



# TOWN OF CANTON<sub>CT</sub>

## BUILDING DEPARTMENT

### APPENDIX F – PASSIVE RADON GAS CONTROLS

(Reprinted from the 2018 Connecticut State Building Code)

**AF101.1 General.** This appendix contains radon-resistant construction techniques for new construction.

**AF101.2 Radon Mitigation Preparation Construction Technique.** All newly constructed detached one- and two-family dwellings and townhouses shall be provided with radon mitigation preparation construction in accordance with Section AF104 of this code.

**Exceptions:**

1. Radon-resistant construction technique complying with Section AF103 of this code.
2. Such systems shall not be required in existing buildings undergoing repair, addition or alteration. In the case of an addition to an existing building, this exception also applies to the new construction.

#### SECTION AF102.2 Definitions.

**AF102.1 General.** For the purposes of these requirements, the following 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 exterior perimeter of a *basement* or crawl space footing.

**RADON GAS.** A naturally occurring, chemically inert, radioactive gas that is not detectable by human senses. As a gas it can move readily through particles of soil and rock, and can accumulate under the slabs and foundations of homes where it can easily enter into the living space through construction cracks and openings.

**SOIL-GAS-RETARDER.** A continuous membrane of 6-mil polyethylene or other approved equivalent material 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 relative to indoor air pressure by use of a vent pipe routed through

the conditioned space of a building and connecting the subslab area with outdoor air, thereby relying on the convective air upward in the vent to draw air from beneath the slab.

**VENT PIPE.** Not less than a 3-inch diameter 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 construction techniques are intended to resist radon entry and prepare the building for post-construction radon mitigation, if necessary (see figure AF102).

**AF103.2 Subfloor preparation.** Potential radon entry routes shall be closed in accordance with Sections AF103.4.1 to AF103.4.10, inclusive, of this code.

**AF103.3 Soil-gas-retarder.** A layer of gas permeable material shall be placed under all concrete slab and other floor systems that directly contact the ground and are within the walls of the living spaces of the building, to facilitate future installation of a subslab depressurization system, if needed. The gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate, a minimum of 4" thick. This aggregate shall consist of material that will pass through a 2" sieve and be retained by a 1/4" sieve.

**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 floors.** In dwellings 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 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 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 above the roof in a location not less than 10 feet away from any window or other opening into the conditioned spaces of the building that is less than 2 feet below the exhaust point. The vent pipe shall be the same diameter throughout its length and shall be supported in accordance with section P2605.

**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. 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 above the roof in a location not less than 10 feet away from any window or other opening into the conditioned spaces of the building that is less than 2 feet below the exhaust point. The vent pipe shall be the same diameter throughout its length and shall be supported in accordance with section P2605.

**AF103.5 Drain tile and sump used for depressurization.** As an alternative to inserting a vent pipe into a “T” fitting, a vent pipe may 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 not less than 12 inches above the roof or each individual vent pipe shall terminate separately not less than 12 inches above the roof. The vent pipe shall be the same diameter throughout its length and shall be supported in accordance with section P2605.

**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 may 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 Systems.”

**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 in diameter by 3 feet in height adjacent to the vent pipe shall be provided at the anticipated location of a future radon fan.

## **SECTION AF104 RADON MITIGATION PREPARATION**

**AF104.1 Soil-gas-retarder.** A continuous membrane of 6-mil polyethylene or other approved equivalent material used to retard the flow of soil gases into a dwelling shall be installed under the floor slab in accordance with R506.2.3.

**AF104.2 “T” fitting and vent pipe.** Before a slab is cast or other floor system is installed, a 3-inch “T” fitting shall be inserted beneath the soil-gas-retarder. The “T” fitting shall be surrounded by aggregate consisting of material that will pass through a 2-inch sieve and be

retained by a 1/4-inch sieve not less than an 8-inch deep by 24-inch diameter hole. The aggregate shall be wrapped in filter fabric or equivalent material. The “T” fitting shall be connected to a 3-inch diameter ABS or PVC gas-tight pipe extending from the basement through the conditioned space of the dwelling and terminate not less than 12 inches above the roof in a location not less than 10 feet away from any window or other opening into the conditioned spaces of the building that is less than 2 feet below the exhaust point. The vent pipe shall be the same diameter throughout its length and shall be supported in accordance with section P2605.

**AF104.2.1 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.

**AF104.2.2 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.

**AF104.3 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. In addition, slab joints inclusive of cracks, penetrations, expansion joints and the slab to foundation connections, shall be filled with polyurethane caulk.

**AF104.4 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.

**AF104.5 Waterproofing and dampproofing.** The exterior surfaces of foundation walls below grade shall be waterproofed or dampproofed in accordance with Section R406.

**AF104.6 Power source and access for future radon fan.** To provide for future installation of a potential radon fan, a 3/4 inch electrical compliant conduit from the basement or room or space that the electrical panel is located to the attic shall be installed during construction. This conduit is intended to and dedicated for accommodating electrical wiring should a radon mitigation fan be installed. The conduit shall be capped in both the basement and in the attic. An accessible clear space 24 inches in diameter by 3 feet in height adjacent to the vent pipe shall be provided in the attic or at an acceptable location of a potential radon fan.

**AF104.7 Labeling.** The 3/4 inch electrical conduit shall be labeled at the top and bottom and specifically state: “Reserved for a Potential Radon Reduction Mechanical System”. The 3-inch diameter ABS or PVC gas-tight pipe shall be labeled at the bottom and in the attic and shall specifically state: “Reserved for a Potential Radon Reduction Mechanical System”.

If you have any questions please contact the Building Department.

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