NEBRASKA
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DEPT. OF HEALTH AND HUMAN SERVICES

Radon Mitigation

Radon Mitigation Systems and Moisture

Soil air drawn from beneath a basement floor is laden with moisture vapor. If your radon mitigation system is not installed properly, this moisture vapor will condense and pool inside the ventilation pipe. Moisture vapor that pools in an unheated area will freeze at low temperatures. A properly designed and constructed radon mitigation system will prevent radon gas and soil moisture vapor from entering your home.

Mitigating a High Radon Level in an Existing Home

Many Nebraska homes have elevated indoor radon levels that should be lower. The purpose of this page is to help familiarize readers with the basic components of a radon mitigation system installed by a licensed radon mitigation business. The structural information provided here to describe a radon mitigation system reflects the construction standards that the Nebraska Department of Health and Human Services requires of licensed businesses.

The DHHS Radon Program licenses radon mitigation businesses who serve the public in the State of Nebraska. Each business employs at least one trained radon mitigation specialist. This specialist can design an effective system to minimize the entry of radon into your home.

Homeowners can also install a radon mitigation system in their own home if they so desire. The Nebraska Radon Program recommends that homeowners who want to fix or mitigate their own home should follow the installation practices presented here.

Whenever practical, a licensed radon mitigation specialist will try to inspect your home when invited to do so. During a visit to your home, they can inspect your house and consult with you about how to install a system in your home.

Designing a mitigation system often requires several discretionary decisions; the homeowner’s perspective is important. A properly designed mitigation system should be both effective at lowering the radon level and acceptable to the homeowner.

A radon mitigation system will collect and remove soil air below your basement floor from one of two sources:

1) A sump pit, if one is present, or
2) A five-inch suction point (the size of a CD) that will be drilled through the floor in an unfinished storage area or your utility room.

If your home has a sump pit, then have installed an airtight lid so that radon and soil moisture vapor cannot enter your basement. A radon mitigation system can then be constructed to pull the soil air from within the sealed sump pit. Systems that pull soil air from a sealed sump pit are very effective at lowering the indoor radon level.

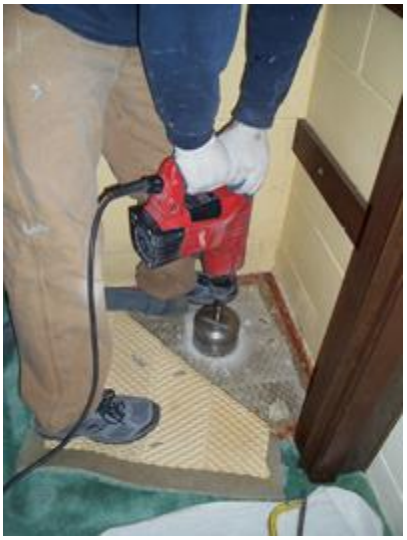
If your home does not have a sump pit, a radon mitigation system will instead remove soil air from a five-inch diameter suction point (the size of a CD) drilled through the basement floor. The suction point will be installed in a location that you approve of, typically in a furnace room or storage area.

Components of a Radon Mitigation System

The following components make up a Radon Mitigation System:

1. Suction Point
2. Plastic Ventilation Pipe
3. Radon Fan

If your home has a sump pit, a clear plastic lid can be made and installed to form a durable, air-tight seal. The lid can be installed with semi-permanent caulk so it is airtight. However, if necessary to permit maintenance work, the lid can be removed.

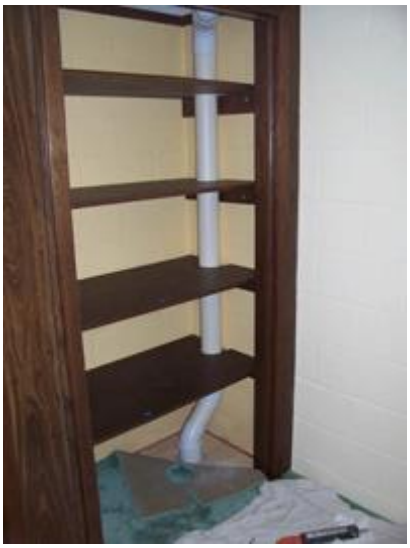


←If your home does not have a sump pit, then a five-inch diameter suction hole will be drilled through the basement floor. This suction point is typically installed in a furnace or utility room in the basement about one to two feet in from an outside wall.

Once the five-inch hole has been drilled through the basement floor, remove enough soil from beneath the floor to fill a five-gallon bucket. This will complete the suction point. You can use a scoop, trowel, spoon, auger or even a shop vac to remove the soil.

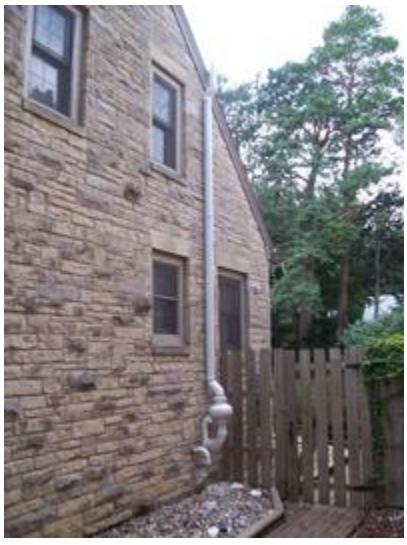
To be effective, the cavity beneath the basement floor should about the size of a five-gallon bucket. Leave this cavity or void below the hole in the basement floor. It will serve as a plenum for the removal of soil air from beneath the basement floor, when the fan is activated.

A 3 or 4 inch diameter, plastic ventilation pipe conducts the soil air to the point where it is exhausted. One end of the ventilation pipe will be inserted into the hole in the basement floor and it extends a few inches down into the void or plenum. The gap between the ventilation pipe and the floor is filled with caulking to make an air-tight seal.



←The ventilation pipe is then extended up vertically to the floor joists. Once the ventilation pipe is up into or just beneath the floor joists, it is extended horizontally to the outside of the house or into an attached garage.

If the ventilation piping takes the soil air outside of the house, then the radon fan will be installed on the outside of the house, just above the point where the pipe exits the side of the house.→



←If the ventilation piping is routed into the garage, then the piping will be extended vertically through the garage and penetrate the ceiling. In such an installation, the centrifugal radon fan will be mounted on the ventilation pipe as it rises through the attic above the garage. The ventilation piping will rise vertically from the radon fan, penetrate the roof and exhaust the soil air above the roof. A centrifugal radon exhaust fan is the only operating component of the system. Radon fans are designed and manufactured to run constantly. As explained above, the radon fan will be installed either in the attic (typically above the garage) or on the outside of the house.

Radon fans installed on the outside of the house must be hard-wired into an electric circuit. When the radon fan is installed in an attic, you can plug it into an electric outlet to power it, if the outlet is within six feet of the fan. In most local jurisdictions the installation of a radon fan requires an electrical permit.

Indicators of a Properly Installed Radon Mitigation System

Several specific features indicate a properly designed and installed radon mitigation system:

- Ventilation piping that does not trap soil moisture vapor condensate in a trap or low spot in the piping.
- The ventilation piping should be labeled as a 'Component of a Radon Reduction System'.
- The system should have a performance indicator so the homeowner can see if the radon fan is running, in case the fan is in a remote area such as an attic.
- Whether the ventilation pipe is installed through a wall or ceiling, caulking should be used to close the penetration.
- A radon fan mounted on the outside of a house should be hard-wired into an electric circuit.
- Brackets or hangers should secure the ventilation pipe to the house every 72 inches horizontally and every 96 inches vertically.
- The outlet or exhaust point from the ventilation pipe should be 10 feet above ground and 2 feet above any windows or doors within 10 feet.

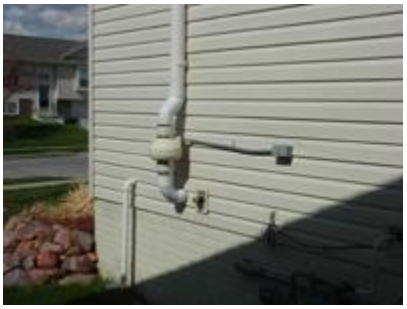
Because of the high content of moisture vapor in the soil air, you should install the ventilation pipe of a radon mitigation system so that it can drain any condensate on the inside of the pipe back to the suction point beneath the basement floor.

←Check to make sure there are no low spots or traps in the ventilation piping that could fill with moisture vapor condense. In areas where the ventilation pipe is installed horizontally, there should be 1 inch of fall for every 10 feet of horizontal run. You should label the ventilation pipe to show that it is a component of a radon mitigation system.→

If a licensed business installed the radon mitigation system, the system will also have the company's phone number in case service is required.

A mitigation system installed by a licensed radon mitigation business will also have a performance indicator. Most businesses use a plastic, U-shaped manometer to show that the radon fan is operating. The manometer is typically located on the ventilation pipe in the basement, about 4 feet above the suction point.

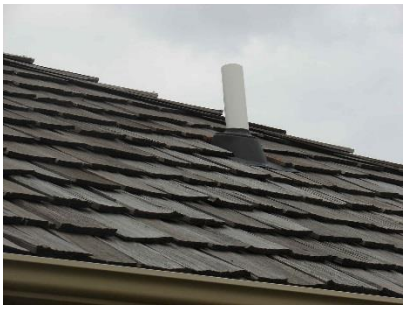
←You should have caulking installed around the vent pipe wherever it penetrates a wall or ceiling. If you have routed the ventilation up through an attached garage, fill both the space around the pipe through the wall (into the garage) and the garage ceiling with fire-rated caulking. In most homes, the garage walls and the ceiling are considered to be fire-barriers.→



←A radon fan mounted on the outside of a house should be hard-wired into an electric circuit. If you mount a fan on the ventilation pipe in an attic, you can plug the fan into an outlet. For future reference, identify the electric circuit that powers the radon fan by labeling it in the electric panel box.

Make sure to use brackets or hangers to secure the ventilation pipe to the house. Place the bracket or hanger every 72 inches horizontally and every 96 inches vertically.→

The outlet or point where the ventilation pipe exhausts the soil air should be 10 feet above the ground and 2 feet above any windows or doors that are within ten feet.



←In many cases, the outlet point will be above the roofline. If so, the outlet should end at a minimum height of 18 inches above the roof.

For More Information

Please refer to the Radon Program's Index Page, http://dhhs.ne.gov/publichealth/Pages/radon_index.aspx, or contact us using the information provided below:

DHHS Division of Public Health, Radon Program
PO Box 95026, 301 Centennial Mall South - 3rd Floor
Lincoln, NE 68509-5026
Phone: 402-471-1005 Fax: 402-471-8833