

[N.J.A.C. 5:23-10.1](#)

This file includes all Regulations adopted and published through the New Jersey Register, Vol. 53 No. 1, January 4, 2021

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§ 5:23-10.1 Title, scope; intent

(a) This part of the regulations, adopted pursuant to the State Uniform Construction Code Act, P.L. 1975, c. 217, as amended and as supplemented by P.L. 1989, c.186 ([N.J.S.A. 52:27D-119](#) et seq.), and entitled Radon Hazard Subcode, shall be known, and may be cited throughout the regulations as, N.J.A.C. 5:23-10 and, when referred to in this subchapter, may be cited as "this subchapter".

1. This subchapter is intended to complement rules adopted by the New Jersey Department of Environmental Protection at N.J.A.C. 7:28-27 which provide for certification of persons who sell radon or radon progeny devices, test for radon or radon progeny, or mitigate radon in buildings.

i. Copies of [N.J.S.A. 26:2D-70](#) et seq. and N.J.A.C. 7:28-27 may be obtained from the New Jersey Department of Environmental Protection, PO Box 411, Trenton, NJ 08625-0411.

(b) This subchapter pertains to the construction of all buildings in Use Groups E and R, as defined in the building subcode, within recognized radon prone areas defined as tier one by the New Jersey Department of Environmental Protection and shall control matters relating to construction techniques to minimize radon gas and radon progeny entry and facilitate any subsequent remediation that might prove necessary.

(c) This subchapter seeks to protect and ensure public safety, health and welfare insofar as it is affected by radon entry into schools and residential buildings.

1. It is the purpose of this subchapter to establish standards and procedures to ensure that construction techniques that minimize radon entry and that facilitate any post-construction radon removal that is required shall be incorporated in the construction of all buildings in Use Groups E and R in tier one areas and are permitted to be incorporated elsewhere in New Jersey.

2. Radon is a colorless, odorless, tasteless, radioactive gas that occurs naturally in soil gas, underground water, and outdoor air. Prolonged exposure to elevated concentrations of radon and its progeny (that is, substances formed as a result of the radioactive decay of radon) has been associated with increases in the risk of lung cancer. An elevated concentration is defined as being at or above the guideline of 4 pCi/L or 0.02 WL average annual exposure.

3. Inasmuch as it is deemed to be more cost effective to build schools and residential buildings that resist radon entry than to remedy a radon problem after construction, design and construction techniques shall be employed, in tier one areas, to minimize pathways for soil gas to enter and features shall be incorporated during construction in tier one areas that will facilitate radon removal after completion of the structure if prevention techniques prove to be inadequate.

4. The installation of radon mitigation systems in existing portions of buildings shall not be subject to the construction technique requirements set forth in [N.J.A.C. 5:23-10.4](#).

History

HISTORY:

N.J.A.C. 5:23-10.1

Amended by R.1994 d.609, effective December 19, 1994 (operative April 1, 1995).

See: 26 New Jersey Register 2704(a), 26 New Jersey Register 5007(b).

Annotations

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§ 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.

"Foundation pipe drain" means a drain placed around the perimeter of a foundation that utilizes a perforated pipe. An "interior foundation pipe drain" is one placed around the internal perimeter of a foundation. An "exterior foundation pipe drain" is one placed around the external perimeter of a foundation.

"French drain" or "channel drain" means a path used to assist with water drainage which is installed in basements of some structures during initial construction, which consists of a gap (typically one-half to one and one-half inch in width) between the basement block wall and the concrete floor slab around the entire inside perimeter of the basement.

"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 inches of piping set approximately 120 degrees apart.

"Picocurie per Liter (pCi/L)" means 2.2 disintegrations per minute of radioactive material per liter. It may be used as a measure of the concentration of radon gas in air. One picocurie is equivalent to 10-12 Curies.

"Radon" means the radioactive noble gas radon-222.

"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.

"Radon progeny" means the short-lived radionuclides formed as a result of the decay of radon-222, including polonium-218, lead-214, bismuth-214 and polonium-214.

"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.

"Sump" means a pit or hole in or through a basement floor slab designed to collect water, and from which such water is drained by means of a vertical-lift or sump pump.

"Sump pump" means a pump used to move collected water out of the sump to an above grade discharge remote from the structure.

"Working level (WL)" means that concentration of short-lived radon decay products that will result in 130,000 million electron volts of potential alpha-particle energy per liter of air. Working level is a measure of radon decay product concentration in air.

History

HISTORY:

Amended by R.2021 d.003, effective January 4, 2021.

See: [52 N.J.R. 1365\(a\)](#), [53 N.J.R. 50\(a\)](#).

In the introductory paragraph, inserted a comma following "terms" and added definitions "Perforated pipe", "Radon collection mat", and "Soil gas vent pipe".

Annotations

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§ 5:23-10.3 Enforcement

(a) The provisions of this subchapter shall be enforced by the enforcing agencies having responsibility for the enforcement of this chapter.

(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. Enforcement responsibility for work other than which is required in [N.J.A.C. 5:23-10.4\(b\)](#) shall be as set forth in [N.J.A.C. 5:23-3.4\(a\)](#).

History

HISTORY:

Amended by R.1991 d.429, effective August 19, 1991.

See: 23 N.J.R. 1487(a), 23 N.J.R. 2501(a).

In (b), added 5 and 6.

Amended by R.1994 d.609, effective December 19, 1994 (operative April 1, 1995).

See: 26 N.J.R. 2704(a), 26 N.J.R. 5007(b).

Amended by R.2007 d.310, effective October 1, 2007.

See: [39 N.J.R. 135\(a\)](#), [39 N.J.R. 4113\(b\)](#).

Rewrote (b)1 and (b)2.

Amended by R.2021 d.003, effective January 4, 2021.

See: [52 N.J.R. 1365\(a\)](#), [53 N.J.R. 50\(a\)](#).

In (b)1, updated the N.J.A.C. references and inserted "and" at the end.

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§ 5:23-10.4 Construction techniques

(a) Tier one radon hazard areas shall be identified in accordance with the county/municipal radon listing established by the Department of Environmental Protection. The current list of municipalities in tier one areas is set forth in Appendix 10-A of this subcode.

(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 and not less than 10 feet 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.

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.

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- 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.
- 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.
 - 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 <2>	3 inch
4,000 ft ² <2>	4 inch
Unlimited	6 inch

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.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.A continuous vapor barrier not less than six-mil (.006 inch; .152 mm) polyvinyl chloride or polyethylene with any seams overlapped not less than 12 inches (305 mm), or other approved

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materials, shall be installed under the slab in basement and slab-on-grade construction and on the soil in crawl space construction.

2.Floors of basements and slab on grade construction shall be placed over a base course, not less than four inches (102 mm) in thickness, consisting of gravel or crushed stone containing not more than 10 percent of material that passes through a No. 4 sieve.

3.Basement slabs with interior foundation pipe drains installed shall have a solid three-inch minimum diameter vent pipe section installed in conjunction with this drainage system and be connected to an independent vent stack pipe terminating at an approved location on the exterior of the building.

4.Basement slabs which do not have an interior foundation pipe drain, and slab on grade construction (excluding non-habitable spaces such as garages), shall be provided with one three-inch minimum solid vent pipe section with a "T" pipe fitting for every 1,500 square feet, or portion thereof, of slab area, this vent pipe section to be installed into the sub-slab aggregate. The horizontal openings of the "T" pipe fitting shall be placed in the sub-slab aggregate. The vertical portion of the "T" pipe fitting shall be connected to an independent vent stack pipe terminating at an approved location on the exterior of the building. Where more than one vent pipe section is provided, interconnection of these sections into a single independent vent stack is permitted.

5.Basement slabs with French drains or channel drains shall not be allowed unless interior foundation pipe drains as described in this section are installed.

6.Joints in foundation walls and floors, including, without limitation, control joints between slab sections poured separately, and between foundation wall and floor (except for French drains or channel drains), as well as penetrations of the foundation walls and floor including, but not limited to, utility penetrations, shall be substantially sealed by utilizing a non-cracking polyurethane or similar caulk, or equivalent, in order to close off the soil gas entry routes. Any openings or penetrations of the floor over the crawl space shall be substantially sealed in order to close off the soil gas entry routes.

7.Untrapped floor drains shall be provided with removable stoppers which substantially close off the soil gas entry routes.

8.A sump cover which substantially closes off the soil gas entry routes shall be provided for all sump installations. If foundation pipe drains terminate at a sump installation and provisions are made for venting from the sump installation, the three-inch diameter solid vent pipe section requirement of (b)3 above need not be provided.

9.Any ductwork that is routed through a crawl space or beneath a slab shall be properly taped or sealed.

10.Sealant materials that substantially close off the soil gas entry routes shall be installed on any doors or other openings between basements and adjoining crawl spaces that are vented to the exterior.

11.The tops of foundation walls, including, without limitation, interior ledges, that are constructed of hollow masonry units shall be capped or the voids shall be completely filled.

12.The independent vent stack pipe provided in accordance with (b)3, 4 or 8 above shall be an adequately supported, gas tight, three-inch minimum diameter solid pipe, through any enclosed portions of the building. The pipe shall be routed in a manner that makes it accessible for the installation of a future in-line vent pipe fan in a non-conditioned (not heated or cooled) space, including, without limitation, an attic space, but excluding a basement or crawl space, and installed in a configuration, and supported in a manner, that will ensure that rain water or condensate accumulation within the pipes will drain downward into the ground beneath the slab or vapor barrier. The vent stack pipe shall meet the following termination requirements:

- i. Vent pipes shall terminate at least 12 inches above the roof, measured from the highest point where the vent intersects the roof. When a vent pipe extension terminates on an occupiable roof the vent pipe shall extend at least seven feet above the roof surface. Exception: Buildings more

than three stories in height shall be allowed to extend vent pipe terminals through a wall provided that the termination is at least 20 feet above grade and is effectively screened.

ii.No vent terminal shall be located directly beneath any door, window, or other ventilating opening of the building or of an adjacent building nor shall any such vent terminal be within 10 feet horizontally of such an opening unless it is at least two feet above the top of such opening.

iii.No vent terminal shall be closer than 10 feet horizontally from any lot line. Where this 10 foot horizontal distance is not possible due to lot width, the vent terminal shall be placed as remote from the lot line as practicable.

13.Radon vent pipes shall be identifiable and clearly labeled at intervals of not more than 25 feet in concealed locations, not more than 50 feet in exposed locations and not less than once in any room or space.

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

15.In combination basement/crawl space or slab-on-grade/crawl space buildings a three-inch minimum solid vent pipe shall be provided between the areas and interconnected into the independent vent stack to permit use of a single in-line vent pipe fan if activation of the system is desired.

16.In order to reduce stack effect, air passages that penetrate the conditioned envelope of the building, such as attic access openings, or other openings installed in top-floor ceilings, shall be closed, gasketed or otherwise sealed with materials approved for such applications.

History

HISTORY:

Amended by R.1994 d.609, effective December 19, 1994 (operative April 1, 1995).

See: 26 N.J.R. 2704(a), 26 N.J.R. 5007(b).

Amended by R.2021 d.003, effective January 4, 2021.

See: [52 N.J.R. 1365\(a\)](#), [53 N.J.R. 50\(a\)](#).

Added (b); recodified former (b) as (c); and in (c), inserted "Group R buildings:" and deleted "in Use Groups E and R" following the second occurrence of "buildings".

Annotations

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APPENDIX 10-A

New Jersey Municipalities in Tier 1

	County		M u n i c i p a l i t y
Burlington	Chesterfield	Washington	
	Mansfield		
Camden	Lawnside Borough	Runnemede	
	Magnolia	Somerdale	
Cumberland	Bridgeton	Lawrence Township	
	Greenwich	Upper Deerfield Township	
Gloucester	Deptford	South Harrison Township	
	East Greenwich	Swedesboro	
	Greenwich	Wenonah	
	Harrison	Woolwich	
Hunterdon	All municipalities except Union		
Mercer	Ewing	Pennington	
	Hopewell Borough	Princeton Borough	
	Hopewell Township	Princeton Township	
	Lawrence		
Middlesex	Highland Park	Piscataway	
	North Brunswick		
Monmouth	Allentown	Marlboro	
	Colts Neck	Millstone Township	

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	Freehold Borough	Roosevelt
	Freehold Township	Shrewsbury Borough
	Holmdel	Shrewsbury Township
	Little Silver	Upper Freehold
Morris	Chester Borough	Morris
	Chester Township	Morris Plains
	Dover	Morristown
	Harding	Mount Olive
	Jefferson	Randolph
	Kinnelon Borough	Riverdale
	Long Hill	Roxbury
	Mendham Borough	Victory Gardens
	Mendham Township	Washington
	Mine Hill	Wharton
Passaic	Pompton Lakes	West Milford
Salem	Mannington Township	Woodstown
	Pilesgrove	
Somerset	Bernardsville	Millstone
	Bernards	Montgomery
	Branchburg	Peapack & Gladstone
	Bridgewater Township	Rocky Hill
	Far Hills	Somerville
	Hillsborough	Warren
	Franklin	Watchung
Sussex	All municipalities	
Warren	All municipalities	

History

HISTORY:

Public Notice.

See: 23 N.J.R. 3745(a).

Revised Tier I list issued.

Administrative change.

See: 26 N.J.R. 3707(b).

Administrative change.

See: [27 N.J.R. 3600\(a\)](#).

Administrative change.

See: [28 N.J.R. 4783\(a\)](#).

Administrative change.

See: [37 N.J.R. 885\(b\)](#).

Administrative change.

See: [47 N.J.R. 2061\(a\)](#).

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