your slab. The tighter the soil, the more material you'll have to remove so the radon fan can do its job. For loose gravel, you need to remove only about 5 gallons. For tighter soils like sand, dirt or clay, plan to remove 15 gallons or more. A shop vacuum helps suck up the loose stuff. For tighter soil, you'll probably need to do a combination of hand digging and vacuuming.

Make a big hole with several small ones

You'll need a hole in the basement floor a little bigger than the PVC pipe to give you some wiggle room and make it easier to remove soil and gravel. You could rent a large rotary hammer drill and coring bit from the home center, but save yourself some money and try this trick instead: Just draw a 6-in. circle where the pipe will be installed. Then, using a 3/16-in. masonry bit, drill several holes close together. Now just whack the center of the large hole with a hammer to break through.



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Dry-fit all the piping

Doing a “dry fit” before gluing the PVC pipe and fittings ensures that everything will fit together properly after you apply the glue. Once you commit to gluing, you only have seconds to push and twist everything together before they’re permanently fused.



Install fire-stop collars in garages

If you route part of your radon piping through a garage, then you must install fire-stop pipe collars (also called fire barriers) wherever pipe goes through a finished wall or ceiling. The collars seal around the pipe, preventing—or at least slowing down—fire from spreading to other parts of the house. You can buy fire-stop collars for \$40 to \$50 online.



MEET THE EXPERTS

Gary and Jake Vaness are professional radon system installers. They run Radon Reduction Inc., in Minnetonka, Minnesota, and let us tag along on one of their installations for this article.



Exit through the rim joist

If you'll be running pipe directly outside from the basement or out through an attached garage, you'll need to cut a nice, clean hole in the rim joist. A hole saw (\$25 to \$40 at home centers) is the perfect tool for this job. Buy the cheapest one you can find since you'll probably use it only once or twice in your lifetime. The installers we worked with use a 4-1/2-in.-diameter hole saw, which matches the outside diameter of 4-in. PVC pipe, giving it a very snug fit. Drill a locator hole from inside the basement first, then use the hole saw to cut the hole from outside.



Seal around the pipe with patching cement

After you've installed all the pipe, stuff some foam backer rod into the gap between the pipe and the concrete and apply fast-setting concrete patching cement. Trowel the cement flush with the top of the concrete floor.



Install a manometer

Radon fans don't run forever (typically 7 to 10 years), so you need a warning device to tell you when it stops working. One option is a liquid-filled manometer (\$10 to \$30 online) mounted on the PVC pipe. When the liquid level drops, the system isn't working. Electronic monitors that measure radon in the air are another option. The Safety Siren Radon Detector, for example, sounds an alarm when radon levels become dangerous (\$130 online).

Do another radon test

After installing your radon system, do another test. If that test shows you still have high levels of radon, contact the company you bought the fan from. Chances are, you'll need to install a more powerful fan. But in some cases, a second suction point (where pipe enters the floor) is the solution. (See "Buy Your Fan from an Expert" on p. 47.)