

## APPENDIX F

# PASSIVE RADON GAS CONTROLS

(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

### SECTION AF101 SCOPE

**AF101.1 General.** This appendix contains requirements for new construction in *jurisdictions* where radon-resistant construction is required. These requirements are intended to provide a passive means of resisting radon gas entry and prepare the *dwelling* for post-construction radon mitigation, if necessary (see Figure AF102). Active construction techniques, rather than passive techniques, shall be permitted to be used where approved.

Inclusion of this appendix by *jurisdictions* shall be determined through the use of locally available data or determination of Zone 1 designation in Figure AF101 and Table AF101(1).

### SECTION AF102 DEFINITIONS

**AF102.1 General.** For the purpose of these requirements, the terms used shall be defined as follows:

**DRAIN TILE LOOP.** A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a *basement* or crawl space footing.

**ENCLOSED CRAWL SPACE.** A crawl space that is enclosed with foundation walls inclusive of any windows, doors, access openings and required vents.

**GAS-PERMEABLE LAYER.** A gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate that is not less than 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill) that is not less than 4 inches (102 mm) thick and that is overlain by a soil gas collection mat or soil gas matting installed in accordance with the manufacturer's instructions.

**RADON GAS.** A naturally occurring, chemically inert, radioactive gas.

**SOIL-GAS-RETARDER.** A continuous membrane of 6-mil (0.15 mm) polyethylene used to retard the flow of soil gases into a *dwelling*.

**SUBMEMBRANE DEPRESSURIZATION SYSTEM.** A system designed to achieve lower submembrane air pressure relative to basement or crawl space air pressure by use of a vent drawing air from beneath the soil-gas-retarder membrane.

**SUBSLAB DEPRESSURIZATION SYSTEM (Passive).** A system designed to achieve lower subslab air pressure rela-

tive to indoor air pressure by use of a vent pipe drawing air from beneath concrete floor slabs or other floor assemblies that are in contact with the ground.

**VENT PIPE.** Not less than a 3-inch-diameter (76 mm) ABS or PVC gas-tight pipe extending from the gas permeable layer through the roof.

### SECTION AF103 PASSIVE RADON-RESISTANT SYSTEM REQUIREMENTS

**AF103.1 General.** The following components of a passive submembrane or subslab depressurization system shall be installed during construction.

**AF103.2 Entry routes.** Potential radon entry routes shall be closed in accordance with Sections AF103.2.1 through AF103.2.8.

**AF103.2.1 Floor openings.** Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs, or other floor assemblies, shall be filled with a polyurethane caulk or expanding foam applied in accordance with the manufacturer's instructions.

**AF103.2.2 Sumps.** Sumps open to soil or serving as the termination point for subslab or exterior drain tile loops shall be covered with a gasketed or sealed lid. Sumps used as the suction point in a subslab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

**AF103.2.3 Foundation walls.** Hollow block masonry foundation walls shall be constructed with a continuous course of *solid masonry*, one course of masonry grouted solid, or a solid concrete beam at or above *grade*. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be *solid masonry*, one course of masonry grouted solid, or a solid concrete beam. Joints, cracks or other openings around penetrations of both exterior and interior surfaces of foundation walls below *grade* shall be filled with polyurethane caulk.

**AF103.2.4 Dampproofing.** The exterior surfaces of foundation walls below *grade* shall be dampproofed in accordance with Section R406.

**AF103.2.5 Air-conditioning systems.** Entry points, joints or other openings into air-conditioning systems in enclosed crawl spaces shall be sealed.

**Exception:** Systems with gasketed seams or that are otherwise sealed by the manufacturer.

**AF103.2.6 Ducts.** Ductwork passing through or beneath a slab within a *dwelling* shall be of seamless material unless the air-conditioning system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed.

Ductwork located in enclosed crawl spaces shall have seams and joints sealed by closure systems in accordance with Section M1601.4.1.

**AF103.2.7 Crawl space access.** Access doors and other openings or penetrations between *basements* and adjoining crawl spaces shall be closed, gasketed or sealed.

**AF103.3 Basements or enclosed crawl spaces with soil floors.** In *dwelling*s with *basements* or enclosed crawl spaces with soil floors, the following components of a passive sub-membrane depressurization system shall be installed during construction.

**Exception:** *Basements* or enclosed crawl spaces that are provided with a continuously operated mechanical exhaust system in accordance with Section R408.3.

**AF103.3.1 Soil-gas-retarder.** The soil in *basements* and enclosed crawl spaces shall be covered with a soil-gas-retarder. The soil-gas-retarder shall be lapped not less than 12 inches (305 mm) at joints and shall extend to foundation walls enclosing the *basement* or crawl space. The soil-gas-retarder shall fit closely around any pipe, wire or other penetrations of the material. Punctures or tears in the material shall be sealed or covered with additional sheeting.

**AF103.3.2 "T" fitting and vent pipe.** A 3- or 4-inch "T" fitting shall be inserted beneath the soil-gas-retarder and be connected to a vent pipe. The vent pipe shall extend through the *conditioned space* of the *dwelling* and terminate not less than 12 inches (305 mm) above the roof in a location not less than 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point.

**AF103.4 Basements or enclosed crawl spaces with concrete floors or other floor systems and slab-on-grade dwellings.** The following components of a passive subslab depressurization system shall be installed during construction in slab-on-grade *dwellings* or in *dwellings* with *basements* or crawl spaces with concrete or other floor systems.

**AF103.4.1 Sub-slab preparation.** A layer of gas-permeable material shall be placed under concrete slabs and other floor systems that directly contact the ground and are within the walls of the dwelling.

**AF103.4.2 Soil-gas-retarder.** A soil-gas-retarder shall be placed on top of the gas-permeable layer prior to casting

the slab or placing the floor assembly. The soil-gas-retarder shall cover the entire floor area with separate sections lapped not less than 12 inches (305 mm). The soil-gas-retarder shall fit closely around any pipe, wire, or other penetrations of the material. Punctures or tears in the material shall be sealed or covered.

**AF103.4.3 "T" fitting and vent pipe.** Before a slab is cast or other floor system is installed, a "T" fitting shall be inserted below the slab or other floor system and the soil-gas-retarder. The "T" fitting shall be connected to a vent pipe. The vent pipe shall extend through the *conditioned space* of the *dwelling* and terminate not less than 12 inches (305 mm) above the roof in a location not less than 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point.

**AF103.5 Drain tile and sump used for depressurization.** As an alternative to inserting a vent pipe into a "T" fitting, a vent pipe shall be permitted to be inserted directly into an interior perimeter drain tile loop or through a sump cover where the drain tile or sump is exposed to the gas-permeable layer.

**AF103.6 Multiple vent pipes.** In *dwellings* where interior footings or other barriers separate the gas-permeable layer, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

**AF103.7 Combination foundations.** Where *basement* or crawl space floors are on different levels, each level shall have a separate vent pipe. Multiple vent pipes shall be permitted to be connected to a single vent pipe that terminates above the roof.

**AF103.8 Vent pipe drainage.** Components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the soil-gas-retarder.

**AF103.9 Vent pipe identification.** Exposed and visible interior vent pipes shall be identified with not less than one *label* on each floor and in accessible *attics*. The *label* shall read: "Radon Reduction System."

**AF103.10 Power source and access for future radon fan.** To provide for future installation of a radon fan, an electrical circuit terminated in an *approved* box shall be installed during construction in the anticipated location of the radon fans. An accessible clear space 24 inches (610 mm) in diameter by 3 feet (914 mm) in height adjacent to the vent pipe shall be provided at the anticipated location of a future radon fan.

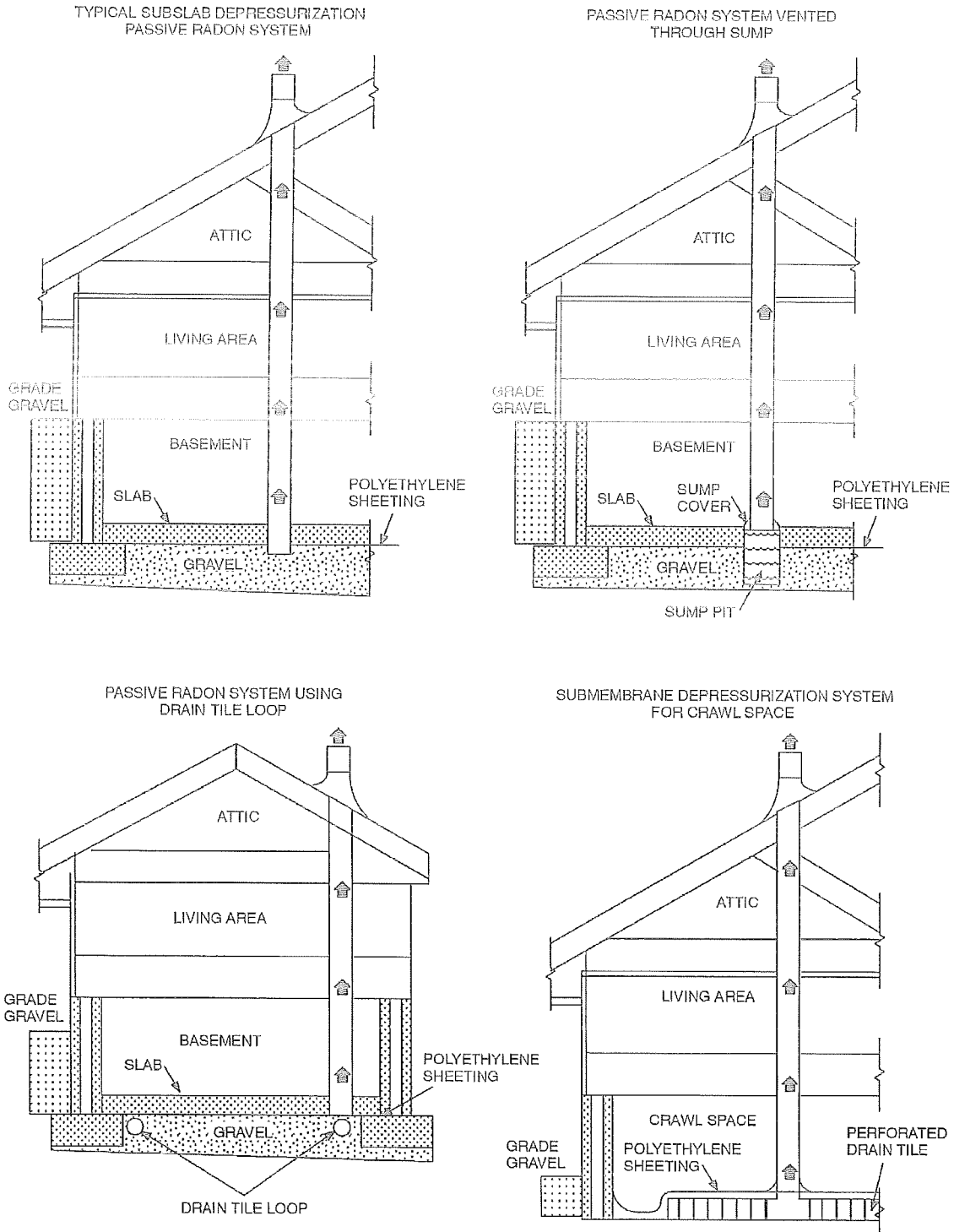


FIGURE AF102  
RADON-RESISTANT CONSTRUCTION DETAILS FOR FOUR FOUNDATION TYPES