



COURSE 18181

Radon

Exam Material

Uscontractorlicense LLC

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Summary Of This Course

Radon

Approved by the

Wisconsin Department of Safety and Professional Services Safety and Buildings Division

Course Identification Number 18181

Educational Credit Hours: 6 Hours

Course Provider:

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This Radon course is designed to familiarize the contractors with basic facts about Radon, how to build a Radon Resistant Building with Wisconsin specific Radon support and contact information.

This Course is approved for the following electrical Registrations/Certifications or Licenses:

This course is a distance learning or e-learning course, which allows the attendee to complete the course on their time schedule.

Course Outline

This course is a distance learning or e-learning course, which allows the attendee to complete the course on their time schedule.

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Exam

180 questions related to the reference materials are used to test the attendee on their comprehension of the materials. A 70% score will need to be attained in order to pass this course.

Answer Sheet(s)

2 bubble style answer sheet(s) are included. When you are finished with the exam, you may return the answer sheets for grading to:

By Mail: Uscontractorlicense LLC
PO Box 268
Platteville, Wisconsin 53818

By Email: michael@uscontractorlicense.com
By Fax: 608-571-0096

Once we get the answer sheets back, we will grade them, enter your hours into the attendance portal and email or mail you back your certificate of completion(s). You will be responsible for renewing your license with the DSPS at www.license.wi.gov website.

Any questions, please contact us at 608.348.6688

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Radon

Basic Radon Facts

1. Radon is a naturally occurring radioactive gas released in _____ that can build up to dangerous levels inside any home.

- a. rock
- b. soil
- c. water
- d. all of the above

2. Radon gas is _____ and the only way to know if your home has a radon problem is to test for it.

- a. odorless
- b. invisible
- c. both a. and b.
- d. none of the above

3. EPA estimates that radon causes more than _____ deaths from lung cancer each year in the U.S.

- a. 5000
- b. 10,000
- c. 5,000
- d. 20,000

4. In the United States, the average indoor radon level is about _____. The average outdoor level is about _____.

- a. 1.3 pCi/L / 0.4 pCi/L
- b. 0.4 pCi/L / 1.3 pCi/L
- c. 1.3 pCi/L / 1.0 pCi/L
- d. 2.4 pCi/L / 0.8 pCi/L

5. Every home should be tested before, or soon after, you move in.

- a. True
- b. False

Building the Framework: Introduction

6. The U.S. Surgeon General and EPA recommend fixing homes with radon levels at or _____. EPA also recommends that people think about fixing their homes for radon levels _____.

- a. above 1.3 pCi/L /between 1.4 pCi/L and 2 pCi/L
- b. above 4 pCi/L / between 2 and 4 pCi/L
- c. above 5 pCi/L /between 4 pCi/L and 6 pCi/L
- d. above 3 pCi/L /between 3 pCi/L and 5 pCi/L

7. Your customers rely on you to construct a high quality, safe home.

- a. True
- b. False

8. You can _____ the radon level in the homes that you build, and build the radon problems right out of the house.

- a. not lower
- b. effectively lower
- c. not control
- d. never eliminate

Does it make sense to build homes radon-resistant?

9. About _____ is being built radon-resistant in the United States every year, averaging about 200,000 homes annually, according to annual surveys of home builder practices conducted by the National Association of Home Builders (NAHB) Research Center over the past decade.

- a. one in every six homes
- b. two in every six homes
- c. three in every six homes
- d. our in every six homes

10. The features can also decrease moisture and other soil gases entering the home, reducing _____, pesticide gases, volatile organic compounds, and other indoor air quality problems.

- a. molds
- b. mildews
- c. methane
- d. all of the above

11. On average, installing radon-resistant features during construction costs about _____, or even less if you already use some of the techniques for moisture control or energy efficiency.

- a. \$250 - \$400
- b. \$350 - \$500
- c. \$450 - \$600
- d. \$550 - \$700

12. In contrast, retrofitting an existing home will typically cost _____.

- a. between \$600 and \$2000
- b. between \$700 and \$2200
- c. between \$800 and \$2500
- d. between \$900 and \$3000

13. A basic radon reduction system, called a passive sub-slab depressurization system, effectively reduces radon levels an average of _____ and, in most cases, to levels below EPA's action level.

- a. about 25%
- b. about 50%
- c. about 75%
- d. about 95%

14. Homes with a _____ system can be upgraded to an _____ system with the simple installation of a special in-line fan to further reduce the radon level.

- a. passive / passive
- b. active/ active
- c. active / passive
- d. passive / active

What is radon?

15. Radon is a radioactive gas. It comes from uranium and radium in soils, which can be found everywhere in the world.

- a. True
- b. False

16. Uranium is present in rocks such as _____, phosphate and _____.

- a. granite
- b. shale
- c. pitchblende
- d. all of the above

17. There is a way to sense or smell the presence of radon, thru Radon training.

- a. True
- b. False

Is Radon a Significant Health Risk?

18. Not everyone exposed to elevated levels of radon will develop lung cancer, but your risk of getting radon-induced lung cancer _____ as your exposure to radon _____ (either because the radon levels are higher or you live in the home longer).

- a. increases/ increases
- b. remains stable / increases
- c. increases / remains stable
- d. none of the above

19. Radon is classified as a Class B carcinogen (known to cause cancer in humans)

- a. True
- b. False

20. Some other Class A carcinogens are: _____.

- a. arsenic
- b. asbestos
- c. benzene
- d. all of the above

Is Radon a Health Problem in Homes?

21. Radon causes 15,000 - 22,000 deaths per year, making it _____ cause of lung cancer in the U.S.

- a. serious
- b. the second leading
- c. the third leading
- d. the fourth leading

Is There a Safe level of Radon?

22. Using the 'Comparison of Death Risks' chart, the letter 'B' represents:

- a. Home Fires
- b. Drowning
- c. Radon
- d. Motor Vehicle Accidents

23. There is no safe level of radon.

- a. True
- b. False

24. High indoor radon levels are found in eastern seashore states only.

- a. True
- b. False

How Does Radon Enter a House?

25. _____ main factors drive radon entry into homes. All of these factors exist in most homes throughout the country.

- a. Three
- b. Four
- c. Five
- d. Six

26. The soil is permeable enough to allow radon to migrate into the home through the _____.

- a. basement
- b. slab
- c. crawlspace
- d. all of the above

27. Uranium is present in the soil _____ in the United States.

- a. in swampy areas only
- b. in sandy areas only
- c. nearly everywhere
- d. both a. and b.

28. An _____ between the basement or crawlspace and the surrounding soil draws radon into the home.

- a. temperature difference
- b. air pressure difference
- c. both a. and b.
- d. none of the above

29. There are pathways for the radon to enter the basement, such as small holes, _____, _____, or sumps. All homes have radon entry pathways.

- a. plumbing pathways
- b. cracks
- c. both a. and b.
- d. none of the above

How does air pressure affect radon entry?

30. Air handlers and leaky return ducts _____ draw in radon; they can also _____ it throughout a home.

- a. can not only / distribute
- b. may contribute to / eliminate
- c. might / distribute
- d. sometimes / eliminate

31. One reason why this pressure difference occurs is because _____ remove air from inside the house.

- a. windows
- b. doors
- c. exhaust fans
- d. wood stoves

32. Mechanical systems, such as the furnace or central air conditioners, may also contribute to the difference in air pressure.

- a. True
- b. False

Does Foundation Type Affect Radon Entry?

33. Radon can enter through _____ and _____ in the slab.

- a. cracks
- b. floor-to wall joints
- c. control joints
- d. all of the above

34. Unless these buildings [_____] are set up on piers without any skirting placed around them, interior vacuums can cause radon to enter these types of homes as well.

- a. Manufactured Homes
- b. Basement
- c. Crawlspace
- d. Slab-on-Grade

35. Slabs built on grade _____ just as many openings to allow radon to enter as do basements.

- a. have
- b. can have
- c. always have
- d. none of the above

36. Even with crawlspace vents, _____ vacuum is still exerted on the crawlspace. Measurements in homes with crawlspaces have shown elevated radon levels.

- a. strong
- b. a constant
- c. a slight
- d. a zero

What can you do to reduce Radon in New Homes?

37. Sealing large cracks and openings is important to do when you build a home, both in the lower portion of the home to reduce radon _____, and in the upper portion of the home to reduce _____.

- a. entry points / stack effect
- b. stack effect / entry points
- c. entry points / entry points
- d. stack effect / stack effect

38. Plastic sheeting and foundation sealing and caulking can serve as barriers to _____, entry of other soil gases, and _____.

- a. radon entry
- b. moisture
- c. both a. and b.
- d. None of the above

39. Seamless ducts are preferred for runs through crawlspaces or beneath slabs.

- a. True
- b. False

40. Sealing and caulking reduce stack effect, and thus reduce the _____ in lower levels in the home.

- a. positive pressure
- b. negative pressure
- c. both a. and b.
- d. none of the above

41. Any seams or joints in ducts shall only be sealed at the homeowner's request.

- a. True
- b. False

What are the radon-resistant features?

42. If the pipe is routed through _____ (such as an interior wall or the furnace flue chase, following local fire codes), the stack effect can create a natural draft in the pipe.

- a. warm space
- d. cold space
- c. well insulated space
- d. All of the above

43. In many parts of the country, the _____ beneath the slab (gas-permeable layer), _____, _____ are already employed for moisture reduction. In these cases, simply adding the vent pipe and junction box is extremely cost-effective for reducing radon.

- a. plastic sheeting / gravel/ sealing and caulking
- b. gravel /plastic sheeting/ sealing and caulking
- c. sealing and caulking / plastic sheeting/ gravel
- d. None of the above

44. Using the sample picture from the review materials section on Page 9 "What are the radon-resistant features', the letter 'D' represents:

- a. caulking
- b. sealant
- c. gravel beneath slab
- d. polyethylene soil-gas retainer

45. Using the sample picture from the review materials section on Page 9 "What are the radon-resistant features', the letter 'F' represents:

- a. caulking
- b. sealant
- c. gravel beneath slab
- d. polyethylene soil-gas retainer

46. Using the sample picture from the review materials section on Page 9 "What are the radon-resistant features', the letter 'B' represents:

- a. caulking
- b. sealant
- c. junction box
- d. polyethylene soil-gas retainer

47. Using the sample picture from the review materials section on Page 9 "What are the radon-resistant features', the letter 'E' represents:

- a. polyethylene soil-gas retainer
- b. radon vent pipe
- c. caulking
- d. junction box

48. Using the sample picture from the review materials section on page 9 "What are the radon-resistant features', the letter 'C' represents:

- a. sealant
- b. caulking
- c. gravel beneath slab
- d. junction box

49. Using the sample picture from the review materials section on Page 9 "What are the radon-resistant features', the letter 'A' represents:

- a. radon vent pipe
- b. caulking
- c. gravel beneath slab
- d. junction box

50. A _____ (recommended) PVC pipe or other gas-tight pipe (commonly used for plumbing) runs from the gas permeable layer through the house and roof to safely vent radon and other soil gases above the house.

- a. 1- or 2- inch
- b. 2- or 3- inch
- c. 3- or 4- inch
- d. 4 inch or larger

51. Usually a _____ of clean, coarse gravel is used beneath the slab to allow the soil gas to move freely underneath the house. Other options are to install _____, _____ (also known as drainage mat or soil gas matting).

- a. 4-inch layer of
- b. a loop of perforated pipe
- c. soil gas collection mat
- d. all of the above

Is there a way to test the lot before building?

52. Soil testing for radon is highly recommended for determining whether a house can be built without radon-resistant features.

- a. True
- b. False

53. The cost of a single soil test for radon ranges from \$70 to \$150, and at least _____ could be required to accurately characterize the radon in the soil at a single building site.

- a. 4 to 8 tests
- b. 4 to 9 tests
- c. 5 to 9 tests
- d. 6 to 10 tests

54. It is much easier and far less costly to prepare the sub-grade to improve soil gas flow _____ the slab is cast.

- a. before
- b. during
- c. after
- d. any time

55. The best way to determine the radon level in a home: test the home for radon after occupancy.

- a. True
- b. False

Would I incur liability by installing the features?

56. New homes in the United States _____ to meet a specified radon level.

- a. are required
- b. are not required
- c. will be required by 2020
- d. will never be required

57. Adopting radon-resistant building techniques _____ increase your liability risks in any jurisdiction as long as due care is exercised in following the proper construction techniques.

- a. will not
- b. are going to
- c. should not
- d. will

58. Once you have decided to build radon-resistant, you will want to make sure to install the features properly. If your building code includes provisions for the radon features, follow your code requirements.

- a. True
- b. False

Should all new homes be built radon-resistant?

59. All homes could benefit from having a radon reduction system. However, it is especially _____ to install the features in homes with the greatest potential for high radon levels.

- a. important
- b. cost effective
- c. prudent
- d. all of the above

60. The elevated radon levels are uniform throughout the United States.

- a. True
- b. False

61. The map (in the review materials) indicates _____ defined by the likelihood of finding radon measurements within certain ranges when a short-term closed building radon test is performed.

- a. radon hot spots
- b. two radon potential zones
- c. three radon potential zones
- d. four radon potential zones

62. _____ that all homes built in Zone 1 (high radon potential) areas have radon reduction systems.

- a. EPA requires
- b. EPA recommends
- c. DSPS requires
- d. DHS requires

63. Which of the following counties are included in 'List of Zone 1 Counties' from the review materials on Page 12?

- a. Grant
- b. Green
- c. Iowa
- d. all of the above

64. Which of the following counties are included in 'List of Zone 1 Counties' from the review materials on Page 12

- a. Sauk
- b. Shawano
- c. Sheboygan
- d. all of the above

NUTS AND BOLTS: INSTALLATION GUIDE

65. Proper installation of the radon-resistant features is very important. Improper installation _____ indoor radon levels.

- a. could actually increase
- b. will increase
- c. creates temporary higher
- d. has no effect on

Planning Step 1 – Answer the Question:
To install or not to install?

66. Some _____ have done further research on radon potential, and you can check with your state or county government to find out whether additional information is available.

- a. states
- b. counties
- c. both a. and b.
- d. none of the above

67. A large investment up front on your part may present a gamble down the road, particularly as home buyers are increasingly frugal even for environmentally-conscious builders and healthy homes.

- a. True
- b. False

68. Some states and local jurisdictions have adopted _____ of the 1995 CABO One & Two Family Dwelling Code, _____ of the 1998 International One & Two Family Dwelling Code or a similar code requiring installation of radon-resistant features.

- a. Appendix D / Appendix E
- b. Appendix E/ Appendix F
- c. Appendix F / Appendix D
- d. None of the above

69. A sub-slab depressurization system not only helps to reduce indoor radon levels, but also may help to reduce _____ and other soil gases. The techniques also improve _____, which can translate into energy savings for the home buyer.

- a. moisture / energy efficiency
- b. moisture / moisture
- c. energy efficiency / moisture
- d. energy efficiency / energy efficiency

70. If you don't already know what is required in your area, check with your local code official for more information.

- a. True
- b. False

Planning Step 2 –
Determine what type of system to install

71. There are _____ of radon-reduction systems that builders have installed.

- a. two general types
- b. three general types
- c. four general types
- d. five general types

72. Using the two graphs on page 13 of the review materials, the letter 'O' represents:

- a. Perforated Drain Tile
- b. Slab
- c. Gravel
- d. Polyethylene Sheeting

73. Using the two graphs on page 13 of the review materials, the letter 'A' represents:

- a. Passive System in Crawlspace
- b. Slab
- c. Grade level
- d. Polyethylene Sheeting

74. Using the two graphs on page 13 of the review materials, the letter 'G' represents:

- a. Perforated Drain Tile
- b. Slab
- c. Grade level
- d. Polyethylene Sheeting

75. Using the two graphs on page 13 of the review materials, the letter 'L' represents:

- a. Basement
- b. Crawl Space
- c. Grade level
- d. Polyethylene Sheeting

76. Using the two graphs on page 13 of the review materials, the letter 'D' represents:

- a. Basement
- b. Crawl Space
- c. Grade level
- d. Polyethylene Sheeting

77. Using the two graphs on page 13 of the review materials, the letter 'H' represents:

- a. Passive System in Crawlspace
- b. Attic
- c. Living Area
- d. Passive System in Basement or with slab-on-grade

78. It is _____ and _____ to install a complete passive sub-slab or sub-membrane depressurization system, which would be fully functioning as soon as construction is finished.

- a. cost-effective / recommended
- b. cost-prohibitive / not recommended
- c. cost-prohibitive / recommended
- d. cost-effective / not recommended

79. Virtually all homes with a passive system have radon levels below the 6 pCi/L action level.

- a. True
- b. False

80. Using the graph on page 13 of the review materials, the letter 'Q' represents:

- a. Fan
- b. Attic
- c. Living Area
- d. Electrical Junction Box

81. Using the graph on page 13 of the review materials, the letter 'S' represents:

- a. Fan
- b. Electrical Junction Box
- c. Living Area
- d. Attic

82. If you elect to "rough in" a radon-reduction system, it is advisable to speak with the home buyer that the home is equipped with a functioning system.

- a. True
- b. False

83. Be sure to _____ the riser stub so that radon is not being vented into the living space. Also, label the stub so it is not used as a plumbing waste line.

- a. mark
- b. label
- c. seal off
- d. none of the above

Determine Vent Pipe Location and Size

84. One objective of a radon system in a new home is to _____ it in such a manner that _____ occurs in the pipe to draw the radon from the soil without the use of a fan.

- a. prepare / no natural draft
- b. prepare / natural draft
- c. install / no natural draft
- d. install / a natural draft

85. The vent pipe _____ be installed in a vertical run, with the least number of elbows which _____ restrict air flow.

- a. should / could
- b. could / should
- c. may / could
- d. should / will

86. A radon vent pipe can also be run through the same chase as the furnace and water heater flue.

- a. True
- b. False

87. Do not tie them together, but rather allow for enough room to route the radon vent pipe up alongside the flues with proper clearances consistent with _____, _____.

- a. local building code
- b. local fire code
- c. EPA regulations
- d. both a. and b.

88. In hot climates and predominantly air-conditioned houses, the passive stack will depend more on _____, _____.

- a. wind
- b. a hot attic
- c. sun heating the pipe
- d. all of the above.

89. In cold climates, do not route the pipe up through an outside wall.

- a. True
- b. False

90. To prevent radon from re-entering the house or any other nearby buildings, make sure the vent pipe exhausts _____ above the surface of the roof.

- a. a minimum of 10 inches
- b. b. a minimum of 12 inches
- c. c. a minimum of 14 inches
- d. d. a minimum of 16 inches

91. Field results have indicated that passive systems tend to function better with a _____.

- a. 2-inch pipe
- b. 3-inch pipe
- c. 4-inch pipe
- d. 5-inch pipe

92. To prevent radon from re-entering the house or any other nearby buildings, make sure the vent pipe exhausts, a minimum of _____ away from any window or other openings in the building.

- a. 7 feet
- b. b. 8 feet
- c. c. 9 feet
- d. d. 10 feet

93. If you are routing the pipe through the same chase as the furnace flue, the vent pipe needs to exit the roof _____ away from the furnace flue.

- a. at least 8 feet
- b. b. at least 10 feet
- c. c. at least 12 feet
- d. d. at least 14 feet

94. To prevent radon from re-entering the house or any other nearby buildings, make sure the vent pipe exhausts, a minimum of _____ away from any window or other openings in adjoining or adjacent buildings.

- a. 6 feet
- b. b. 8 feet
- c. c. 10 feet
- d. d. 12 feet

Installation – Basement and Slab-on-Grade
Construction: Sub-Slab Preparation

95. If the house you are building has a slab-on-grade or basement foundation, the radon gas _____ move laterally beneath the slab to the location where the vent pipe collects the gas.

- a. must be able to
- b. should be able to
- c. is recommended to be able to
- d. may be able to

96. A continuous _____ of 1/2 inch to 3/4 inch clean (no fines) gravel place beneath a slab provides a largely unrestricted path for radon to be collected.

Gravel

- a. three-inch layer
- b. four-inch layer
- c. five-inch layer
- d. three to four inch layer

97. Which basic method for improving soil gas collection beneath slabs is discussed on pages 15 thru 18?

- a. Perforated Pipe Alternative
- b. Gravel
- c. Soil gas Collection Mat Alternative
- d. All of the above

98. One alternative is to use the native fills beneath the slab and lay in a loop of perforated pipe to improve soils gas movement.

- a. True
- b. False

99. Drain mats consist of plastic material that resembles an egg crate. Wrapped around the 'egg crate' is a geotextile filter fabric that allows for the passage of air _____ the infiltration of wet concrete.

- a. and enables
- b. but prevents
- c. and speeds
- d. none of the above

100. The loop of perforated pipe works well because the soil gases need only move to the loop rather than all the way across the slab as in the case of _____.

- a. two collection points
- b. multiple collection points
- c. a single collection point
- d. a collection mat

101. The gravel should be _____.

- a. about 1/2 to 3/4 inch size
- b. about 3/4 inch to 1 inch
- c. from the local area
- d. multiple size layers

102. _____, or gravel that is not as _____, will restrict air movement under the slab.

- a. river rock/ large in size
- b. smaller or fine gravel / uniform in size
- c. large in size/ small or fine gravel
- d. None of the above

103. How many options are talked about on page 16 to avoid grade beam obstructions to soil gas air flow?

- a. One
- b. Two
- c. Three
- d. Four

104. Use post and beam construction by setting teleposts that support overhead beams on pads rather than continuous footings.

- a. True
- b. False

105. Option 2: One pipe should be installed every _____.

- a. 10 feet
- b. 11 feet
- c. 12 feet
- d. 13 feet

106. Option 2:Provide a means for air to flow through the grade beam. This can be done by inserting at least _____ between the form boards or trench and pouring the grade beam over them.

- a. one 4-inch pipe sleeve
- b. b. two 4-inch pipes sleeves
- c. c. one 3-inch pipe sleeve
- d. d. two 3-inch pipe sleeves

107. Inserting Vent Pipe in Gravel: Connect a short stub, at least _____, of 3- or 4-inch PVC pipe vertically into the TEE.

- a. 4 inches
- b. 6 inches
- c. 8 inches
- d. 10 inches

108. Soil gas flow will be restricted if the pipe is inserted into the gravel, and the gravel surrounds the pipe, especially if the system is later activated.

- a. True
- b. False

109. Make sure that the concrete does not plug up the pipe during pour.

- a. True
- b. False

Perforated Pipe

110. Be sure the pipe is covered by _____ of fill to keep concrete from filling perforations.

- a. no more than one inch
- b. no more than two inches
- c. at least one inch
- d. none of the above

111. _____ and _____ pipe is flexible, which makes it easy to lay down in a trench. The perforations also allow for good soil gas collection.

- a. Perforated/corrugated
- b. Corrugated/ permeable
- c. Permeable/ solid
- d. None of the above

112. The pipe loop should be located approximately _____ from the inside of the exterior perimeter foundation walls.

- a. 10 inches
- b. b. 12 inches
- c. c. 14 inches
- d. d. 16 inches

113. For slab areas greater than 2,000 square feet, but less than 4,000 square feet, the same configuration may be used but the pipe size should be a _____ in diameter.

- a. minimum of 4 inches
- b. b. maximum of 4 inches
- c. c. minimum of 5 inches
- d. d. maximum of 5 inches

114. Slab designs in excess of 4,000 square feet _____ separate loops each 2,000 to 4,000 square feet depending upon the size of the pipe utilized (3-inch or 4-inch).

- a. can have
- b. may have
- c. should have
- d. have to have

115. Crossing Grade Beams: Lay the loop before the grade beams are poured, or lay a length of _____ but _____ pipe across the trench before pouring a grade beam.

- a. non-perforated/corrugated
- b. non-permeable/straight
- c. corrugated/solid
- d. straight/solid

116. Install in loops rather than straight sections: The reason for laying out the pipe in a loop is to allow for the soil gas to enter the collection pipe _____.

- a. from one side
- b. from two sides
- c. in a circle
- d. none of the above

117. Connecting Pipe Loop to Riser: Close the loop by connecting the ends to short pipe stubs and to opposite legs of a _____.

- a. 3- or 4-inch Lead TEE
- b. 3- or 4- inch Copper TEE
- c. 3- or 4-inch PVC TEE
- d. 3- or 4-inch Rubber TEE

118. Install in loops rather than straight sections: If the pipe is crushed at one point during the construction, the soil gas will still be drawn to the vent pipe.

- a. True
- b. False

119. When 4-inch _____ is used, 4-inch by 4-inch rubber couplings can be used to connect the _____ to the solid PVC pipe stubs.

- a. perforated pipe / corroded pipe
- b. corroded pipe / corrugated pipe
- c. corroded pipe / perforated pipe
- d. corrugated pipe / perforated pipe

Soil Gas Collection Mat

120. Use a soil gas collection mat or drainage mat having minimum dimensions of _____, and a nominal cross-sectional air flow are of 12 square inches.

- a. 1/2 inch in height by 12 inches wide
- b. one inch in height by 12 inches wide
- c. 1 1/2 inch in height by 12 inches wide
- d. one inch in height by 10 inches wide

121. The matrix should be covered by a geotextile filter cloth on _____ to prevent dirt or wet concrete from entering the matrix. Repair all breaches and joints in the geotextile cloth prior to the pouring of the slab.

- a. at least two sides
- b. at least three sides
- c. all four sides
- d. the corners

122. Do not cover with plastic strips because _____ can occur and cause a crack in the concrete along the edge of the plastic.

- a. differential concrete drying
- b. concrete drying
- c. uniform concrete drying
- d. concrete sweating

123. There is a special adaptor fitting that will accept the flat mat and adapt to a round vent pipe. This type of adaptor is available from _____, _____ and from _____.

- a. soil gas collection mat suppliers/ drainage mat suppliers/ radon mitigation equipment suppliers
- b. drainage mat suppliers/ radon mitigation equipment suppliers/ soil gas collection mat suppliers
- c. radon mitigation equipment suppliers/soil gas collection mat suppliers/ drainage mat suppliers
- d. None of the above

124. When making splices, slit the fabric of the two ends to be joined. Lay the core from one end on top of the core from the other end with a _____.

- a. one inch overlap
- b. two inch overlap
- c. three inch overlap
- d. four inch overlap

125. To keep the mat in place while the concrete is being poured, the mat should be nailed down with 8-inch landscape staples or 60 penny nails, about every _____.

- a. six feet
- b. seven feet
- c. eight feet
- d. nine feet

Plastic Sheeting

126. Prior to pouring the slab or placing the floor assembly, lay a minimum _____ (or 3-mil cross laminated) or equivalent flexible sheeting material on top of the gas permeable layer. The sheeting should cover the entire floor area.

- a. 1-mil polyethylene
- b. 3-mil polyethylene
- c. 4-mil polyethylene
- d. 6-mil polyethylene

127. Separate sections of sheeting should be overlapped by _____. Below the slab, it is not necessary to seal the joint between overlapping sheets of plastic.

- a. at least 12 inches
- b. at least 14 inches
- c. at least 16 inches
- d. None of the above

128. Repair punctures or tears in the material. _____ may work for small uniform tears and holes. For larger areas, cover with an additional piece of overlapping sheeting.

- a. Painters tape
- b. Duct tape
- c. Electrical tape
- d. All of the above

Seal Off and Label Riser Stubs

129. Care should be taken to cover the end of the pipe so that it does not become filled with concrete when the slab is poured.

- a. True
- b. False

130. Support the stub, perhaps off a wall, so that it stays _____ as the wet concrete is poured.

- a. horizontal
- b. diagonal
- c. vertical
- d. none of the above

Lay Foundation

131. In poured _____, _____, _____ and any other joints should be caulked with an elastomeric sealant such as polyurethane caulk.

- a. concrete walls/all control joints/isolation joints
- b. control joints/ floors/roofs
- c. floors/isolation joints/control joints
- d. concrete walls/ floors/roofs

132. Hollow block masonry walls typically have cavities that _____ radon movement. To prevent this, hollow block walls should be topped with a continuous course of solid block or be grouted solid on the top.

- a. can allow
- b. will allow
- c. have
- d. always have

133. Although concrete slabs will almost inevitably crack, control joints can help the concrete to crack in planned locations. As with the foundation walls, all control joints or other joints should be sealed with polyurethane caulk to _____ radon entry.

- a. control
- b. reduce
- c. eliminate
- d. both a. and c.

134. Trap any condensate or floor drains which pass through the slab, or route them through non- perforated pipe to daylight. Mechanical traps _____ rather than 'wet' traps which can dry out.

- a. shall be used
- b. have to be used
- c. should be used
- d. are required to be used

135. Sump pits are open to the soil or fed by drain tile loops should be covered with a gasket lid.

- a. True
- b. False

Crawlspac Construction

136. Access doors and other openings or penetrations between basements and adjoining crawlspaces should be _____ with materials that prevent air leakage.

- a. closed
- b. gasketed
- c. otherwise sealed
- d. all of the above

137. The riser needs to be located central in the crawlspac. It needs to be the center, so plan on placing it in the crawlspac that will not be convenient for crawlspac access and for routing the pipe up through the house.

- a. True
- b. False

138. Lay a length (usually _____) of 3- or 4-inch diameter corrugated and perforated pipe or a strip of geotextile drain matting on the soil at the location where you will run the radon vent pipe up.

- a. two feet or more
- b. three feet or more
- c. four feet or more
- d. five feet or more

139. The edges should also be brought up on the foundation walls about _____ to allow for proper adhesion.

- a. 8 inches
- b. 10 inches
- c. 12 inches
- d. 14 inches

140. In high traffic areas, the polyethylene should be overlain by heavier material along expected _____.
Various materials have been used for this purpose, including roofing felt, EPDM rubberized roofing membrane, and drainage mat.

- a. drainage routes
- b. traffic routes
- c. piping routes
- d. none of the above

141. Optional Improvement: The minimum thickness of plastic is a _____ sheeting.

- a. 6-mil polyethylene
- b. 8-mil polyethylene
- c. 10-mil polyethylene
- d. 12-mil polyethylene

142. Regular 8-mil to 10-mil sheeting would provide better _____. **High-density, cross- laminated polyethylene has even greater puncture resistance and is stronger and more durable.**

- a. coverage
- b. moisture control
- c. puncture resistance
- d. all of the above

Optional Improvement:
Sealing seams and edges of plastic sheeting

143. _____ in current radon-resistant construction building codes, increasing the air-tightness of the seams in the plastic sheeting may enhance the system's effectiveness and integrity.

- a. Although not required
- b. Required
- c. Recommended
- d. Mentioned

144. To effectively seal the plastic sheeting, use a _____ bead of caulk.

- a. 1/4 inch wide
- b. 1/2 inch wide
- c. 3/4 inch wide
- d. 1 inch wide

145. Polyurethane caulk will provide some adhesion to the polyethylene sheeting. However _____ form a more durable bond with the plastic.

- a. butyl rubber
- b. acoustical sealant
- c. butyl acrylic caulk
- d. all of the above

146. Brush the walls with a wire brush at _____ above the crawlspace floor to remove any dirt or loose deposits.

- a. 4 to 8 inches
- b. 6 to 10 inches
- c. 6 to 12 inches
- d. 8 to 14 inches

147. Plan on using one 12-ounce tube of caulk to attach an 6-foot length of plastic to the wall.

- a. True
- b. False

148. Secure plastic to the wall at _____ above the crawlspace floor with a _____ of acoustical sealant or butyl caulk along the wall.

- a. 4 to 8 inches / 1/2 inch wide bead
- b. 6 to 12 inches / 1/2 inch wide bead
- c. 4 to 8 inches / 1 inch wide bead
- d. 6 to 12 inches / 1 inch wide bead

149. If there is an obstruction to the wall within six to 12 inches of the floor, such as a crawlspace access door, trim the sheeting to pass beneath the obstruction and _____ to the wall around the obstruction.

- a. duct tape the sheeting
- b. staple the sheeting
- c. caulk the sheeting
- d. All of the above

150. Vertical Penetrations: The sheeting needs to be sealed around posts and plumbing lines.

- a. True
- b. False

151. Using the picture on page 25 from the review materials, the letter 'B' represents:

- a. Screw
- b. Sealant
- c. Roof Flashing
- d. Plastic Sheeting

152. Using the picture on page 25 from the review materials, the letter 'C' represents:

- a. Screw
- b. Sealant
- c. Roof Flashing
- d. Plastic Sheeting

153. Riser Installation: Another way to prevent air leakage around the joint is to use two roof flashing hoods. One roof flashing goes below the plastic and one is placed above the plastic to provide a flat area to which the plastic can be sealed.

- a. True
- b. False

154. Label Riser and Plastic: It is also a good idea to label the plastic to state that the plastic _____ be removed and, if cut, it should be patched or replaced.

- a. should not
- b. can not
- c. shall not
- d. will not

155. After home construction is completed, inspect the sheeting for damage and _____.

- a. rodent infestation
- b. repair as necessary
- c. inform the homeowner
- d. moisture

Seal Openings

156. Use materials that provide a _____ such as non-shrink mortar, grouts, expanding foam, or similar materials.

- a. temporary seal
- b. moisture seal
- c. permanent airtight seal
- d. airtight seal

157. Floor-to-wall joints are _____ places to seal.

- a. recommended
- b. preferred
- c. suggested
- d. critical

158. Alternative: Tie into sumps: If the sump is used without a drain tile loop, install a sump pit cover specifically designed to accommodate a radon vent pipe and run the vent pipe directly from the sump.

- a. True
- b. False

159. If the sump is connected to a drain tile loop, the radon vent pipe _____ into the sump or into any convenient section of the drain tile loop (then cover and seal the open sump).

- a. could be inserted directly
- b. needs to be inserted directly
- c. has to be inserted directly
- d. none of the above

160. Other places to seal the slab and foundation: Caulk joints, cracks, or other openings around all penetrations of _____ surfaces of masonry block or wood foundation walls below the ground surface. Penetrations of poured concrete walls should also be sealed on the exterior surface. This includes sealing wall tie penetrations.

- a. exterior
- b. interior
- c. both a. and b.
- d. none of the above

161. Other considerations: Always use floor drains and air conditioning condensate drains because they discharge directly into the soil below the slab or into the crawlspace.

- a. True
- b. False

Install Vent Pipe

162. Avoid angles in the pipe, if possible, to increase air flow through the vent pipe and _____.

- a. minimize radon reduction
- b. maximize radon reduction
- c. improve radon flow
- d. eliminate radon exposure

163. Type of Pipe: _____ should be primed and glued in a similar manner as indoor plumbing.

- a. Most joints
- b. Certain joints
- c. All joints
- d. Small joints

164. Do not trap pipe: Piping should also slope back to the suction pipe at a _____ per foot.

- a. minimum angle of 1/8 inch
- b. minimum angle of 1/4 inch
- c. minimum angle of 3/8 inch
- d. minimum angle of 1/2 inch

165. Maintain fire resistive rating of walls and ceiling: If you route your vent pipe through the wall between the house and the garage, you _____ to put a fire barrier around the pipe (on the inside of the garage) to maintain the integrity of the wall. Install a fire barrier with a rating equal to the wall.

- a. may need
- b. could need
- c. will need
- d. might need

166. Recommended Improvements: Screen on Discharge: _____ to put a 1/4 inch mesh screen on the discharge to keep birds from nesting in the pipe.

- a. It is a requirement
- b. The customer may request
- c. It is a good idea
- d. All of the above

167. In all climates, insulate the pipe where the pipe is routed through the wall.

- a. True
- b. False

Seal Ducts and Air-handling Units

168. HVAC systems should be carefully _____ to avoid depressurization of basements and other areas in contact with the soil. Ideally, ductwork should remain in the conditioned spaces of the home.

- a. designed
- b. installed
- c. operated
- d. all of the above

Install Electrical Junction Box

169. An unswitched electrical junction box should be installed in the attic or garage within _____ of the vent pipe.

- a. 4 feet
- b. 5 feet
- c. 6 feet
- d. 7 feet

Post-Occupancy Testing

170. Some builders installing passive systems are testing the homes they build and activating the passive radon systems if radon levels are at or above 4 pCi/L. In all cases you should advise the homeowners _____ to confirm radon levels remain low.

- a. to retest sometime in the future
- b. to retest immediately
- c. to retest every other month
- d. None of the above

171. The quickest way to test is with short-term tests. Short-term tests remain in the home for _____, depending on the device.

- a. two days to 10 days
- b. two days to 30 days
- c. two days to 60 days
- d. two days to 90 days

172. Long term tests remain in the home for more than 90 days. A long-term test will give a reading that is _____ a home's year-round average radon level than a short-term test.

- a. guaranteed to give
- b. more likely to give
- c. immediately giving
- d. seasonally adjusted to give

Activating the System

173. The ideal location is _____, or, perhaps, in _____, where the fan housing and vent pipe can be sheltered from the elements, yet be outside the buildings conditioned spaces.

- a. in the attic/ an attached garage
- b. an attached garage/ inside the house
- c. inside the house/ an unattached garage
- d. unattached garage/ in the attic

174. Inappropriate fan locations:

- a. in crawlspace
- b. in basement
- c. in occupied attic
- d. All of the above

175. A system failure warning device _____ to alert occupants to any malfunction of the system or drop in its suction flows.

- a. shall be used
- b. should be used
- c. has to be used
- d. is required to be used

176. In regions with prolonged or extreme cold, both fans and attic vent pipes should be insulated to reduce condensation and the possibility of vent exhaust 'freeze up.'

- a. True
- b. False

Wisconsin Radon Information

177. The State of Wisconsin currently has a very strict statewide code for RRNC (Radon Resistant New Construction), which is administered by DHS.

- a. True
- b. False

178. If I want to find state specific information about the Health effects of Radon, where can I get that information?

- a. the Dept. of Health Services website
- b. the Radon Information Center Hotline
- c. by calling the Wisconsin Division of Public Health
- d. all of the above

179. Who can provide me with radon test kits?

- a. the local health department
- b. my building inspector
- c. the local hospital
- d. All of the above

180. If I live in Grant or Iowa County, where is my closest local health department located?

- a. Madison, WI
- b. Lancaster, WI
- c. Baraboo, WI
- d. Dodgeville, WI

