



Radon Control Measures

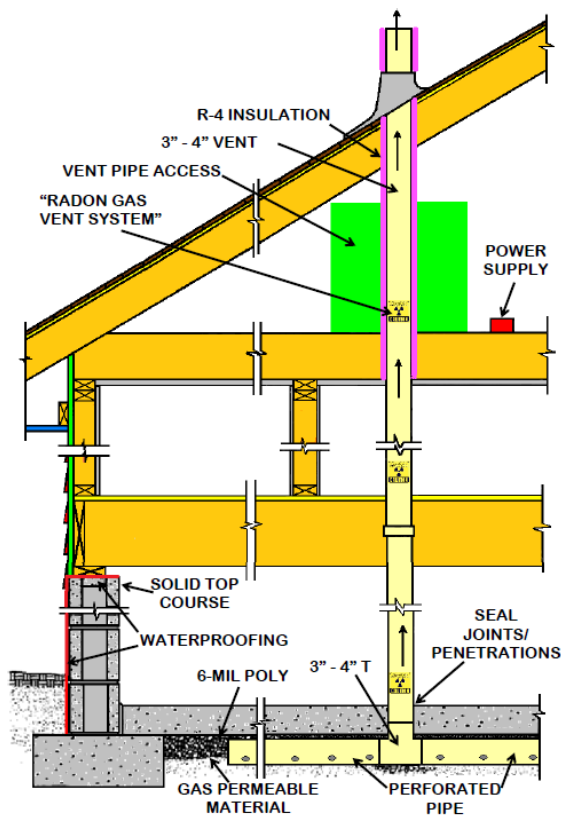
for

Active & Passive System

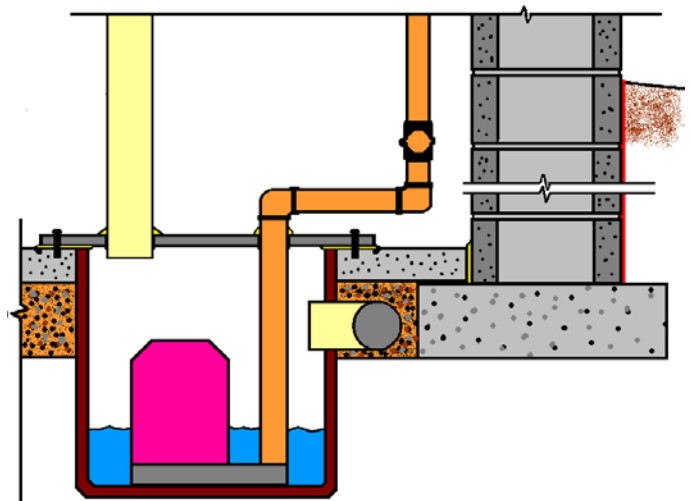
Muscatine County Building, Zoning, & Environmental Office
3610 Park Ave. West
Muscatine, IA 52761
563-263-0482 - www.muscatinecountyiowa.gov

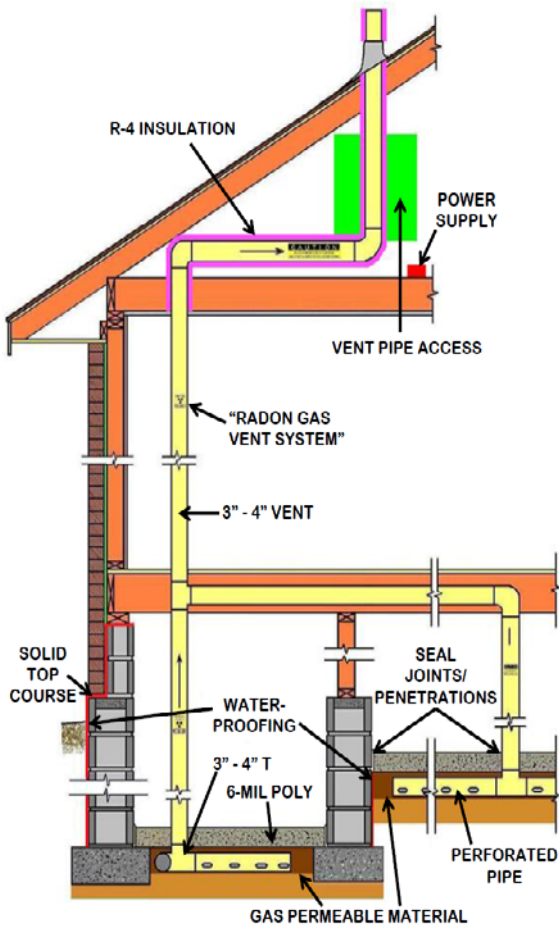
This handout is intended only as a guide and is based in part on the 2015 Iowa Residential Code, Muscatine County ordinances, and good building practice. While every attempt has been made to insure the correctness of this handout, no guarantees are made to its accuracy or completeness. Responsibility for compliance with applicable codes and ordinances falls on the owner or contractor. For specific questions regarding code requirements, refer to the applicable codes or contact your local Building Department.

TYPICAL PASSIVE RADON INSTALLATION

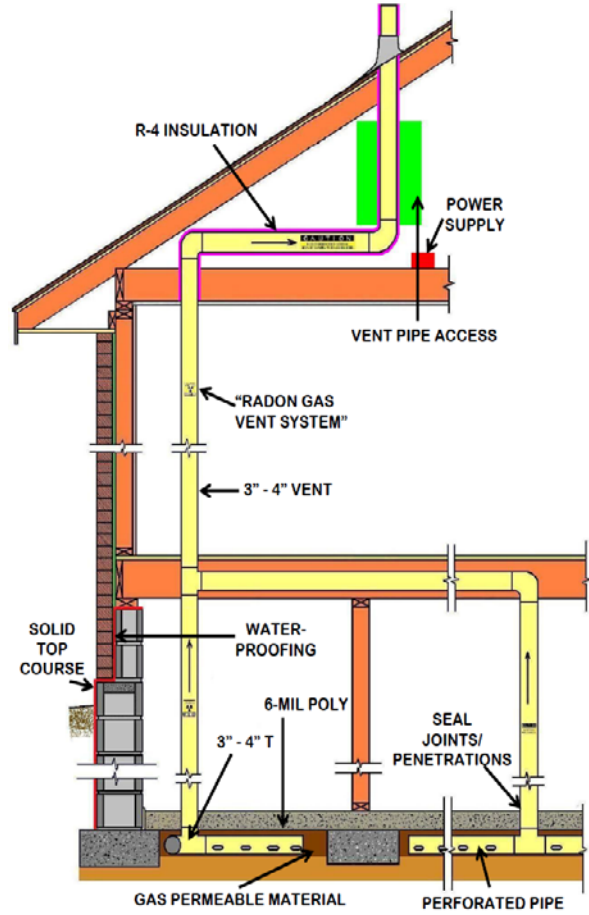


RADON VENT INSTALLED IN SUMP PUMP

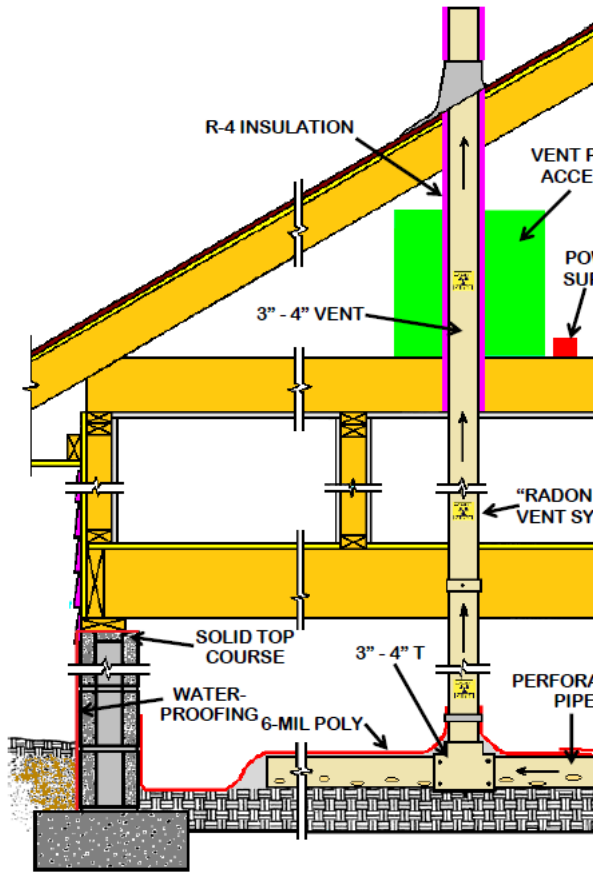




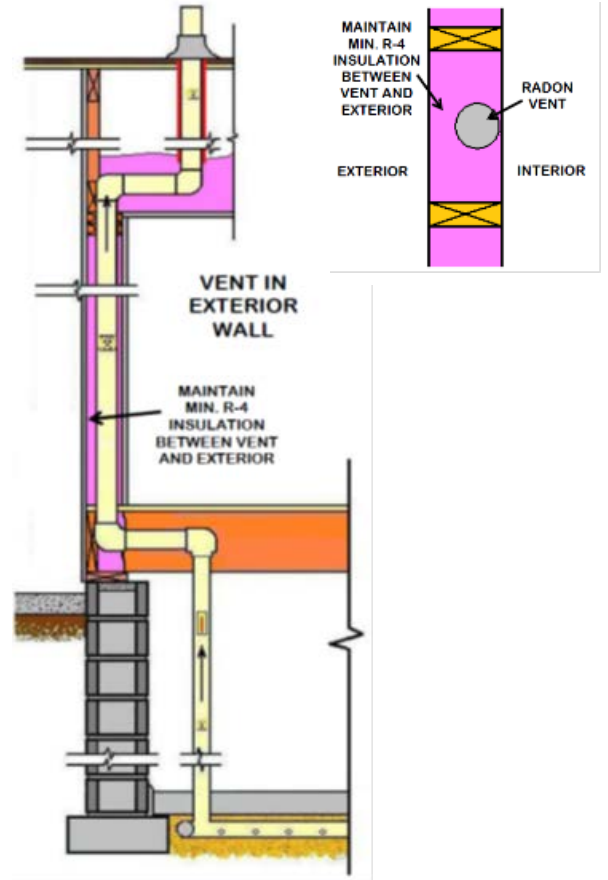
SPLIT OR MULTI LEVEL BASEMENT



FOOTING BARRIER / SEPARATE VENTS



CRAWL SPACE INSTALLATION



1303.2400
Purpose and Scope

Subpart 1. Applicability; residential structures. The purpose of parts 1303.2400 to 1303.2402 is to establish minimum requirements for passive radon control systems that apply to all new residential structures listed in items A to H:

- A. One-family dwellings;
- B. Two-family dwellings;
- C. Townhouses;
- D. Apartment buildings;
- E. Condominiums;
- F. Multistory buildings that include any residential occupancy;
- G. Mixed-occupancy buildings that include any residential occupancy; and
- H. Any addition to an existing dwelling that currently has a radon control system incorporated into the existing building.

If a fan is installed in a passive radon control system, this creates an active radon control system that must comply with the requirements of parts 1303.2400 to 1303.2403.

Subp. 2. Applicability; design features. The requirements of parts 1303.2400 to 1303.2402 shall apply to any structure identified in subpart 1, items A to H, if the structure is designed with any of the features identified in items A to F:

- A. A basement concrete slab in contact with earth;
- B. A crawl space;
- C. A wood foundation floor constructed on or directly above the earth;
- D. Slab on grade construction designs;
- E. Attached or tuck-under garages, unless the floor, wall and ceiling assemblies separating the garage from the dwellings are sealed; and
- F. Any building configuration that allows radon gas to enter the residential dwelling.

Exceptions:

- 1. Crawl spaces outside the conditioned space of the residential dwelling, when the crawl space is ventilated directly to the outside atmosphere according to IRC sections R408.1 and R408.2; IBC Section 1203.3 and 1203.3.1; Code of Federal Regulations Section 3285.505; and Minnesota Rules, Chapter 1350.
- 2. Hotels and motels.
- 3. Additions to existing dwellings that do not currently have a radon control system incorporated into the existing dwelling.

Subp. 3. Mixed occupancy or multistory occupancy buildings. When the nonresidential occupancy is in contact with the earth, all assemblies that separate the occupancies shall be sealed to prevent the movement of air and airborne gases between the nonresidential and residential occupancies. When the residential occupancy is in contact with the earth and adjacent to a nonresidential occupancy, the residential occupancy shall incorporate a radon control system and all assemblies that separate the nonresidential and residential occupancy shall be sealed to prevent the movement of air or airborne gases.

**1303.2401
DEFINITIONS**

Subpart 1. Terms not defined. For purposes of parts 1303.2400 to 1303.2403, where terms are not defined in parts 1303.2400 to 1303.2403, Merriam-Webster's Collegiate Dictionary, available at www.m-w.com, shall be considered as providing ordinarily accepted meanings. The dictionary is incorporated by reference, is subject to frequent change, and is available through the Minitex interlibrary loan system.

Subp. 2. Definitions. For purposes of parts 1303.2400 to 1303.2403, the terms defined in this part have the meanings given to them.

ACTIVE RADON CONTROL SYSTEM. "Active radon control system" means a system designed to achieve lower air pressure below the soil-gas membrane relative to the indoor air pressure by the use of a fan that has been added to the passive radon control system.

APPROVED. "Approved" means approval by the building official, pursuant to the Minnesota Building Code, by reason of inspection, investigation, or testing; accepted principles; computer simulations; research reports; or testing performed by either a licensed engineer or by a locally or nationally recognized testing laboratory.

CFR. "CFR" means the Code of Federal Regulations, title 24, Chapter 3285.

GAS PERMEABLE MATERIAL. A "gas permeable material" means any of the following:

1. A uniform layer of clean aggregate, a minimum of 4 inches thick. The aggregate shall consist of material that will pass through a 2-inch sieve and be retained by a ¼" sieve.
2. A uniform layer of sand, native or fill, a minimum of 4 inches thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases.
3. Other materials, systems or floor designs if the material, system, or floor design is professionally engineered to provide depressurization under the entire soil-gas membrane.

IBC. "IBC means the International Building Code incorporated by reference except as qualified and amended in Minnesota Rules, Chapter 1305.

IRC. "IRC" means the International Residential Code incorporated by reference except as qualified and amended in Minnesota Rules, Chapter 1309.

PASSIVE RADON CONTROL SYSTEM. "Passive radon control system" means a system designed to achieve lower air pressure below the soil-gas membrane relative to the indoor air pressure by use of a vent pipe that relies on stack effect to provide an upward flow of air from beneath the soil-gas membrane.

RADON GAS. "Radon gas" means a naturally occurring, chemically inert, radioactive gas.

SEALED. "Sealed" means to prevent the movement of air or airborne gases through a floor, wall, or ceiling assembly.

SOIL-GAS MEMBRANE. "Soil-gas membrane" means a continuous membrane of 6-mil polyethylene, or 8-mil cross-laminated polyethylene.

VENT PIPE. "Vent pipe" means a 3-inch or 4-inch diameter ABS or PVC pipe used to vent subsoil gases that have collected under the soil-gas membrane to the exterior of the dwelling.

1303.2402
REQUIREMENTS FOR PASSIVE
RADON CONTROL SYSTEMS

Subpart 1. Gas permeable material preparation. A gas-permeable material shall be placed on the prepared subgrade under all floor systems.

Subp. 2. Soil-gas membrane installation. A soil-gas membrane shall be placed on top of the gas-permeable material prior to placing a floor on top of or above the soil. The soil-gas membrane shall cover the entire floor area. Separate sections of membrane must be lapped at least 12 inches. The membrane shall fit closely around any penetration of the membrane to reduce the leakage of soil gases. All punctures or tears in the soil-gas membrane shall be repaired by sealing and patching the soil-gas membrane with the same kind of material, maintaining a minimum 12-inch lap.

Subp. 3. "T" fitting. A "T" fitting shall be installed beneath the soil-gas membrane with a minimum of 10 feet of perforated pipe connected to any two openings of the "T" fitting, or by connecting the two openings to the interior drain tile system. The third opening of the "T" fitting shall be connected to the vent pipe. The perforated pipe or drain tile and the "T" fitting shall be the same size as the vent pipe. All connections to the "T" fitting shall be tight fitting.

Subp. 4. Potential entry routes. Potential entry routes for radon gas shall be sealed according to this subpart, as applicable.

- A. **Floor openings.** Floor openings around bathtubs, showers, water closets, pipes, wires, or other objects that penetrate the soil-gas membrane and the concrete slab or other floor systems, shall be sealed.
- B. **Concrete joints.** All control joints, isolation joints, construction joints, or any other joints in the concrete slab, or the joint between the concrete slab and a foundation wall, shall be sealed. All gaps and joints shall be cleared of all loose material prior to sealing.
- C. **Foundation walls.** Penetrations of all foundation wall types shall be sealed. Joints, crack, or other openings around all penetrations of both exterior and interior surfaces of foundation wall shall be sealed.
 - 1) Hollow block masonry foundation walls shall be constructed with either:
 - a) continuous course of solid masonry at or above the exterior ground surface;
 - b) one course of masonry grouted solid at or above the exterior ground surface; or
 - c) a solid concrete beam at or above the finished exterior ground surface.
 - 2) When a brick veneer or other masonry ledge is installed, the masonry course immediately below the veneer or ledge shall be solid or filled.
- D. **Unconditioned crawl spaces.** All penetrations through floors or walls into unconditioned crawl spaces shall be sealed.
- E. **Sumps.** A sump connected to interior drain tile may serve as the termination point for the vent pipe, if the sump cover is sealed or gasketed and designed to accommodate the vent pipe. The sump pump water discharge pipe shall have a backflow preventer installed.

Subp. 5. Vent pipes.

- A. **Single vent pipe.** The vent pipe shall be primed and glued at all fittings and shall extend up from the radon control system's collection point to a point terminating a minimum of 12 inches above the roof. The vent pipe shall be located at least 10 feet away from any window or other opening into the conditioned spaces of the building. Vent pipes routed through unconditioned spaces shall be insulated with a minimum of R-4 insulation. Vent pipes within the conditioned envelope of the building shall not be insulated.
- B. **Multiple vent pipes.** In buildings where interior footings or other barriers separate the gas-permeable material into two or more areas, each area shall be fitted with an individual radon control system in accordance with item A, or connected to a single radon gas vent pipe terminating above the roof in accordance with item A.
- C. **Vent pipe drainage.** All components of the radon gas vent pipe system shall be installed to provide drainage to the ground beneath the soil-gas membrane.

- D. **Vent pipe accessibility.** Radon gas vent pipes shall be provided with space around the vent pipe for future installation of a fan. The space require for the future fan installation shall be a minimum of 24 inches in diameter, centered on the axis of the vent pipe, and shall extend a minimum distance of 3 vertical feet.
- Exception:** Accessibility to the radon gas vent pipe is not required if the future fan installation is above the roof system and there is an approved rooftop electrical supply provided.
- E. **Vent pipe identification.** All radon gas vent pipes shall be identified with at least 1 label on each story and in attics and crawl spaces. The label shall read: "Radon Gas Vent System."
- F. **Combination foundations.** Combination basements/crawl space or slab-on grade/crawl space foundations shall have separate radon gas vent pipes installed in each type of foundation area. Each radon gas vent pipe shall terminate above the roof or shall be connected to a single vent pipe that terminates above the roof.

Subp. 6. Power source. A power source consisting of an electrical circuit terminating in an approved electrical box shall be installed during construction in the anticipated location of the vent pipe fan to all for the future installation of a fan into a passive radon control system. The power source shall not be installed in any conditioned space, basement or crawl space.

1303.2403 REQUIREMENTS FOR ACTIVE RADON CONTROL SYSTEMS

When an active radon system is installed, all the requirements for the passive radon control system in parts 1303.2400 to 1303.2402 shall be met. In addition, an active radon control system shall incorporate items A to C in this part.

- A. **Radon gas vent pipe.** A radon gas vent pipe fan manufactured for radon control systems and rated for continuous operation that provides a minimum measurement of 50 cubic feet per minute at ½-inch water column shall be installed in the vertical vent pipe. The fan shall be attached to a radon gas vent pipe that connects the air below the soil-gas membrane with outdoor air and relies on the fan to provide upward air flow in the vent pipe. The radon gas vent pipe fan shall be installed outdoors, in attics, or in garages. The radon gas vent pipe shall not be installed in conditioned spaces of a building, basement, or crawl space. The radon gas vent pipe fan shall not be located where it positively pressurizes any portion of the vent pipe that is located inside conditioned space.
- B. **System monitoring device.** An audible alarm, a manometer, or other similar device shall be installed to indicate when the fan is not operating.
- C. **Luminaire and receptacle outlet.** A switch-controlled luminaire and the receptacle outlet near the fan shall be installed according to the Minnesota Electrical Code. The requirements of the International Mechanical Code, section 306, do not apply.