Radon Mitigation for Existing Housing

About Radon

- Radon is a gas that occurs naturally in the ground and some rocks.
- Radon is colorless, odorless, and invisible. It is impossible to tell if you have inhaled it.
- Radon can enter buildings through cracks and openings in foundations.
- Radon occurs at low concentrations in outside air but can accumulate to higher levels in buildings, especially in basements or ground-floor spaces. Most people experience their greatest exposure to radon in their homes.
- Long-term exposure to radon is the leading cause of lung cancer among nonsmokers.
- The Environmental Protection Agency (EPA) estimates that radon causes about 21,000 deaths per year.

Mitigating Radon in Existing Buildings

- Radon mitigation systems in existing buildings are designed and installed as permanent, integral additions.
- A passive system may be converted to an active system by the addition of a fan.
- Systems must be designed and installed by a Radon Professional or a Qualified Contractor.
- Installation must follow any applicable state or local regulations.

A qualified professional is certified according to requirements from the National Radon Proficiency Program (NRPP) or the National Radon Safety Board (NRSB).

ASD Systems Installation

Active Soil Depressurization (ASD) is the most common form of mitigation systems for radon and is relatively low cost. ASD systems use fan-driven air pressure to capture radon in the soil and direct it away from living spaces. ASD systems work well for most foundation types.

1. **ASD suction points.** The diagrams below illustrate examples of suction point system designs.
2. **ASD piping.** Pipes and fittings must be air- and watertight.
3. **ASD exhaust discharge.** Exhaust systems with standard 3- to 4-inch diameter pipes should aim directly up and away from the building.
   – Install the exhaust discharge at least 10 feet from building openings and occupied outdoor spaces.
4. **ASD fan.** The ASD fan is installed within the radon pipe close to the point of discharge. Fans should be sealed to prevent leakage and weather damage.

Sealing

All accessible openings or cracks in the slab, foundation, or crawl space must be **sealed** to break the connection between soil and living spaces using appropriate sealant.

The most common materials for sealing are **concrete,** to seal openings and cracks in the foundation, and **soil gas retarder membrane,** which is applied on the soil. There are special sealants (caulks) that can be used around penetrations such as holes in the ground for passing pipes or wiring.

Figure 1. ASD Suction Points

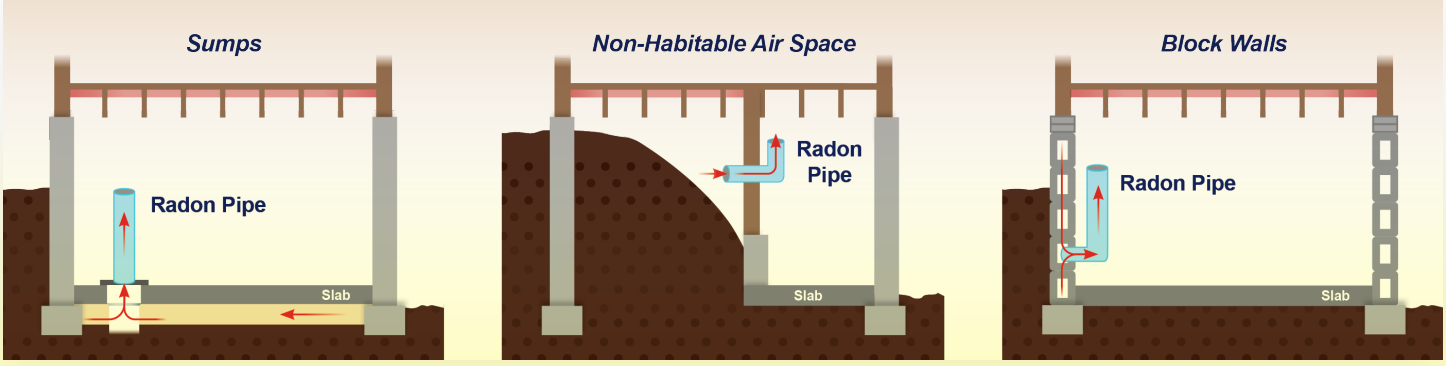

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Figure 2. ASD Piping

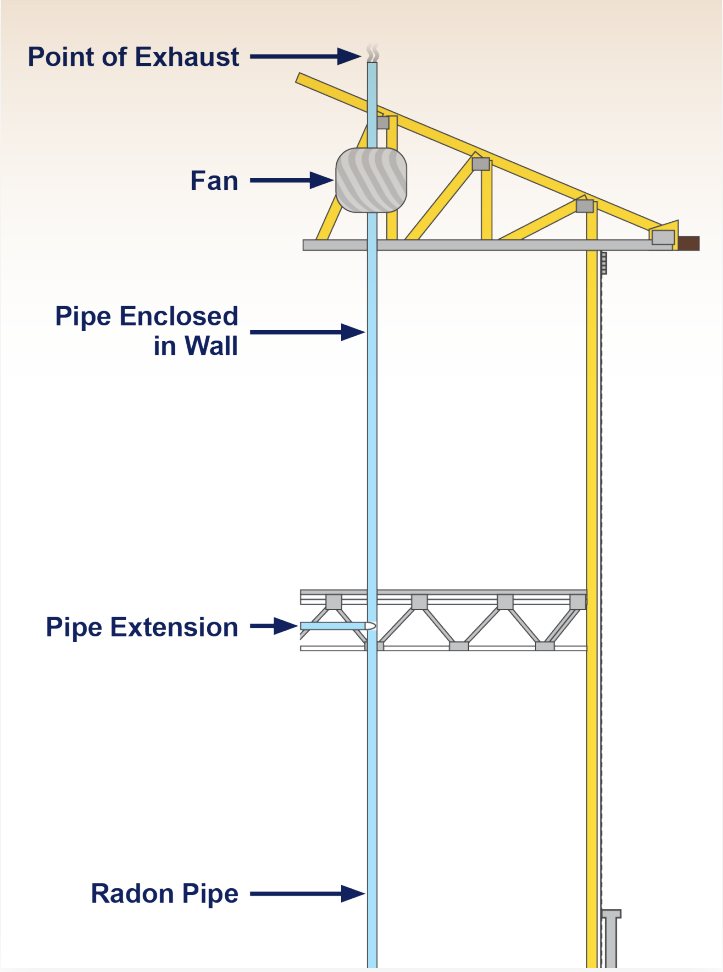
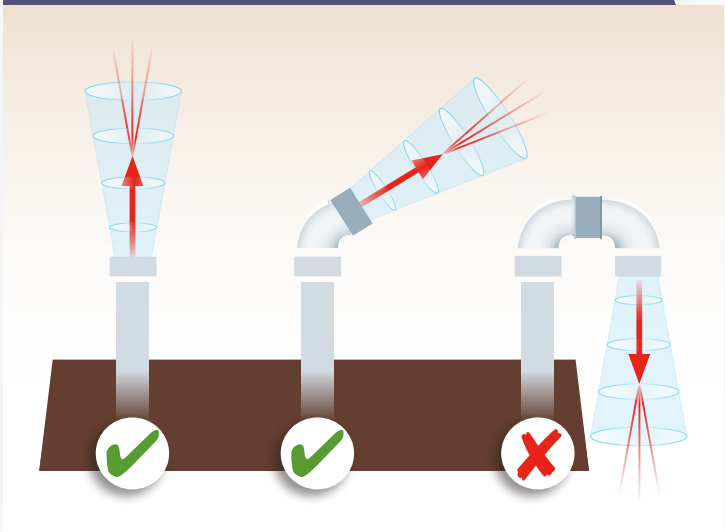


Figure 3. ASD Exhaust Discharge & ASD Fan



Cost of Mitigation

According to the American Association of Radon Scientists and Technologists (AARST), the average cost to install a mitigation system in a single-family residence is between $1,500 and $3,000. For multifamily buildings, the cost averages between $2,500 and $4,000 per unit. These estimates do not include long-term operation, maintenance, or monitoring.

Complete Systems

After installing the ASD system, take the following steps to make sure it operates correctly:

- **Label systems –** Label all major components of the system.
- **Evaluate and test –** Have an HVAC specialist evaluate the system.
- **Operate and maintain –** The contractor or radon mitigation specialist in charge of installing the system must prepare a written, working operation and maintenance plan that property owners and managers can use and implement.

Post-Mitigation

Soon after the mitigation system is installed, it must undergo a post-mitigation inspection for compliance and efficacy, including a short-term radon test 24 hours after the system is turned on. Additional radon tests are recommended every 2 years following mitigation.

Considerations for Multifamily Housing

Radon mitigation systems for multifamily buildings can be significantly more complex than single-unit dwellings. As such, a multifamily mitigation project MUST be managed by a qualified professional and may require licenses where state requirements are applicable.

System Planning for Multifamily Mitigation Projects:

Building Investigations

1. Conduct a **nondestructive investigation** to account for building features that may affect the work.
2. Conduct a **diagnostic investigation,** including pressure field extension tests.
3. Prepare design feasibility plans.

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Communication Planning:

Prior to any work, the Qualified Contractor must prepare a written **communication plan** for the building owners and managers. This plan includes information such as proposed designs, costs, safety information, and building specs.

Collateral Mitigation

Dwelling units located in buildings with a shared foundation and electrical meter can share some components of a radon mitigation system. However, each unit must be equipped with its own fan monitor.

More Information

This fact sheet contains information from the following two AARST/ANSI Standards of Practice:

1. **SGM-SF 2017: Soil Gas Mitigation Standards for Existing Homes**
   – Read the Standard here: https://standards.aarst.org/SGM-SF-2017/index.html
2. **RMS-MF 2018: Radon Mitigation Standards for Multifamily Buildings**
   – Read the Standard here: https://standards.aarst.org/RMS-MF-2018/index.html

Access all of the AARST/ANSI soil gas and radon Standards at https://www.epa.gov/radon/radon-standards-practice.