Radon Control Methods

1303.xxxx INCORPORATION BY REFERENCE.

Appendix F, Radon Control Methods, of the ~~2006~~ 2012 edition of the International Residential Code (Appendix F) as promulgated by the International Code Council, Inc. (ICC), Falls Church, VA 22041, is incorporated by reference and made part of the Minnesota State Building Code except as qualified by the applicable provisions in chapter 1300, and as amended in parts ~~1322.2101~~1303.xxxx to ~~1322.2103~~1303.xxxx. Appendix F is not subject to frequent change and a copy of Appendix F, with amendments for use in Minnesota, is available in the office of the commissioner of labor and industry. Portions of parts ~~1322.2101~~1303.xxxx to ~~1322.2103~~1303.xxxx reproduce text and tables from Appendix F, which is copyrighted by the ICC. All rights reserved.

Scope

~~**General.**~~ These radon control requirements apply only to new residential buildings. (~~MS~~ MS §326B.106, subd.6.)

~~Intent~~

These provisions apply to new~~,~~; single family dwellings, two-~~-~~family dwellings, townhouses, apartment buildings, condominiums ~~and~~or ~~any~~ a similar building intended ~~to be occupied by persons~~ for use as a residence.

Exception: Any new building ~~where~~ in which the residential portion of the building is ~~an upper story of other occupancies~~at least one story above another occupancy such as, but not limited to, retail, mercantile, business, or a parking garage. This~~The~~ residential occupancy shall be sealed~~, caulked or otherwise atmospherically separated from~~at the occupancy ~~below~~seperation.

Definitions

~~**General.**~~ For the purpose of parts 1303.xxxx to 1303.xxxx, the terms defined have the meaning given to them.

ACTIVE DEPRESSURIZATION SYSTEM. "Active depressurization system" means a system designed to achieve lower ~~sub-membrane~~ air pressure below the soil-gas membrane relative to the indoor air pressure by use of a fan. The fan shall be attached to a vent pipe routed through the building ~~and connecting~~ that connects the ~~sub-membrane area~~ air below the soil-gas membrane with outdoor air, thereby relying on the fan to provide upward air flow in the vent pipe~~., thereby relying on the fans flow of air upward in the vent to draw air from beneath the sub-membrane~~.

~~**DRAIN TILE.** "Drain tile" mMeans a continuous length of drain tile or perforated pipe extending that extends around all of the entire internal perimeter of a basement or crawl space~~.**GAS PERMEABLE MATERIAL. "**Gas permeable material" means

1. A uniform layer of clean aggregate, a minimum of 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 ¼ -inch (6.4 mm) sieve;

2. A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases; or

Comment [d1]: This rule has been removed from Mn. Rule 1322 and placed here in 1303 because it is a Minnesota Specific requirements and the 1303 rule chapter is designed for this type of regulation This rule has also been clarified and simplified to reduce confusion for its adoption, enforcement and use. The format of how it appears in the National Documents is not always clear on if it is addressing a active or passive system. This entire rule will appear underlined and as new for the Revisor.

Comment [d2]: This is simply a update to Mn Statue

Comment [d3]: The previous language from Mn rule 1322 has been carried over and altered to be specific as to what buildings require radon mitigation and what buildings will not. There has been some confusion based on the State Statue language and the department felt a need to clarify the intent of the statue.

Comment [C4]: The rest of this sentence is really a description of how the system would work and not part of the definition itself. The first part of this paragraph has been changed to clarify where the depressurization will be and how the air flow creating this depressurization will be moved up throughout the building

Comment [d5]: Deleted Definition since it is not used in the rule there is no need to define it. We al;so addresses this as it should be defined as a "Gas Permeable material" because that is what it is intended to be in the language of the code.

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3. Other materials, systems, or floor designs with demonstrated capability to permit depressurization under the entire soil gas membrane

PASSIVE DEPRESSURIZATION SYSTEM. "Passive depressurization system" means a system designed to achieve lower ~~sub-membrane~~ air pressure below the soil-gas membrane relative to the indoor air pressure by use of a vent pipe that is routed through the building, ~~and~~ connecting the ~~sub-membrane area~~ air below the soil-gas membrane with the outdoor air, thereby relying on stack effect to provide an upward flow of air upward in the vent pipe to draw air from beneath the soil-gas membrane.~~, thereby relying on the convective flow of air upward in the vent to draw air from beneath the sub-membrane~~.

RADON GAS. "~~r~~Radon gas" ~~M~~means a naturally-occurring, chemically inert, radioactive gas~~ that is not detectable by human senses~~.

SOIL-GAS MEMBRANE. "Soil gas membrane" means a continuous membrane of 6-mil (0.15 mm) polyethylene, 3-mil (0.075 mm) cross-laminated polyethylene or other equivalent material approved by the building official.~~used to retard the flow of soil gases into a building.~~

SUB-MEMBRANE. "Sub-membrane" means below the soil-gas membrane.

SUB-MEMBRANE DEPRESSURIZATION SYSTEM. "Sub-membrane depressurization system" m~~M~~eans a system designed to achieve lower ~~sub-membrane~~ air pressure below the soil-gas membrane relative to basement or crawl space air pressure by the use of a vent system ~~drawing~~ that draws air ~~from beneath~~out from under the soil-gas membrane.

Requirements for passive depressurization systems

~~**General.**~~ The construction techniques in this ~~part~~ chapter shall be used to ~~resist~~ ~~restrict~~resist radon entry into the building.

Sub-membrane preparation. A layer of gas-permeable material shall be placed ~~directly~~ under the soil-gas membrane that directly contacts the ground and is within the walls of the conditioned spaces of the building.

~~The gas-permeable material shall consist of one of the following:~~

1. ~~A uniform layer of clean aggregate, a minimum of 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 ¼-inch (6.4 mm) sieve;~~

2. ~~A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases; or~~

3. ~~Other materials, systems, or floor designs with demonstrated capability to permit depressurization across the entire sub-floor area.~~

Soil-gas membrane. A soil-gas membrane shall be installed within the basement or crawl space of a building, placed on top of the gas-permeable ~~layer~~material.~~, to serve as a soil-gas membrane.~~ ~~by bridging any cracks or openings that may develop in the slab or floor assembly, and to prevent concrete or other debris from entering the void spaces in the aggregate base material.~~ The soil-gas membrane shall cover the entire floor area with separate sections of membrane that lap~~ped~~ at least 12 inches (305 mm) and are sealed with a sealant compatible with

Comment [C6]: Changes were made by the department to simplify and clarify the language of the documents that address Radon gas. Te changes here incorporate the definition changes noted earlier in the document and truly do clarify and simplify the code for easier enforcement, understanding and use .The rest of this sentence is really a description of how the system would work and not part of the definition itself.

Comment [d7]: Language in the definition was removed since it is vague as to the human senses an therefore is not enforceable. This new definition is clear and consice.

Comment [d8]: This language "approved by the Building Official was added to the code to be consistent with Mn. Rule Chapter 1300.0110 Supt. 13 on "Alternate materials, design and methods of construction.

Comment [d9]: To clarify where the depressurization must take place the department needed to add this definition into the code. This is referenced in the code language and is now defined.

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Comment [d10]: The department simply reworded this section using the new definition stated earlier. This has been done for additional clarity, enforcement and use.

Comment [d11]: This has been changed from part to chapter for the reason that it is now a chapter under Mn rule 1303

Comment [d12]: The above language was deleted here as it was moved to the definitions section and given a name. It truly belongs as a definition because it is defining something.

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the membrane used. The membrane shall fit closely around ~~(what?)~~ and be sealed to any pipe, wire or other penetration~~s~~ of the ~~material~~membrane. All punctures or tears in the ~~material~~ membrane shall be sealed.

~~W~~**~~Exception:~~** ~~W~~When a Floor System is not installed within the basement or crawlspace of a building, the soil shall be covered with a soil-gas-membrane that is ~~continuously~~ sealed continuously at all edges, seams, and to the foundation wall system.

Entry routes. Potential radon entry routes shall be sealed as follows.~~ (What are the potential radon entry routes? Should we give better description of what or where they could be or is it understood? It is not clear to me…)~~

Floor openings. Openings around bathtubs, showers, water closets, pipes, wires, or other objects that penetrate the soil–gas membrane, concrete slabs, ~~and~~ or ~~other~~ floor assemblies shall be sealed.

Concrete joints. All control joints, isolation joints, construction joints, or any other joint~~s~~ in a concrete slab~~s~~ or between a slab~~s~~ and a foundation wall~~s~~ shall be sealed. Gaps and joints shall be cleared of loose material prior to sealing.

Sumps. Sump pits ~~open to soil or~~ serving as the termination point for sub-membrane ~~interior~~ drain tile or exterior drain tile shall be covered with a gasketed or ~~otherwise~~ sealed lid. Sumps used as the suction point in a sub-membrane depressurization system shall have a lid designed to accommodate the vent pipe.

Foundation walls. Hollow block masonry foundation walls shall be constructed with one of the following to prevent passage of air from the ~~interior~~ core of the wall into the living space~~either~~:

1) a continuous course of solid masonry;
2) one course of masonry grouted solid; or
3) ~~-~~a solid concrete beam at or above finished exterior ground surface~~:. to prevent passage of air from the interior of the wall into the living space~~.

When~~re~~ a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be solid or filled. ~~J~~jJoints, cracks, or other openings around all penetrations of both exterior and interior surfaces of ~~masonry block or wood~~ foundation walls below the exterior ground surface shall be filled with ~~polyurethane~~ an approved caulking or equivalent sealant. Penetrations of all foundation wall types shall be sealed.

Unconditioned crawl space floors. Openings around all penetrations through floors that are located above unconditioned crawl spaces shall be caulked or otherwise sealed to prevent air leakage.

Unconditioned crawl space access. Access doors and other openings or penetrations, any of which are located between basements and adjoining unconditioned crawl spaces, shall be closed, gasketed, or ~~otherwise~~ sealed to prevent air leakage.

Ventilation. Vents to the building's exterior shall be installed in unconditioned crawl spaces~~Unconditioned crawl spaces shall be provided with vents to the exterior of the building~~. The minimum net area of ventilation openings shall comply with Section R408.1 of the International Residential Code (IRC).

Comment [d13]: The department simply rearranged and refered back to previous language used in this document. The intent and meaning are basically the same however the new language will be much mor clear and concise for enforcement and use.

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Comment [d14]: The department removed this as a exception because it is actually good code language. We also reworded it for clarity of enforcement and use.

Comment [d15]: No real change in the meaning the department simply cleaned up the language for clearer enforcement and use.

Comment [d16]: No real change in the meaning the department simply cleaned up the language for clearer enforcement and use.

Comment [d17]: No real change in the meaning the department simply cleaned up the language for clearer enforcement and use.

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Comment [d18]: No real change in the meaning the department simply cleaned up the language for clearer enforcement and use, and placed it in the proper formatting style.

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Comment [d19]: No real change in the meaning the department simply cleaned up the language for clearer enforcement and use.

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Comment [d20]: No real change in the meaning the department simply cleaned up the language for clearer enforcement and use.

Comment [d21]: No real change in the meaning the department simply cleaned up the language for clearer enforcement and use.

Comment [d22]: No real change in the meaning the department simply cleaned up the language for clearer enforcement and use.

Vent pipe. A ~~plumbing~~ vent pipe tee or other connection approved by the building official,~~connection (approved by whom? Maybe rephrase as "other connection approved by the building official"???)~~ shall be inserted horizontally beneath the soil-gas membrane.~~, with~~ The tee ~~or connection shall consist of~~ shall be connected to one ten-foot section of perforated pipe connected ~~to~~ at each side of the "T" fitting, ~~then~~ and shall be connected to a 3- or 4-inch-diameter (76 mm or 102 mm) fitting with a 3- or 4-inch vertical vent pipe installed through the soil-gas membrane. The vent pipe shall be primed and glued together at all fittings and shall extend up through the building floors, terminating a minimum of 12 inches (305 mm) above the roof. The vent pipe shall be located ~~in a location~~ at least 10 feet (3048 mm) away from any window or other opening into the conditioned spaces of the building~~.~~. ~~The (vent pipe or opening??) shall be no that is less than 2 feet (610 mm) below the exhaust point, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings. The vent~~ Vent pipes ~~may be~~ routed through unconditioned spaces, ~~if the vent pipe is~~shall be insulated with a minimum of R-4 insulation. Vent pipes within the conditioned envelope of the building shall not be insulated.

Vent Pipe materials. Vent pipe materials shall be air duct material listed and labeled to the requirements of UL181 for Class 0 air ducts, or any of the following piping materials that comply as a building sanitary drainage and vent pipe: cast iron; galvanized steel; brass or copper pipe; copper tube of a weight not less than that of copper drainage tube, Type DWV; and plastic piping.

Multiple vent pipes. In buildings where interior footings or other barriers separate ~~the~~ sub-membrane aggregate or other gas-permeable material, 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.

Vent pipe drainage. All components of the radon vent pipe system shall be installed to ~~provide~~ drain ~~positive drainage~~back to the ground beneath the soil-gas-membrane by gravity. Vent pipes shall not be trapped and shall have a minimum slope of one eighth unit vertical in 12 units horizontal.

Vent pipe accessibility. Radon vent pipes shall provide space around the pipe for future installation of a fan ~~system~~. The space required for the future fan installation shall be a minimum of 24 inches in diameter, centered on the axis of the vent ~~stack~~pipe, and shall extend a minimum distance of minimum 3 vertical feet ~~vertical distance~~.

Exception: The radon vent pipe ~~need not~~does not have to be accessible where an approved roof-top electrical supply is provided, if the future fan installation is above the exterior roof system.

Vent pipe identification. All radon vent pipes shall be identified with at least one label affixed to the vent pipe that is visible ~~on~~ in each ~~floor~~ story and in accessible attics. The label shall read: "Radon ~~Reduction System~~Vent Pipe."

Combination foundations. Combination basement/crawl space or slab-on-grade/crawl space foundations shall have separate radon vent pipes installed in each type of foundation area. Each radon vent pipe shall terminate above the roof or shall be connected to a single vent pipe that terminates above the roof.

Exception: A single vent pipe is permitted in a building with a combination foundation,

Comment [d23]: No real change in the meaning, the department simply cleaned up the language for clearer enforcement and use. Especially since a radon system is not allowed to be hooked into the buildings plumbing system we wanted to remove that information. Vent Pipe Materials are also now defined in this chapter as well.

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Comment [d24]: The Department added this language to this Chapter to be consistent with the IMC Section 512 on Sub-Slab Soil exhaust Systems

Comment [d25]: Deleted the word "the" , a formatting change, as the only change made. This does not change the intent or meaniog of this section.

Comment [d26]: The department made the changes here to clarify where the pipes shall drain back to. We also added that a vent pipe shall not have a trap in it, because a trap will not allow it to vent tha soil gasses.

Comment [d27]: No real change in the meaning the department simply cleaned up the language for clearer enforcement and use by adding the words "vertical" and "minimum distance ".

Comment [d28]: No real change in the meaning the department simply cleaned up the language for clearer enforcement and use.

Comment [d29]: No real change in the meaning the department simply cleaned up the language for clearer enforcement and use.

Comment [d30]: No real change in the meaning the department simply cleaned up the language by adding the word "pipe" for clearer enforcement and use.

if the soil gasses flow freely between the combination foundations and the vent is connected to ~~an approved~~ vent pipe system.

~~AF103.12~~ Power source. To ~~provide for~~permit future installation of an active sub-membrane ~~or sub-slab~~ depressurization system, an electrical circuit ~~terminated~~ terminating in an approved box shall be installed during construction in the anticipated location of vent pipe fans.

REQUIREMENTS FOR ACTIVE DEPRESSURIZATION SYSTEMS

Active Systems. When an active depressurization system~~s~~ is installed, all the requirements for the passive depressurization system shall be met. In addition, an active depressurization system shall incorporate the following:

1. A ~~Radon~~ vent pipe fan with a minimum ~~cfm~~ measurement of 50 cfm @ ½ inch w.g. shall be installed in the vertical vent pipe. If the fan is installed ~~on the interior side of~~inside the building envelope, the vent pipe on the discharge side of the fan shall be independently pressure tested at 5 psi for 15 minutes to e~~i~~nsure there are ~~the vent pipe contains there are~~ no leaks in the pipe ~~in the vent pipe itself~~.
2. A system monitoring device such as but not limited to, an audible alarm or a manometer, shall be installed~~.~~ to indicate when the fan is not operating. ~~(the device may need a better description – the ALJ will not understand this…maybe "such as…")~~

Comment [d31]: No real change in the meaning, the department simply cleaned up the language by deleting the words "an approved" since if built in accordance with this chapter the user can only use an approved system. This was done for clearer enforcement and use.

Comment [d32]: No real change in the meaning the department simply cleaned up the language for clearer enforcement and use.

Comment [d33]: This was rearranged out of the first part of the code and placed here for those who wish to install a active System. This gives them the additional itens they will need to do to change a passive system into a active system. In separating this out the code I s now muc clearer and easier to enfoce.

Comment [d34]: The department feels that this is a viable optional installation location for the fan of a radon System. When installing a fan in the attic there are many additional requirements that need to be met as well including the requirement for a light and light switch in the attic for the appliance. The building code says you will need a way to get to the appliance with out damaging the insulation. This would then require a cat walk or something that will now change the loading on the structural truss System. All these add costs and complexity to the code. Keeping it on the interior in a sealed pip system is much better and is easier ,more cost effective and is also better for future fan change outs etc…

Comment [d35]: No real change in the meaning the department simply cleaned up the language for clearer enforcement and use.