How Active Soil Depressurization Lowers Radon in a Home

What Is Active Soil Depressurization?

Radon is a radioactive gas that comes from the natural decay of uranium in soil and rock. It can enter a home through cracks in the foundation, gaps around pipes, or other openings in the slab. One of the most effective ways to lower indoor radon is a technique called active soil depressurization, or ASD. This method works by creating a low-pressure zone beneath the home, which prevents radon from being pulled inside.

ASD is the most common radon mitigation system installed in homes across the United States. It is especially effective in houses with a basement or a slab-on-grade foundation. The system uses a fan to draw soil gas from under the concrete floor and vent it safely above the roofline, where it dilutes in the outdoor air.

How the System Works

The basic principle behind ASD is simple: reverse the pressure difference between the soil and the living space. Normally, the air pressure inside a home is slightly lower than the pressure in the soil beneath it. This difference, combined with the stack effect from warm air rising, pulls soil gas - including radon - through any openings in the foundation. ASD flips that pressure gradient by creating a suction field under the slab.

A typical ASD system has several key components. A sump is cut into the concrete floor, usually in the basement, to access the gravel layer or soil below. A vent pipe runs from that sump up through the interior of the home and out through the roof. A small, continuously running fan is installed in the vent pipe, either in the attic or on the exterior wall. The fan pulls soil gas from under the slab and pushes it up and out. A manometer, a simple U-shaped tube with colored liquid, is mounted on the vent pipe to show whether the system is operating correctly. If the liquid levels are even, the system may not be running or there could be a blockage.

View the location on Google Maps

Where ASD Works Best

Active soil depressurization is most effective in homes that have a basement or a crawl space with a concrete floor. The system relies on a continuous layer of permeable material - gravel or crushed stone - beneath the slab. This layer allows the suction to spread across the footprint

of the house. Without it, the system may only pull from directly under the sump, leaving other areas untreated.

In homes with a dirt-floor crawl space, ASD is usually not the first choice. Instead, a soil-gas barrier such as a heavy polyethylene sheet is laid over the dirt, and the depressurization is created under that barrier. For homes with a basement, the sump is typically placed in the floor, and the pipe runs through a closet, utility room, or garage. The fan can be installed in the attic or on the exterior wall, depending on the climate and the layout of the home.

Installation Steps at a Glance

While the installation of an ASD system is best left to a qualified radon mitigation contractor, understanding the steps can help a homeowner know what to expect. The process usually goes like this:

- A professional conducts a radon test in the lowest livable area of the home to determine the level of the gas.
- The contractor locates the best spot for the sump, often in a utility room or a corner of the basement that is not used for living space.
- A 4- to 6-inch hole is cut in the concrete slab, and the soil or gravel below is excavated to create a small cavity.
- A section of PVC pipe is fitted into the sump and sealed to the concrete with a urethane or hydraulic cement.
- The pipe is routed up through the interior of the home, with the fan installed either on the pipe in the attic or on the exterior wall. The pipe exits through the roof or the side of the house above the roofline.

The fan runs continuously. The manometer is checked periodically to confirm the system is drawing a vacuum. Many contractors also seal cracks in the foundation and around utility penetrations to improve the system's efficiency. Sealing cracks helps reduce the amount of air the fan has to move, but it is not a stand-alone fix.

Cost and Energy Considerations

An ASD system adds a small amount to a home's electricity bill, because the fan runs 24/7. However, modern radon fans are designed to be energy-efficient and draw very little power, typically less than a 60-watt light bulb. In most climates, the system does not affect the home's heating or cooling costs significantly, because the pipe is sealed and insulated where it passes through unconditioned spaces. The cost of installation can vary, but the long-term benefit of

reducing radon exposure is well worth the investment. Radon is the second leading cause of lung cancer after smoking, so lowering levels in a home is a serious health measure.

Other Ways to Lower Indoor Radon

Active soil depressurization is not the only method. There are several other ways to lower indoor radon, and a professional can help decide which approach is best for a given house. Sealing cracks and openings in the foundation is a helpful first step, but it rarely brings radon levels below the EPA action level of 4 picocuries per liter on its own. Increasing ventilation by opening windows and running fans can temporarily lower radon levels, but it is not a permanent solution and can increase energy costs. Heat recovery ventilators, or HRVs, can bring in fresh air while recovering heat, but they are more expensive to install and maintain. For homes with a crawl space, a soil-gas barrier combined with passive ventilation can help, but it may not be enough without a fan. A qualified radon mitigation contractor can test the home and recommend the most effective system.

What a Homeowner Should Check

After an ASD system is installed, the homeowner has a few simple responsibilities. Check the manometer once a month to make sure the liquid levels are uneven, indicating the fan is running. If the levels are equal, the fan may have failed or the pipe may be blocked. Listen for unusual noises from the fan; a rattling or humming sound can signal a problem. Keep the vent pipe clear of debris, snow, or bird nests where it exits the roof. If the system was installed in a crawl space, make sure the access panel is secure and that the area stays dry. If there is a sump pump in the basement, ensure it is not interfering with the ASD system. Finally, retest the radon level in the home every two years or after any major structural changes, such as a new foundation or a renovation.

Why Active Soil Depressurization Is the Standard

Among the various ways to lower indoor radon, ASD has become the standard for a reason. It is reliable, relatively simple, and works in most homes with a concrete floor. The system does not require the homeowner to change their daily habits, and it operates quietly in the background. It also provides a continuous barrier against radon entry, unlike passive methods that depend on weather or stack effect. For homes with elevated radon levels, ASD is often the most straightforward and cost-effective solution.

One local option is York PA Radon Pros. They can be reached at 867 Clare Ln, York, PA 17402, phone +17178075245, for more information about radon testing and mitigation.