

Radon Exposure and Control

Radon is a colorless, odorless, tasteless radioactive gas that occurs naturally in soil gas, underground water, and outdoor air. It is present at various levels throughout the United States. Prolonged exposure to elevated concentrations of radon decay products (radon daughters) has been associated with increases in the risk of lung cancer. (An elevated concentration is defined as being at or above the Environmental Protection Agency guidelines of 4 picoCuries per liter, or 0.02 Working Level average annual exposure). Soil gas entering buildings through exposed soil in crawl spaces, through cracks and openings in slab-on-grade floors, and through below-grade walls and floors is the primary source of elevated radon levels. Radoncontaminated water, when heated and agitated (as in a dishwasher, shower, or washing machine) may also contribute to adverse radon exposure.

The following radon control measures should be utilized for new and existing buildings.

New Construction

- Site Evaluation - (At this time, there are no standard soil tests or specific standards for correlating the results of soil tests at a building site with subsequent indoor radon levels).
 - Determine if existing buildings in same geological area have elevated levels of radon.
 - Determine soil characteristics (above average uranium or radium concentrations, grain size, porosity, moisture content, overall soil permeability).
 - Determine if local sources of water contain excessive levels of radon.
- Methods to Reduce Pathways for Radon Entry
 - Place a 6-mil polyethylene vapor barrier under the slab. Seal all penetrations of the vapor barrier. Avoid puncturing barrier when pouring the slab.
 - Use proper water content in concrete mix to minimize slab shrinkage and cracks.
 - Install flexible expansion joint material at all floor wall joints and any control joints between separately-poured slab sections.
 - If French Drain slab channels are utilized, install perforated drain pipe loop under the slab, adjacent to the footing and imbedded in aggregate, and tie this pipe into a subslab ventilation system to draw radon gas away from the French Drain joint.
 - When possible, pour the foundation and slab as a single unit.

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- Remove all grade stakes and screed boards and fill in the holes as the slab is being finished.
- Seal around all pipes and wires which penetrate the slab.
- Floor drains, if installed, should drain to daylight, a sewer, or to a sump pump discharge.
- Sumps should be sealed at the top.
- Seal or cap the tops of all hollow block foundation walls.
- Seal around any pipe or wire penetrations of below-grade walls.
- Cover interior surfaces of masonry foundations with a water-resistant coating.
- Tape or seal all HVAC ductwork that is routed through a crawlspace or beneath a slab.
- Install airtight seals on any doors or other openings between basements and crawl spaces.
- Place a 6-mil polyethylene vapor barrier over the soil in the crawl space. Use a 12-inch overlap and seal the seams between barrier sections and seal edges to foundation wall.
- Methods to Reduce the Vacuum Effect
 - Locate and install vents in crawl space walls according to local building practices/ requirements.
 - Close and seal all openings and penetrations of the floor over the crawlspace.
 - Seal all spaces around chimney flues, plumbing chases. Install ducting to provide an external air supply for fireplace combustion.
 - Install extra weather sealing above the soil line to reduce depressurization caused by the Venturi effect.
 - Design HVAC systems to neutralize indoor and outdoor air pressure imbalances.
- Methods to Facilitate Post-Construction Radon Removal
 - Before pouring a slab, fill entire sub-floor area with a 4-inch thick layer of pea gravel to facilitate installation of a sub-slab ventilation system.
 - Lay a continuous loop of 4-inch diameter drain pipe around the inside or outside perimeter of the foundation footing. Run a vent from this loop into the side of a closed sump that, if necessary, can be equipped with a fan-driven vent to the outside.
 - Ventilate the soil beneath a slab by installing 4-inch PVC standpipes in the sub-slab aggregate that can be connected to 1 or more convection stacks or fan-driven stack pipes; or drill 4-inch holes through finished slabs for future insertion of vent pipes.
 - Locate all stack/ventilation exit points at or above the eave line of the roof and away from all doors and windows.
 - Where fan-driven sub-slab ventilation systems are utilized, provide adequate makeup air to prevent backdrafting.

New Construction

- Seal cracks in foundations, along basement walls, floors, moldings with low-shrinkage, long-life, gas-impervious caulk.
- Seal loose fitting pipes. Seal around all pipe and wire chases.
- Vent sump pumps to outside.
- Paint basement walls and floors with a gasimpervious paint.
- Increase air flow wherever possible, especially for basement areas. Keep crawl space vents open all year.
- Reduce time spent in areas with high radon concentrations.
- Stop smoking and do not allow smoking in building.

The loss prevention information and advice presented in this brochure are intended only to advise our insureds and their managers of a variety of methods and strategies based on generally accepted safe practices, for controlling potentially loss producing situations commonly occurring in business premises and/or operations. They are not intended to warrant that all potential hazards or conditions have been evaluated or can be controlled. They are not intended as an offer to write insurance coverage for such conditions or exposures, or to simply that Great American Insurance Company will write such coverage. The liability of Great American Insurance Company is limited to the specific terms, limits and conditions of the insurance policies issued.
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