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RULE ADOPTIONS

Reporter

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Agency

COMMUNITY AFFAIRS > DIVISION OF CODES AND STANDARDS

Administrative Code Citation

Adopted Amendments: [N.J.A.C. 5:23-10.2](#), [10.3](#), and [10.4](#)

Text

Uniform Construction Code

Radon Hazard Subcode

Radon for Educational Group E Buildings

Proposed: July 20, 2020, at 52 N.J.R. 1365(a).

Adopted: November 13, 2020, by Lt. Governor Sheila Y. Oliver, Commissioner, Department of Community Affairs.

Filed: December 8, 2020, as R.2021 d.003, **with non-substantial changes** not requiring additional public notice and comment (see [N.J.A.C. 1:30-6.3](#)).

Authority: [N.J.S.A. 52:27D-119](#) et seq.

Effective Date: January 4, 2021.

Expiration Date: March 25, 2022.

Summary of Public Comments and Agency Responses:

Comments were received from Mitchell Malec, a former employee of the Department of Community Affairs (Department).

1. COMMENT: The commenter recalled a one-day workshop in 2003, regarding radon-resistant new construction in schools and the resulting document, "Proposed New Jersey Radon Resistant School Construction Code," and

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inquired into why the Department's presently proposed amendments deviate from this document. The commenter expressed general dissatisfaction with the proposed amendments and recommended that the Department instead initiate a New Jersey Register reproposal to mimic what is contained in the model codes, specifically by reviewing current IRC Appendix F provisions and the Soil-Gas Control Systems subsection within the 2018 International Green Construction Code (IgCC).

[page=51] RESPONSE: The Department thank the commenter for his concerns. This rulmaking applies to Educational Group E buildings, as defined by the buildings subcode; the International Residential Code (IRC) Appendix F applies to one- and two-family dwellings, which are outside the scope of this rulemaking. In addition, the International Green Construction Code (IgCC) would be considered an "above-code" item and is not within the scope of the Uniform Construction Code (UCC).

2. COMMENT: The commenter requested the source for the Department's proposed definition of "perforated pipe" and raised a number of issues with the definition. The commenter recommended "the use of a standard pattern 3 hole (1/2 or 7/8 inch holes) perforated pipe (4/6/8 o'clock installed with holes down or 4/8/12 o'clock turned with 12 o'clock hole down or one set of holes down)," but noted "standard pattern two hole perforated pipe seems okay too."

RESPONSE: The definition of perforated pipe is based upon Section 5.7.1 of ANSI/AARST CC-100 2018, which is referenced in the Summary statement of the notice of proposal. The Department thanks the commenter for bringing attention to the standard pattern of the pipe. The definition is corrected upon adoption to amend the size from five feet to five inches.

3. COMMENT: The following comments were made regarding the proposed definition of "radon collection mat": "I assume the Department is attempting to describe prefabricated soil gas collection mats or vapor mats or drainage mats that are often used for radon removal. As written it appears that only water or air is to pass through it. I would assume that the 'air' mat and not the 'water' mat would be specified for radon removal. I also assume that the Department reviewed the EPA's document 'Building Radon Out.' With that in mind, does this mat need a base course material? Should this drainage mat be filter fabric (geotextile fabric) wrapped? Since the proposed amendments are for schools (Group E), should similar provisions be added to the residential building provisions (Group R)? Does the Department have a listing of 'approved radon collection mats' ([N.J.A.C. 5:23-10.4\(b\)4ii](#))? Does the Department approve the mats or an agency or the AHJ being who? The benefit of adding this definition as proposed, considering the knowledge of most NJ architects and engineers and even homebuilders, is questionable. What is the source of this definition?"

RESPONSE: This rulemaking was a joint venture between the U.S. Environmental Protection Agency (EPA), New Jersey Department of Environmental Protection (DEP), New Jersey School Development Authority (SDA), and the Department. The EPA, through DEP, recommended this standard as applicable to Educational Group E buildings, rather than the document noted by the commenter. The use of this standard was further supported by the SDA. The definition of radon collection mat is based on Section 5.7.5 ANSI/AARST CC-100 2018. As for the radon collection mat, it remains an alternative for radon collection; a geotextile fabric would meet the intent of that collection mat and would be approved for use by the local enforcing agency.

4. COMMENT: The following comments were made regarding the proposed definition of "soil gas vent pipe": "... not less than three to four inches in diameter ..."? OD or ID? (Outside Diameter or Inside Diameter) Or since this is 'pipe' is it NPS (Nominal Pipe Size)? If 3 inch pipe is used, so not less than 3 inches (or is it?) and it is less than 4 inches, it's (sic) use is allowed (maybe) even if sub-slab pipe is reduced from 4 inches or 6 inches to 3 inches? When using the required 4 inch 'T', how is 3 inch vent pipe even possible if reducing not allowed? Just reviewed proposed [NJAC 5:23-10.4\(b\)11](#) along with Table 11 [...] Since the size of pipe is based on NPS, the conversion of 3 inch to 7.6 cm is illogical. A 3 inch PVC, schedule 40 pipe has an OD of 3.5 inches, an average ID of 3.042 inches with a minimum wall thickness of 0.216 inches. A 3 inch PVC, schedule 80 pipe has an OD of 3.5 inches, an average ID of 2.864 inches with a minimum wall thickness of 0.300 inches. (The Department can review four inch, six inch, eight inch, and other pipe sizes on their time.) So if the Department is considering the ID as the determining factor for the soil gas vent pipe; 3 inch PVC, schedule 80 pipe is not allowed. [Note that the NPS

compared to outside diameter is significantly different].” The commenter expressed further disagreement with the imperial to metric conversions for pipe and questioned how the transition from sewer and drain pipe to schedule 40 pipe would be completed.

RESPONSE: To be consistent with the existing code text at N.J.A.C. 5:23-10, this rulemaking for Group E buildings also provides nominal pipe sizes. Therefore, inside and outside diameters are not specified. The connection under the slab to perforated pipe does not require an airtight connection. The requirement to “mechanically fasten” can be accomplished by fitting a four-inch perforated pipe around the end of a three-inch “T” pipe fitting. A simple screw can hold the pipe and “T” in place when concrete slabs are cast. The Department appreciates the mention of the metric conversion. The existing Radon Hazard Subcode does not provide metric conversions, and for consistency, they will be removed from the proposed code.

5. COMMENT: The commenter issued further technical suggestions, stating, “Base course may not be needed if mat used. If gravel base course required - I would recommend requiring a minimum of 6 inches for Group E buildings when the footprint is large per vent pipe. The use of 6 mil polyethylene (does not state as minimum and is specific at 6-mil) is questionable in large footprint building construction due to amount of construction personnel traffic and equipment use. Maybe consider 10 mil or high density cross laminated polyethylene sheathing or reinforced EPM rubber roofing or use of spray applied vapor coating. And be specific of overlapping seams. And consider requiring sealing with acoustical sealant in lieu of requiring tape or just allowing overlapping. Consider specifying schedule 40 plastic pipe as a minimum. Consider requiring ‘looped’ systems. Proposed [NJAC 5:23-10.4\(b\)](#)4 is illogical per proposed definition of perforated pipe. (Five foot of pipe/‘T’/Five foot of pipe - If the 2-1/2 inch hole (or holes?) is made in the center of a 10 foot section of solid pipe, and then the pipe is cut in half at the hole, putting the 5 foot un-cut ends of the pipe into the ‘T’ results in a ‘T’ fitting with two solid pipe extensions with openings at each end.) Clarify requirement of using an appropriate gas vent mat connector when transitioning from mat to pipe. If 6 inch pipe is used, it is unlimited in area coverage? Please explain and justify this, especially since 3 inch and 4 inch pipe have limits. A 60,000 square foot slab area would require 15 four-inch pipes or only one six-inch pipe? [Note that the July NJ Register does not contain the “6” in Table 11.] I’m visualizing a 500 student middle or high school that has a foot print area the size of a football field. There are multiple sub-slab areas but they are joined with minimum 4 inch pipe sleeves. One six inch vent pipe, in one of the goal post areas, is all that is required? In this case, it seems that the minimum proposed radon construction techniques fall short in facilitating remediation if needed. Also the radon construction requirements for schools needs to be compared with the radon construction requirements for residential buildings. (Example: Three inch vent pipe for 2500 square foot Group E area versus three inch vent pipe ‘T’ for 1500 square foot Group R area.) Consider and require use of soil gas plenum boxes when appropriate. Reword electrical requirements. Include provisions that address vent piping through fire walls and ceilings (where PVC pipe not approved or need for fire stops or dampers) and piping provisions for grade beam or interior footings or barriers. Address future fan requirements, such as location and access, if fan or fans are needed for remediation. Where are the ‘habitable attics’ ([NJAC 5:23-10.4\(b\)](#)11.iv.)?”

RESPONSE: The Department thanks the commenter for noting the provision applicable to habitable attics. Because habitable attics apply only to Residential Group R buildings, this term has been deleted upon adoption at [N.J.A.C. 5:23-10.4\(b\)](#)11iv. The Department further thanks the commenter for his recommendations, but based on the review performed by the four involved agencies (EPA, DEP, SDA, and the Department), the standards proposed were established to be appropriate for Educational Group E buildings. There are differences between Residential Group R uses and Educational Group E uses; thus, it is appropriate to have separate requirements for these groups. For example, one- and two-family dwellings must be constructed in accordance with the International Residential Code, while all other buildings must be constructed in accordance with the International Building Code. Penetrations through rated walls are already addressed at Chapter 7 of the building subcode (the International Building Code (IBC)). The SDA, the agency that reviews most of the schools throughout the State, agreed with the standard as written. The Department does agree with the commenter regarding the electrical requirements and, upon adoption, has changed the language applicable to Group E buildings to reflect those of Group R buildings.

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[page=52] 6. COMMENT: The commenter stated that, for these provisions, the Department's only duty is "to state what needs to be done," for example, "Walls shall be damp proofed" without further direction, and argued that the provisions should only be elaborated upon if another adopted subcode requires it.

RESPONSE: The Department respectfully disagrees with the commenter. This rulemaking falls under the scope of the Department's rulemaking authority; the contents of the rulemaking were approved by the Uniform Construction Code Advisory Board.

7. COMMENT: The commenter asked about differences in radon protective measures between schools and residential buildings, specifically why the proposed amendments stipulate vent pipe termination at least 30 feet above grade for schools but only 20 for residential buildings.

RESPONSE: To the degree that the commenter seems to suggest a uniform standard for schools and residential buildings, the Department respectfully disagrees. The distance is based off of Chapter 9 of ANSI/AARST CC-100 2018. It is appropriate for these standards to differ from residential uses, as they are different structures built to different codes. One- and two-family dwellings are constructed in accordance with the IRC; all other buildings are constructed in accordance with the IBC. Furthermore, the International Energy Conservation Code is also split into residential and commercial portions, recognizing that residential construction needs unique standards.

8. COMMENT: The commenter recommended that the Department require the same radon construction techniques for all State-licensed childcare facilities of Group I-4 constructed within tier one areas, given the safety and health concerns of occupants of those buildings, as well as the cost benefits. The commenter acknowledged that, although such a requirement would be outside the scope of the enabling statute, [N.J.S.A. 52:27D-123a](#), the Department should nevertheless redefine the definition of Group E in the Radon Hazard Subcode to include Group I-4 licensed childcare facilities, or otherwise interpret the law's usage of "schools" to apply to childcare facilities. The commenter recommended that the Department promote new legislation to include those facilities should the above attempts fail.

RESPONSE: This rulemaking modifies the construction techniques for educational buildings. This rulemaking does not modify the scoping of its application. The commenter is correct that there are multiple laws relevant to environmental hazards in childcare facilities; however, the Department's rulemaking authority for radon is limited to that established by [N.J.S.A. 52:27D-123a](#), which does not include I-4 uses. It would be outside the Department's authority to revise the definition as requested.

Federal Standards Statement

No Federal standards analysis is required for the amendments because the amendments are not being adopted in order to implement, comply with, or participate in any program established under Federal law or under a State law that incorporates or refers to Federal law, standards, or requirements.

Full text of the adoption follows (additions to the proposal indicated in boldface with asterisks ***thus***; deletions from proposal indicated in brackets with asterisks *[thus]*):

SUBCHAPTER 10. RADON HAZARD SUBCODE

5:23-10.2 Definitions

The following words, terms, and abbreviations, when used in this subchapter, shall have the following meanings unless the context clearly indicates otherwise.

...

"Perforated pipe" means rigid plastic pipe that is a minimum wall thickness of Sewer and Drain ASTM-D2729, with at least a two-and-a-half-inch diameter hole every five *[feet]* ***inches*** of piping set approximately 120 degrees apart.

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...

"Radon collection mat" means an under slab prefabricated material specifically made to create a lateral void space under a slab to allow water or air to pass through it.

...

"Soil gas vent pipe" means a gas- and water-tight pipe not less than three to four inches in diameter that is routed from perforated pipe or radon collection mats (or equivalent approved method) to an approved location outside the building.

...

5:23-10.3 Enforcement

(a) (No change.)

(b) Enforcement responsibility shall be divided among subcode officials in the following manner:

1. Plan review and inspection with regard to compliance with [N.J.A.C. 5:23-10.4\(b\)](#) and (c) shall be the responsibility of the building subcode official, except that [N.J.A.C. 5:23-10.4\(b\)](#)13 and (c)14 shall be the responsibility of the electrical subcode official; and

2. (No change.)

5:23-10.4 Construction techniques

(a) (No change.)

(b) Group E buildings: The construction techniques set forth in this subsection shall be the minimum radon hazard protective features required to be incorporated into construction of buildings in tier one areas, and may be incorporated elsewhere, in order to minimize radon and radon progeny entry and facilitate any postconstruction radon removal that may be required. Enumeration of these construction techniques is not intended to preclude voluntary use of additional or more extensive techniques. Full compliance with these construction techniques is not required for additions; however, those construction techniques that are feasible shall be incorporated.

1. A base course in accordance with Section 1805.4.1 of the building subcode shall be installed below slabs and foundations. There shall be a continuous base course under each soil gas vapor barrier that is separated by foundation walls or footings. Punctures, tears, and gaps around penetrations of the soil gas vapor barrier shall be repaired or covered with an additional soil gas vapor barrier.

i. The soil gas vapor barrier shall be a continuous 6-mil (0.15 mm) polyethylene or an approved equivalent.

ii. Approved alternative soil gas collection areas, such as sealed crawlspaces, shall be permitted.

2. Foundation walls and floors in contact with the soil shall be damp-proofed or waterproofed in accordance with Section 1805 of the building subcode.

3. There shall be an unobstructed path for soil gas flow within the base course and out through the vent in the roof.

4. Soil gases below the foundation shall be collected by a perforated pipe with a diameter of not less than four inches *[(10 cm)]* and not less than 10 feet *[(3 m)]* in total length that is mechanically fastened to a "T" pipe with two horizontal openings within the base course for radon collection or an equivalent method.

i. The "T" pipe fitting connection within the base course and the soil gas vent pipe that extends to the roof shall be designed to prevent clogging of the radon collection path.

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ii. Alternately the soil gas collection shall be by approved radon collection mats or an equivalent approved method.

5. Openings in slabs, soil gas vapor barriers, and joints, such as plumbing, ground water control systems, soil gas vent pipes, piping, and structural supports, shall be sealed against air leakage at the penetrations with a polyurethane caulk, expanding foam, or other approved sealing method.

6. Gaps, seams, and joints below grade in walls and footings that surround soil gas collection areas shall be closed with cementitious materials, damp-proofing, or other approved products.

7. Closure shall be provided to prevent air migration between the base course that serves soil gas collection and the foundation drain systems located outside of the walls or footings that surround the soil gas collection areas.

8. Masonry unit walls below grade shall provide a barrier between soil gas and interior spaces. Barriers shall include, but not be limited to, closure of openings within the hollow masonry units, full grouting, solid masonry units, or other approved method.

9. A sump cover that substantially closes off the soil gas entry routes shall be provided for all sump installations.

[page=53] 10. Sumps intended for ground water control shall have gasketed lids or be otherwise sealed and shall not be connected to the soil gas exhaust system.

11. Vent pipes shall connect to a single vent that terminates at least 12 inches above the roof. If the design requires multiple individual vent pipes, they shall terminate separately at least 12 inches above the roof. Alternatively, vent pipe termination from the soil gas permeable layer shall extend to at least 30 feet above grade. In addition, vent pipes shall meet the following:

i. The vent pipe shall terminate no less than four feet vertically above or 10 feet horizontally away from operable windows, doors, or skylights.

ii. The vent pipe shall be sloped to avoid collecting condensate or rainwater.

iii. The vent pipe size shall not be reduced at any location as it goes from gas collection to the roof.

iv. Exposed and visible interior vent pipes shall be identified with not less than one label reading "Radon Reduction System" on each floor *[and in habitable attics]*.

v. The minimum vent pipe diameter and maximum area vented per vent pipe shall be as specified in Table 11 below.

vi. Multiple sub-slab areas that are segregated and combined into a single vent pipe shall be subject to minimum vent pipe diameter and maximum area vented per vent pipe specifications in Table 11 below.

TABLE 11

Maximum Vented Foundation Area	
Maximum Area Vented	Minimum Pipe Diameter
2,500 ft ² *[(232 m ²)]*	3 inch *[(7.6 cm)]*
4,000 ft ² *[(372 m ²)]*	4 inch *[(10 cm)]*
Unlimited	6 inch *[(15.2 cm)]*

12. In buildings that have interior footings or other barriers that separate the soil gas permeable layer, each area shall be fitted with an individual vent pipe.

[13. Each radon vent pipe shall have an electrical junction box installed within six feet of the area where a future radon fan may be installed.]

13. Electrical junction boxes shall be installed within six feet of the provided area, such as an accessible attic space, where a future in-line vent pipe fan and system failure alarms may be installed.

(c) Group R buildings: The construction techniques set forth in this subsection shall be the minimum radon hazard protective features required to be incorporated into construction of buildings in tier one areas, and may be incorporated elsewhere, in order to minimize radon and radon progeny entry and facilitate any post-construction radon removal that may be required. Enumeration of these construction techniques is not intended to preclude voluntary use of additional or more extensive techniques. Full compliance with these construction techniques is not required for additions; however, those construction techniques that are feasible shall be incorporated.

1.-16. (No change.)

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