EXAM

Course 16188
12 Hours of Continuing Education

Construction Standards
&
Energy Conservation

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We would like to thank you for ordering Course # 16188 (12 Hours of Continuing Education).

Overview: This course is designed to familiarize Contractors and Inspectors with information on the updated construction codes required for building a home, according to the Uniform Dwelling Code (UDC), as well as the Energy Conservation Standards.

Topics covered under the Construction Codes include Design Criteria, Excavations, Footings, Foundations, Floors, Walls, Roof and Ceilings, Fireplace Requirements, Construction in Floodplains and Installation of Manufactured Homes.

Topics covered under the Energy Codes include Scope, Application, Definitions, Insulation Materials and Installation, Dwelling Thermal Envelope, Systems and Simulated Performance Alternative.

Materials included

1. REVIEW MATERIALS
2. EXAM
3. ANSWER SHEET

Once you complete the course

Return the answer sheets to our company.

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The State of Wisconsin requires that you attain a passing score of 70%.

Once you complete the course, we will notify the Dept. of Safety & Professional Services of your successful completion. They will send you a renewal reminder prior to the expiration of your certification/registration or license. ***If you are notified that you can renew online, click on this link;*** **https://dsps.wi.gov/Pages/SelfService/ElectronicPayments.aspx**

If you did not receive the renewal reminder or obtained your continuing education after the expiration date; contact the Dept. of Safety & Professional Services by e-mail: DspsSbCredentialing@wi.gov or call them at 608-266-2112 to request information about the renewal requirements.

Please feel free to contact us with any questions and/or suggestions on improving this course or future educational courses you would like to see us offer.

Thank you for your business!

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Questions 1 to 7 (Refer to Review Materials SPS 321.02 Loads and Materials)

1. _____. Every dwelling shall be designed and constructed to support the actual dead load, live loads and wind loads acting upon it without exceeding the allowable stresses of the material. The construction of buildings and structures shall result in a system that provides a complete load path capable of transferring all loads from point of origin through the load resisting elements to the foundation.

a. Dead Loads
b. Live Loads
c. Design Load
d. Snow Loads

2. _____. Dwellings shall be designed and constructed to withstand either a horizontal and uplift pressure of 20 pounds per square foot acting over the surface area or the wind loads determined in accordance with ASCE 7–05, *Minimum Design Loads for Buildings and Other Structures*.
Note: ASCE 7–05 allows for substantial reduction from 20 psf as applied to the surface area.

a. Dead Loads
b. Live Loads
c. Wind Loads
d. Snow Loads

3. _____. Roofs shall be designed and constructed to support the minimum snow loads listed on the zone map. The loads shall be assumed to act vertically over the roof area projected upon a horizontal plane.

a. Snow Loads
b. Wind Loads
c. Dead Loads
d. Live Loads

4. STRUCTURAL STANDARDS. *General.* Design, construction, installation, practice and structural analysis shall conform to the following nationally recognized standards.

a. True
b. False

5. STRUCTURAL STANDARDS. *Wood.* 3. Sawn lumber that is not graded in accordance with the standards under subd. 1., shall use the NDS published allowable design stresses for the lumber species using grade number 3 when used for _____ and may use grade number 1 when used for beams, posts or timbers.

a. Studs
b. Stringers
c. Rafters or joists
d. All of the above

6. STRUCTURAL STANDARDS. *Whole logs.* Dwellings constructed of whole logs shall conform to ICC 600, Standard on the Design and Construction of Log Structures.
Note: This standard requires the minimum log diameter to be 12 inches.

a. True
b. False

7. STRUCTURAL STANDARDS. *Masonry.* The design and construction of masonry shall conform to the following standards:

1. ACI 530, Building Code Requirements for Masonry Structures.
2. ACI 530.1, Specification for Masonry Structures.

a. True
b. False

Questions 8 to 23 (Refer to Review Materials SPS 321.03 Exits and 321.035 Interior Circulation)

8. EXITS FROM THE FIRST FLOOR. (b) Both exits shall discharge to grade and may not go through a garage. This exit may include interior or exterior stairs.

a. True
b. False

9. EXITS FROM THE FIRST FLOOR. (a) Except as allowed under par. (h), every dwelling unit shall be provided with at least ____ exit doors accessible from the first floor.

a. one
b. two
c. three
d. none of the above

10. EXITS ABOVE THE SECOND FLOOR (b) A second stairway or ramp exit is not required for habitable areas on a third floor that meet all of the following requirements:
1. The habitable area consists of a single room.
Note: Non−habitable areas, such as closets and bathrooms may be partitioned off.
2. The room is not used for sleeping.
3. The habitable area has a floor area of 400 square feet or less.
4. There is at least one egress window meeting the requirements of sub. (6) in the habitable area.

a. True
b. False

11. EXITS ABOVE THE SECOND FLOOR. (a) Except as provided under pars. (b) and (c), each habitable floor above the second floor shall be provided with at least 2 exits that meet all of the following requirements:
1. The exits shall be _____ that lead to the second floor or discharge to grade.
2. The exits shall be located such that an exit is accessible to the second floor if another exit is blocked.

a. ramps
b. stairways
c. stairways or ramps
d. none of the above

12. EXITS FROM LOFTS. At least one stairway exit shall be provided, to the floor below, for a loft exceeding _____ square feet in area. At least one stairway or ladder exit shall be provided to the floor below for a loft, 400 square feet or less, in area.

a. 300
b. 400
c. 450
d. 500

13. EXITS ABOVE THE SECOND FLOOR (c) A second stairway or ramp exit is required for habitable areas on a third floor that meet all of the following requirements:
1. The dwelling is fully sprinklered in accordance with NFPA 13R or NFPA 13D.
2. If a required exit includes an attached garage, the garage shall be sprinklered.

a. True
b. False

14. EXITS FROM BASEMENTS AND GROUND FLOORS. *Basement and ground floors used for sleeping.*
1. Basements and ground floors used for sleeping shall be provided with at least _____.

a. one exit
b. two exits
c. one exit and one small window
d. Three exits

15. WINDOWS USED FOR EXITING (b) 1. The nominal size of the net clear window opening shall be _____ irrespective of height or width. Nominal dimensions shall be determined by rounding up fractions of inches if they are 1/2−inch or greater or rounding down fractions of inches if they are less than 1/2−inch.

a. not more than 20 inches by 24 inches
b. at least 22 inches by 24 inches
c. at least 20 inches by 24 inches
d. not more than 24 inches by 20 inches

16. WINDOWS USED FOR EXITING. 5. a. Ladders or other stairs used to comply with subd. 4. May infringe on the required area of the areaway by a maximum of 6 inches.
b. Ladder rungs shall have a minimum inside width of at least 12 inches and shall project at least 3 inches from the wall behind the ladder.
c. Ladder rungs shall be able to support a concentrated load of 200 pounds.
d. Ladder rungs shall have a maximum rise of 12 inches between rungs and shall extend to within 12 inches of exterior grade.

a. True
b. False

17. WINDOWS USED FOR EXITING (d) 1. For any window used for exiting, the lowest point of clear opening shall be no more than _____ above the floor.

a. 30 inches
b. 48 inches
c. 50 inches
d. 60 inches

18. BALCONIES: Balconies which are required for exit purposes shall also comply with all of the following requirements:
1. The balcony guardrail shall terminate no more than 46 inches above the floor level of the balcony.
2. The floor level of the balcony shall be no more than _____ above the grade below.
3. The floor of the balcony shall have minimum dimensions of 3 feet by 3 feet. The guard and its supports may infringe on the dimensions of the required area no more than 4.5 inches.

a. 10 feet
b. 15 feet
c. 18 feet
d. 20 feet

19. TWO−FAMILY DWELLINGS. In a 2−family dwelling, each dwelling unit _____ provided with exits in compliance with this section.

a. shall be
b. can be
c. may be
d. could be

20. DOORS USED FOR EXITING. (a) Doors used for exiting from a dwelling shall meet the following dimensions:
1. At least one exit door shall be a swing-type door at least 80 inches high by _____ wide.
2. Except as allowed under subds. 3. And 4., other required exit doors shall be at least 76 inches high by 32 inches wide.
3. Where double doors are used as a required exit, each door leaf shall provide a clear opening at least 30 inches wide and be at least 76 inches high.
4. Where sliding doors are used as a required exit, the clear opening shall be at least 29 inches wide and be at least 76 inches high.

a. 29 inches
b. 32 inches
c. 34 inches
d. 36 inches

21. HALLWAYS. (a) Except as allowed under par. (b), the clear width of hallways shall be at least 36 inches.
(b) The following are allowed to infringe on the required clear width of a hallway:
1.Door hardware and finish trim.
2. Handrails may infringe into the minimum width of a hallway up to 41/2 inches on each side.
3. Heating registers may infringe into the minimum width of a hallway up to 41/2 inches and no part of the register may be more than 38 inches above the floor.
4. Ducts, pipes, light fixtures, structural features, and corner treatments that are within 84 inches of the floor may infringe into the minimum width of a hallway by a maximum of 41/2 inches on each side.
5. Unlimited infringements are allowed in a hallway more than 84 inches above the floor.

a. True
b. False

22. DOORS AND OPENINGS. All doors and openings to the following areas shall be _____ 80 inches high and provide either a net clear opening width of 30 inches or be a 32−inch door:

(a)Except as provided under pars. (b) and (c), all entrances into common use areas.

(b)At least 50% of the bedrooms.

(c) 1. At least one full bathroom, including doors or openings to a sink, toilet and tub or shower. If this bathroom is accessible only through a bedroom, the bedroom door shall meet the minimum width requirements of this section.

2. If one or more full bathrooms are provided on the first floor, the bathroom meeting the requirements under this section shall be on the first floor.

Note: This section does not require a full bathroom on the first floor.

a. at least
b. no more than
c. a maximum of
d. none of the above

23. KITCHENS. (a) There shall be at least 20 inches of clearance between a wall, a permanently− installed kitchen island, permanently−installed kitchen cabinets and the following kitchen appliances, if provided:

1. A range, cook top or oven.
2. A sink, refrigerator or freezer.

(b) Measurements shall be taken from the face of the wall, island, cabinet or appliance, ignoring knobs and handles.

a. True
b. False

Questions 24 to 59 (Refer to Review Materials SPS 321.04 Stairways and Elevated Areas)

24. SCOPE. (b) *Exceptions.* The following stairways are not required to comply with the requirements of this section:

1. Stairways leading to non−habitable attics or crawl spaces.
2. Non−required stairways connecting the basement directly to the exterior of the structure without communicating with any other part of the structure.

a. True
b. False

25. SCOPE. (a) *General.* Except as provided under par. (b), the following stairways shall conform to the requirements of this section.

1. Every interior and exterior stairway attached to, or supported by any part of the structure covered under this code.
2. Tub access steps, unless they are an integral part of an approved plumbing product.

(b) *Exceptions.* The following stairways are not required to comply with the requirements of this section:

1. Stairways leading to non−habitable attics or crawl spaces.
2. Non−required stairways connecting the basement directly to the exterior of the structure without communicating with any other part of the structure.

a. True
b. False

26. DETAILS. (a) *Width.* (2) Spiral staircases shall be at least_____ inches wide measured from the outer edge of the supporting column to the inner edge of the handrail.

a. 26 inches
b. 30 inches
c. 32 inches
d. 36 inches

27. DETAILS. (b) *Riser height.* Except for spiral staircases under subd. 2, risers may not exceed _____ in height measured vertically from tread to tread.

a. 7.5 inches
b. 8 inches
c. 8.5 inches
d. 9 inches

28. DETAILS. *Tread depth.* 1. 'Rectangular treads.' Rectangular treads shall have minimum tread depth of _____ measured horizontally from nosing to nosing.

a. 8.5 inches
b. 9 inches
c. 9.5 inches
d. 10 inches

29. DETAILS. *Winder treads in series.* Two or more winder treads may be placed immediately adjacent to each other anywhere in a stairway provided both of the following conditions are met:
a. The winder treads shall have a minimum tread depth of _____measured at a point 12 inches from the narrow end of the tread.

a. 6 inches
b. 7 inches
c. 8 inches
d. 9 inches

30. DETAILS. *'Spiral staircase treads.'* Spiral staircase treads shall have a _____ from nosing to nosing measured at a point 12 inches from the outer edge of the center column.

a. minimum tread depth of 7 inches
b. maximum tread depth of 7 inches
c. minimum tread depth of 9 inches
d. maximum tread depth of 9 inches

31. DETAILS. (b) *Riser height.* Risers in spiral staircases may not exceed _____ in height measured vertically from tread to tread.

a. 7.5 inches
b. 8 inches
c. 9 inches
d. 9.5 inches

32. DETAILS. *Uniformity.* 1. Within a stairway flight, the greatest tread depth may not exceed the smallest tread depth by more than 3/8 inch and the greatest riser height may not exceed the smallest riser height by more than 3/8 inch.

a. True
b. False

33. DETAILS. *Uniformity.* 2. The allowed variation in uniformity under subd. 1. may not be used to exceed the maximum riser height under par. (b) or to decrease the minimum tread depth under par. (c).

a. True
b. False

34. DETAILS. 4. *'Individual winder treads.'* a. An individual winder tread may be placed between rectangular treads or at the end of a flight of rectangular treads provided the tread depth, measured at a point 12 inches from the narrow end, is equal to the tread depth of the rectangular steps in the flight.
b. There may be more than one individual winder tread in a stairway or in a flight of stairs.
c. Winder treads may be used on a straight stairway.

a. True
b. False

35. DETAILS. (d) *Headroom.* The headroom clearance _____ maintained over an intermediate landing.

a. may be
b. can be
c. could be
d. shall be

36. DETAILS. (d) *Headroom.* Stairways shall be provided with a minimum headroom clearance of _____ measured vertically from a line parallel to the nosing of the treads to the ceiling, soffit or any overhead obstruction directly above that line.

a. 6 feet
b. 76 inches
c. 6.5 feet
d. 80 inches

37. DETAILS. (f) *Open risers.* Stairways with open risers shall be constructed to prevent the through passage of a sphere with a diameter of _____ or larger between any 2 adjacent treads.

a. 4 inches
b. 4.5 inches
c. 5 inches
d. 6 inches

38. HANDRAILS AND GUARDS (c) *Guards.* 1. 'Application.' a. All openings between floors, and open sides of landings, platforms, balconies or porches that are more than _____ above grade or a floor shall be protected with guards.

a. 16 inches
b. 20 inches
c. 24 inches
d. 30 inches

39. HANDRAILS AND GUARDS. *General.* 1. A flight of stairs with more than _____ shall be provided with at least one handrail for the full length of the flight.

a. 2 risers
b. 3 risers
c. 4 risers
d. 6 risers

40. HANDRAILS AND GUARDS. *General.* 3.a. Except as provided in subd. 3. b., guards shall be constructed to prevent the through−passage of a sphere with a diameter of _____, when applying a force of 4 pounds.
b. The triangular area formed by the tread, riser and bottom rail shall have an opening size that prevents the through−passage of a sphere with a diameter of 6 inches, when applying a force of 4 pounds.

a. 4 3/8 inches
b. 6 1/8 inches
c. 8 1/2 inches
d. 10 inches

41. HANDRAILS AND GUARDS. *General.* 3.c. _____ or similar materials used in guard infill shall be strung with maximum openings of 3 1/2 inches with vertical supports a maximum of 4 feet apart.

a. Rope
b. Cable
c. a. and b.
d. None of the above

42. HANDRAILS AND GUARDS. *General. 4.a* Handrails shall be designed and constructed to withstand a _____ load applied in any direction.

a. 150 pound
b. 175 pound
c. 200 pound
d. 225 pound

43. HANDRAILS AND GUARDS. *Handrails.* 1. 'Height.' Handrails shall be located at least 30 inches, but no more than _____ above the nosing of the treads, except as provided in subds. 1. b. to d. Measurement shall be taken from the hard-structural surface beneath any finish material to the top of the rail. Variations in uniformity are allowed only when a rail contacts a wall or newel post or where a turnout or volute is provided at the bottom tread.

a. 36 inches
b. 38 inches
c. 40 inches
d. 42 inches

44. HANDRAILS AND GUARDS. (a) *General.* 5. Exterior _____ shall be constructed of metal, decay resistant or pressure−treated wood, or shall be protected from the weather.

a. handrails
b. guards
c. handrails and guards
d. none of the above

45. HANDRAILS AND GUARDS. *Handrails. 2. Clearance* The clearance between a handrail and the wall surface shall be _____.

a. at least 1 inch.
b. at least 1.5 inches.
c. no more than 2 inches.
d. at least 2 inches.

46. HANDRAILS AND GUARDS (b) *Handrails* 5. 'Size and configuration.' Handrails shall be _____ about the vertical centerline to allow for equal wraparound of the thumb and fingers.

a. symmetrical
b. asymmetrical
c. unbalanced
d. none of the above

47. DETAILS. (a) *Width.* Handrails and associated trim may project a maximum of _____ inches into the required width at each side of the stairway.

a. 2 inches
b. 3.5 inches
c. 4 inches
d. 4.5 inches

48. HANDRAILS AND GUARDS. *Handrails. 6. Continuity.* Handrails shall be continuous for the entire length of the stairs except in any one of the following cases: _____

1. A handrail may be discontinuous at an intermediate landing.
2. A handrail may have newel posts.
3. A handrail may terminate at an intermediate wall provided the lower end of the upper rail is returned to the wall or provided with a flared end, the horizontal offset between the 2 rails is no more than 12 inches measured from the center of the rails, and both the upper and lower rails can be reached from the same tread without taking a step.

a. #1 only
b. #2 only
c. # 3 only
d. All the above…1, 2 and 3

49. HANDRAILS AND GUARDRAILS. 1. 'Application.' a. All openings between floors, and open sides of landings, platforms, balconies or porches that are more than _____ above grade or a floor shall be protected with guardrails.

a. 16 inches
b. 20 inches
c. 24 inches
d. 30 inches

50. HANDRAILS AND GUARDRAILS. For exterior applications, the 24 inch vertical measurement shall be taken from the lowest point within 2 feet horizontally from the edge of the deck, landing, porch or similar structure.

a. True
b. False

51. HANDRAILS AND GUARDS. *General.* 2. Guards shall be provided on all open sides of stairs consisting of more than 3 risers and on all open sides of areas that are elevated more than _____ above the floor or exterior grade.
Note: A handrail provided at 30 to 38 inches above the tread nosing meets the height requirement for a guard on a stairway.

a. 20 inches
b. 22 inches
c. 24 inches
d. 26 inches

52. LANDINGS. (a) *Intermediate Landings.* 3. Curved or irregular landing shall have a radius of at least _____.

a. 30 inches
b. 32 inches
c. 34 inches
d. 36 inches

53. LANDINGS. (a) *Intermediate landings.* A level intermediate landing shall be provided in any stairway with a height of _____.

a. 8 feet or more
b. 10 feet or more.
c. 12 feet or more.
d. 14 feet or more.

54. LANDINGS. (a) *Intermediate landings.4.* Curved or irregular landings shall have a minimum straight line measurement of _____ between the nosing of the 2 connecting treads measured at a point 18 inches from the narrow end of the landing measured along the nosing of the 2 treads.

a. 20 inches
b. 24 inches
c. 26 inches
d. 28 inches

55. LANDINGS. *Exterior landings.* The exterior landing, platform, or sidewalk at an exterior doorway shall be located a _____ below the interior floor elevation, be sloped away from the doorway at a minimal rate that ensures drainage, and have a length of at least 36 inches in the direction of travel out of the dwelling.

a. minimum of 4 inches
b. maximum of 4 inches
c. maximum of 8 inches
d. minimum of 8 inches

56. LANDINGS. (c) *Doors at landings.* Except as provided in subds. 1. to 3. and par. (d), level landings shall be provided on each side of any door located at the top or base of a stair, regardless of the direction of swing. In the following exceptions, a stairway between a dwelling and an attached garage, carport or porch is considered to be an interior stair:
1. A landing is not required between the door and the top of interior stairs if the door does not swing over the stairs.
2. A landing is not required between the door and the top of an interior stairs of 1 or 2 risers regardless of the direction of swing.
3. A landing is not required between a sliding glass door or an in−swinging glass door and the top of an exterior stairway of 3 or fewer risers.

a. True
b. False

57. HANDRAILS AND GUARDS. *Doors and Landings* 3. A landing is required between a sliding glass door or an in−swinging glass door and the top of an exterior stairway of 5 or fewer risers.

a. True
b. False

58. HANDRAILS AND GUARDS. *Guards. 2. 'Height.'* Guards shall extend to at least _____ above the floor or to the underside of a stair handrail complying with s. SPS 321.04 (3) (b). Measurement shall be taken from the hard-structural surface beneath any finish material to the top of the guard.

a. 30 inches
b. 36 inches
c. 40 inches
d. 48 inches

59. LANDINGS. (b) *Landings at the top and base of stairs.* A level landing shall be provided at the _____ of every stairs except as provided in par. (d). The landing shall be at least as wide as the treads and shall measure at least 3 feet in the direction of travel.

a. top
b. base
c. top and base
d. none of the above

Questions 60 to 66 (Refer to Review Materials SPS 321.042 Ladders)

60. Ladders shall be designed to withstand loads of at least _____.

a. 150 pounds
b. 175 pounds
c. 200 pounds
d. 250 pounds

61. Rungs may only be used for ladders with a pitch range of 75degree to 90 degrees. Rungs shall be at least _____ in diameter for metal ladders and 1.5 inches for wood ladders. All rungs shall be uniform in dimension.

a. 1 inch
b. 1.5 inches
c. 2 inches
d. 2.5 inches

62. Open handrails may be provided with intermediate rails or an ornamental pattern such that a sphere with a diameter of 9 inches or larger cannot pass through.

a. True
b. False

63. The width of the ladder shall be a minimum of 20 inches wide and a maximum of _____ wide.

a. 28 inches
b. 30 inches
c. 32 inches
d. 36 inches

64. Handrails shall be located so the top of the handrail is at least 30 inches, but not more than _____, above the nosing of the treads.

a. 34 inches
b. 38 inches
c. 42 inches
d 48 inches

65. The ladder shall have a minimum clearance of at least _____ on either side of the center of the tread.

a. 10 inches
b. 12 inches
c. 14 inches
d. 15 inches

66. For ladders with less than a 65° pitch the vertical clearance above any tread or rung to an overhead obstruction shall be at least 7 feet 4 inches measured from the leading edge of the tread or rung.

a. True
b. False

Questions 67 to 70 (Refer to Review Materials SPS 321 .045 Ramps)

67. Ramps shall not have a gradient greater than 1 in 8 or one foot of rise in 8 feet of run. Walkways with gradients less than 1 in 20 or one foot of rise in 20 feet of run are _____ to be ramps.

a. not considered
b. considered
c. thought
d. treated

68. A level landing shall be provided at the top, at the foot and at any change in direction of the ramp. The landing shall be at least as wide as the ramp and shall measure at least _____ in the direction of travel.

a. 1 foot 6 inches
b. 2 feet
c. 2 feet 6 inches
d. 3 feet

69. Ramps shall have a slip resistant surface and shall have a _____ measured between handrails.

a. maximum width of 36 inches
b. minimum width of 36 inches
c. maximum width of 40 inches
d. minimum width of 40 inches

70. Open−sided ramps shall have the area below the handrail protected by intermediate rails or an ornamental pattern to prevent the passage of a sphere with a diameter of _____ when applying a force of 4 pounds, except as provided in subd. 2.

a. 4 3/8 inches
b. 4 6/8 inches
c. 7 2/3 inches
d. 8 3/8 inches

Questions 71 to 74 (Refer to Review Materials SPS 321.05 Natural Light and Natural Ventilation)

71. Natural ventilation shall be provided to each habitable room by means of openable doors, skylights or windows. The net area of the openable doors, skylights or windows shall be _____ of the net floor area of the room, except as provided in subd. 2.

a. at least 3.5%
b. at least 4.5 %
c. no more than 3.5%
d. no more than 4.5%

72. (am) Except as provided in par. (bm), glazing shall consist of safety glass meeting the requirements of either 16 CFR Part 1201 or ANSI Z97.1 when installed in any of the following locations:
1. In any sidelight or glazing adjacent to a door, that meets all of the following:
a. The nearest point of the glazing is within 2 feet of the door when the door is in the closed position.
b. The nearest point of the glazing is within 5 feet of the floor.
c. The plane of the glazing is within 30 degrees of the plane of the door when the door is in the closed position.

a. # 1 a.only
b. # 1 b. only
c. # 1 c. only
d. # 1 a., 1 b., and 1 c.

73. Except as provided in par. (bm), glazing shall consist of safety glass meeting the requirements of both 16 CFR Part 1201 or ANSI Z97.1 when installed in any of the following locations:
2. In any wall where the glazing is within 7 feet vertically of the lowest drain inlet and within 5 feet horizontally of the nearest part of the inner rim of a bathtub, hot tub, shower, spa or whirlpool appliance.

a. True
b. False

74. (a) *Natural Ventilation*. Balanced mechanical ventilation may be provided in lieu of openable exterior doors, skylights or windows provided the system is capable of providing _____ per hour of fresh outside air while the room is occupied. Infiltration may not be considered as make-up air for balancing purposes.

a. at least one air change
b. at least two air changes
c. not more than one air change
d. not more than two air changes

Questions 75 to 82 (Refer to Review Materials SPS 321.06 Ceiling Height; SPS 321.07 Attic and Crawl Space Access; SPS 321.08 Fire Separation and Dwelling Unit Separation)

75. CRAWL SPACES. Crawl spaces with _____of clearance or more between the crawl space floor and the underside of the house floor joist framing shall be provided with an access opening of at least 14 by 24 inches.

a. 12 inches
b. 16 inches
c. 18 inches
d. 24 inches

76. ATTIC. Attics with 150 or more square feet of area and 30 or more inches of clear height between the top of the ceiling framing and the bottom of the rafter or top truss chord framing shall be provided with an access opening of _____, accessible from inside the structure.

a. at least 10 X 24 inches
b. at least 12 X 24 inches
c. at least 14 X 24 inches
d. at least 16 X 24 inches

77. FIRE SEPARATION. *Attached garages*. 2. For all methods listed under subd. 1., drywall joints shall comply with one of the following:
a. Joints shall be taped or sealed.
b. Joints shall be fitted so that the gap is no more than 1/20−inch with joints backed by either solid wood or another layer of drywall such that the joints are staggered.
Note: 1/20−inch is approximately the thickness of a U.S. dime.

a. True
b. False

78. FIRE SEPARATION. *Doors.* 1. The door and frame assembly between the dwelling unit and an attached garage can be labeled by an independent testing agency as having a minimum fire−resistive rating of 20 minutes. The test to determine the 20−minute rating is required to include the hose stream portion of the test.
Note: Acceptable tests for fire rating of door assemblies include ASTM E−152, UL 10B, and NFPA 252.

a. True
b. False

79. FIRE SEPARATION. *Other openings.* 1. Access openings in fire separation walls or ceilings shall be protected in one of the following ways:
a. The opening is protected with a material that has a finish rating of at least 20 minutes.
b. The opening is protected in the same way as the wall or ceiling where the opening is located.

a. True
b. False

80. DWELLING UNIT SEPARATION. *Walls.* Walls in the dwelling unit separation shall be protected by not less than one layer of 5/8−inch Type X gypsum wallboard or 2 layers of 1/2−inch gypsum wallboard or equivalent on each side of the wall with joints in compliance with sub. (1) (a) 2.

a. True
b. False

81. DWELLING UNIT SEPARATION. *Attic separation.* Dwelling units with attic space that extends over one of the units shall be separated in accordance with one of the following:
1. 'Complete separation.' The units shall be provided with wall construction under par. (d) that cannot extend all the way to the underside of the roof deck.
2. 'Vertical and horizontal separation.'
a. The units shall be provided with wall construction under par. (d) that extends to the dwelling unit ceiling and ceiling construction under par. (e).
b. Dwelling units using this method of separation shall not provide attic draft stopping under par. (f) that extends all the way to the underside of the roof deck above and in line with the separation wall.

a. True
b. False

82. DWELLING UNIT SEPARATION. *Draft stopping for concealed roof spaces and attics.*
1._____ shall be draft stopped above and in line with the separation wall.
2. Acceptable draft stopping materials include:
a. 3/8−inch wood structural panel.
b. 1/2 -inch gypsum board.

a. Attic areas
b. Mansards and overhangs
c. Other concealed roof spaces
d. All of the above

Questions 83 to 86 (Refer to Review Materials SPS 321.085 Fireblocking; SPS 321.09 Smoke Detectors and SPS 321.095 Automatic Fire Sprinklers)

83. SMOKE DETECTORS. (5) For envelope dwellings, at least _____ smoke alarms shall be placed in the air passageways. The alarms shall be placed as far apart as possible.

a. one
b. two
c. three
d. four

84. SMOKE DETECTORS. (2) (a) Except for dwellings with no electrical service, smoke detectors required by this section shall be continuously powered by the house electrical service, and shall be interconnected so that activation of one detector will cause activation of all detectors.
Note: Wireless interconnectivity is permitted under this paragraph.
(b) Dwellings with no electrical service shall be provided with battery−powered smoke detectors in the locations under sub. (1). Interconnection and battery−backup are not required in these dwellings.

a. True
b. False

85. FIREBLOCKING LOCATIONS. Fireblocking shall be provided in all of the following locations:
(a) In concealed spaces of walls and partitions, including furred spaces, at the ceiling and floor levels.
(b) At all interconnections between concealed vertical and horizontal spaces including the attachment between a carport and a dwelling.
(c) In concealed spaces between stair stringers at the top and bottom of the run and at any intervening floor level.
(d) At all openings around wires, cables, vents, pipes, ducts, chimneys and fireplaces at ceiling and floor level.

a. (b) and (d)
b. (a), (b), (c) and (d)
c. (a), (b) and (d)
d. (a), (b), and (c)

86. AUTOMATIC FIRE SPRINKLERS. (1) Except as provided in subs. (2) and (3), the design, installation, testing and maintenance of automatic fire sprinklers shall conform to NFPA 13D.
(2) (a) The requirements of NFPA 13D sections 6.3 (4), 8.1.3 and 8.6 are not included as part of this code.
(b) Fire department connections are prohibited in multipurpose piping systems.
(3) (a) Limited area automatic fire sprinkler systems are allowed in dwellings.
(b) 1. A limited area automatic fire sprinkler system shall add the following wording to the warning sign required in 6.3(5) of NFPA 13D: “The number and location of sprinklers in this system does not conform to NFPA 13D.”

a. True
b. False

Questions 87 to 93 (Refer to Review Materials SPS 321.097 Carbon Monoxide Alarms SPS 321.10 Protection Against Decay and Termites; SPS 321.11 Foam Plastics, SPS 321.115 Installation of Elevators or Dumbwaiters)

87. PROTECTION AGAINST DECAY AND TERMITES. (1) Wood used in any of the applications under this section shall meet all of the following requirements:
a. The wood shall be labeled and pressure treated with preservative in accordance with an AWPA standard or shall be naturally durable and decay−resistant or shall be engineered to be decay resistant.
b. The wood shall be pressure treated with preservative or shall be naturally termite−resistant unless additional steps are taken to make the wood termite−resistant.

a. True
b. False

88. CARBON MONOXIDE ALARMS (2) *NEW CONSTRUCTION*. (a) *General*. Except as provided in sub. (4), listed and labeled carbon monoxide alarms can be installed and maintained in accordance with s. 101.647 (2) to (6), Stats., in one and 2−family dwellings, for which building permit applications were made or construction commenced on or before February 1, 2019.

a. True
b. False

89 PROTECTION AGAINST DECAY AND TERMITES. (4) All pressure−treated wood and plywood shall be identified by a quality mark or certificate of inspection of an approved inspection agency which maintains continued supervision, testing and inspection over the quality of the product.
Note: Heartwood of redwood, cypress, black walnut, catalpa, chestnut, sage orange, red mulberry, white oak, or cedar lumber are considered by the department to be naturally decay−resistant._____ are considered by the department to be naturally termite resistant.

a. Heartwood of bald cypress and redwood
b. Redwood and eastern red cedar
c. Heartwood of bald cypress, redwood and eastern red cedar
d. None of the above

90. PROTECTION AGAINST DECAY AND TERMITES. (5) (a) Fasteners for pressure−preservative treated wood and fire−retardant−treated wood shall meet all of the following requirements:
1. The fastener is a steel bolt with a diameter of 0.5 inch or greater.
2. The fastener is not made with stainless steel.
3. The fastener is made of hot−dipped, zinc−galvanized steel with the coating weight and thickness labeled as complying with ASTM A 153.
4. The fastener is made of steel with a mechanically−deposited zinc coating labeled as complying with ASTM B 695, Class 55 or greater.
5. The fastener has coating types and weights in accordance with the fastener manufacturer's recommendations. In the absence of the manufacturer's recommendations subd. 1., 2., 3., or 4. shall apply.
Note: "Zinc plated," "zinc coated," "chrome plated," etc., fasteners do comply with all of these standards.

a. True
b. False

91. FOAM PLASTIC. (c) The following applications of foam plastic do not require a thermal barrier: _____
1. On overhead garage doors.
2. In the box sill of the basement or ground floor, above the bottom of the floor joists.

a. #1
b. #2
c. #1 and #2
d. None of the above.

92 FOAM PLASTIC. (2) Insulation that does not meet the requirements of this section may be approved by the department in accordance with s. SPS 320.18. Approval will be based on tests that evaluate materials or products representative of actual end−use applications.
Note: See s. SPS 322.21 (3) for requirements for protecting foam plastic on the exterior of a dwelling.

a. True
b. False

93. FOAM PLASTIC. (1) Foam plastic insulation shall have a flame spread rating of _____ and a smoke developed rating of 450 or less when tested in accordance with ASTM E−84.

a. 50 or more
b. 75 or less
c. 100 or more
d. 125 or less

Questions 94 to 104 (Refer to Review Materials SPS 321.12 Drainage; SPS 321.125 Erosion Control and Sediment Control; SPS 321.13 Excavations Adjacent To Adjoining Property; SPS 321.14 Excavations for Footings and Foundations)

94. EROSION CONTROL AND SEDIMENT CONTROL. *Control Standards*. Including the practices under sub. (2), additional erosion and sediment control practices shall be employed, as necessary, to accomplish one of the following:
(a) A potential annual cumulative soil loss rate of not more than one of the following:
1. Five tons per acre per year where sand, loamy sand, sandy loam, loam, sandy clay loam, clay loam, sandy clay, silty clay or clay textures are exposed.
2. Seven and a half tons per acre per [year] where silt, silty clay loam or silt loam textures are exposed.
(c) A reduction of at least _____ of the potential sediment load in storm water runoff from the site on an average annual basis as compared with no sediment or erosion controls for the site where less than one acre of land disturbing construction activity is to occur.
Note: See ch. SPS 325 Appendix A for further explanatory material regarding compliance solutions for 80 and 40% reductions.

a. 25%
b. 30%
c. 35%
d. 40%

95. EROSION CONTROL AND SEDIMENT CONTROL. *General*. Land disturbing construction activities, except those activities necessary to implement erosion or sediment control practices, may not begin until the sediment control practices are in place for each area to be disturbed in accordance with the approved plan.

a. True
b. False

96. EROSION CONTROL AND SEDIMENT CONTROL. *General*. Where land disturbing construction activity is to occur, erosion and sediment control practices shall be employed, as necessary, and maintained to prevent or reduce the potential deposition of soil or sediment to which of the following:
1. The waters of the state.
2. Adjacent properties

a. #1
b. #2
c. #1 and #2
d. None of the above

97. EROSION CONTROL AND SEDIMENT CONTROL. *Soil loss analysis*. Potential soil loss shall be determined using an engineer analytical modeling acceptable to the department.
Note: The Revised Universal Soil Loss Equation II is an example of an acceptable model to determine soil loss.

a. True
b. False

98. EROSION CONTROL AND SEDIMENT CONTROL. *Maintenance.* When the failure of erosion or sediment control practices results in an immediate threat of sediment entering public sewers or the waters of the state, procedures might be implemented immediately to repair or replace the practices.
Note: See ch. SPS 325 Appendix A for further explanatory material.

a. True
b. False

99. EROSION CONTROL AND SEDIMENT CONTROL. *Maintenance.* A municipality shall not enact more stringent requirements regarding cleanup of soil or sediment deposition onto public ways.

a. True
b. False

100. DRAINAGE. (3) *Obstructions.* Where lot lines, walls, slopes, or other barriers prevent having the _____ in sub. (2), swales or other means shall be provided to ensure equivalent drainage away from the dwelling.

a. 10-foot distance
b. 11-foot distance
c. 12-foot distance
d. 13-foot distance

101. EXCAVATIONS ADJACENT TO ADJOINING PROPERTY. (1) *Notice.* Any person making or causing an excavation which may affect the lateral soil support of adjoining property or buildings shall provide at least _____written notice to all owners of adjoining buildings of the intention to excavate. The notice shall state that adjoining buildings may require permanent protection.

a. 10 days
b. 15 days
c. 20 days
d. 30 days

102. EXCAVATIONS ADJACENT TO ADJOINING PROPERTY. (a) *Excavations less than _____ in depth.* If the excavation is made to a depth of _____ or less below grade, the person making or causing the excavation shall not be responsible for any necessary underpinning or extension of the foundations of any adjoining buildings.

a. 12 feet
b. 10 feet
c. 16 feet
d. 14 feet

103. EXCAVATIONS ADJACENT TO ADJOINING PROPERTY. (1*) Notice.* The 15-day time limit for written notification may be waived if such waiver is signed by the owner(s) or tenant(s) of the adjoining properties.

a. True
b. False

104. EXCAVATIONS FOR FOOTINGS AND FOUNDATIONS. (1) *Excavations Below Footings and Foundations.* No excavation _____ be made below the footing and foundation unless provisions are taken to prevent the collapse of the footing or foundation.

a. shall
b. should
c. may
d. can

Questions 105 to 111 (Refer to Review Materials SPS 321.15 Footings; SPS 321.16 Frost Protection; SPS 321.17 Drain Tiles)

105. FOOTINGS. *Size and Type*. Unless designed by structural analysis, unreinforced concrete footings shall comply with the following requirements:
(a) Continuous footings. The minimum width of the footing on each side of the foundation wall shall measure at least _____ wider than the wall. The footing depth shall be at least 8 inches nominal. Footing placed in unstable soil shall be formed. Lintels may be used in place of continuous footings when there is a change in footing elevation.
Note: Unstable soil includes soils that are unable to support themselves at a 90 degree angle for the full depth of the footing.

a. 2 inches
b. 4 inches
c. 6 inches
d. 8 inches

106. FOOTINGS. *Size and Type.* Footing for chimneys or fireplaces shall extend at least _____ on each side of the chimney or fireplace. The minimum depth shall measure at least 12 inches nominal.

a. 2 inches
b. 3 inches
c. 4 inches
d. None of the above

107. FOOTINGS. *Size and Type*. Unless designed by structural analysis, unreinforced concrete footings shall comply with the following requirement:
(b) Column or pier footing. 1. The minimum width and length of column or pier footings shall measure at least 2 feet by 2 feet.
2. The minimum depth of column or pier footings shall measure at least _____ nominal.

a. 8 inches
b. 10 inches
c. 12 inches
d. 16 inches

108. FROST PROTECTION. *Exceptions.* (a) Frost protected shallow foundations shall be designed in accordance with ASCE–32 as adopted in Table SPS 320.24–5.
(b) Portions of footings or foundations located directly under window areaways do not require frost protection provided the rest of the foundation is protected in accordance with this section.
(c) Footings and foundations may bear directly on bedrock less than 40 inches below adjacent grade provided all of the following conditions are met.
1.The rock shall be cleaned of all earth prior to placement.
2. All clay in crevices of the rock shall be removed to the level of frost penetration or to 4 times the width of the rock crevice, whichever is less.
3. Provisions shall be taken to prevent water from collecting anywhere along the foundation.

a. True
b. False

109. DRAIN TILE. *Optional systems.* (a) *New construction.* 1. For new dwelling construction, a municipality or registered UDC inspection agency may determine the soil types and natural or seasonal groundwater levels for which a complete drain tile or pipe system is required.
2. For new dwelling construction, a municipality may not enact requirements for other than complete drain tile or pipe systems.

a. True
b. False

110. DRAIN TILE. *Material and Installation requirements for Required Systems.* (d) Drain tile or pipe installation. Drain tile or pipe used for foundation drainage shall comply with the following requirements:
1. a. Except as allowed under subd. 1. b., the top of the tile or pipe shall be at or below the top of the footing.
b. Where the top of the footing is more than _____ below the bottom of the floor slab, tile or pipe is required on the interior of the foundation only and it shall be placed directly under the floor.
Note: This situation will commonly occur with a walk–out basement.

a. 2 inches
b. 4 inches
c. 6 inches
d. 8 inches

111. FOOTINGS. *Soil−Bearing Capacity*. No footing or foundation shall be placed on soil with a bearing capacity of less than 1,500 pounds per square foot unless the footing or foundation has been designed through structural analysis. The soil−bearing values of common soils may be determined through soil identification.

a. True
b. False

Questions 112 to 117 (Refer to Review Materials SPS 321.18 Foundations)

112. GENERAL. *Anchor bolts.* Structural steel anchor bolts, at least ½ inch in diameter, embedded at least _____ into the concrete or grouted masonry with a maximum spacing of 72 inches and located within 18 inches of wall corners.

a. 4 inches
b. 5 inches
c. 7 inches
d. 9 inches

113. GENERAL. *Lateral support at base.* Lateral support such as floor slabs or framing shall be provided at the base of foundation walls.

a. True
b. False

114. GENERAL. *Floor Framing*. 2. a. Where the floor framing is parallel to the foundation wall, solid blocking or bridging shall be installed in at least the first adjacent joist space at a spacing of no more than _____ on center.
b. Blocking and bridging shall be the same depth as the joist.
c. Fastening of the blocking or bridging shall be in accordance with structural analysis or the fastener schedule in Table 321.02-2.

a. 16 inches
b. 32 inches
c. 48 inches
d. 64 inches

115. MASONRY FOUNDATION WALLS. (a) *Dampproofing.* 1. Except as allowed under subd. 3., masonry block foundation walls shall be coated with a layer of minimum 3/8−inch thick type M or S portland cement mortar parging on the exterior of the wall from footing to finished grade.
2. Masonry foundation walls shall be damp−proofed by applying to the exterior surface of the portland cement parging from footing to finished grade, a continuous coating of (which of the following) _____:
(a) A bituminous coating applied in accordance with the manufacturer's instructions.

(b) Acrylic−modified cement applied at a minimum rate of 3 pounds per square yard.

(c) A layer of minimum 1/8−inch thick structural surface bonding material labeled as complying with ASTM C887.

Note: The ASTM C887 standard is entitled, "Standard Specification for Packaged, Dry, Combined Materials for Surface Bonding Mortar."

(d) A waterproofing treatment applied in accordance with the manufacturer's instructions.

a. (a) and (b)
b. (b), (c) and (d)
c. (a), (b) and (d)
d. All of the above - (a), (b), (c) and (d)

116. MASONRY FOUNDATION WALLS. (a) *Dampproofing.* 3. a. Parging of masonry block foundation walls is not required where a dampproofing material is sufficiently flexible to be listed or designed for direct application to masonry block.
b. Parging of masonry block foundation walls is not required where a layer of minimum 1/4−inch thick structural surface bonding material labeled as complying with ASTM C887 is used for dampproofing.

a. True
b. False

117. WOOD FOUNDATIONS. Wood foundations can be designed and constructed in accordance with the standard adopted in Table 320.24−2.
Note: The department shall not accept Permanent Wood Foundations Design and Construction Guide published by the Southern Forest Products Association through the Southern Pine Council, as complying with this standard. The Design and Construction Guide requires a 5-inch-thick floor slab if a poured concrete floor slab is used.

a. True
b. False

Questions 118 to 130 (Refer to Review Materials SPS 321.19 Floor Design; SPS 321.20 Concrete Floors; SPS 321.203 Garage Floors; SPS 321.205 Wood Floors in Contact with the Ground; SPS 321.21 Precast concrete floors; SPS 321.22 Wood Frame Floors; SPS 321.225 Decks)

118. CONCRETE FLOORS. When concrete floors are provided, the thickness of the concrete shall measure at least_____.

a. 2 inches
b. 3 inches
c. 4 inches
d. 5 inches

119. GARAGE FLOORS. The floor shall be sloped such that water is removed in accordance with _____:
(a) Water drains toward the overhead door or to exterior grade such that no damage will be caused to any structural member or wall covering of the garage or the dwelling.
(b) Water drains into an interior floor drain that complies with the requirements of ch. SPS 382.

a. None of the above
b. Only (a)
c. Only (b)
d. Both (a) and (b)

120. GARAGE FLOORS. Garage floors shall be constructed of concrete or other noncombustible materials which are impermeable to petroleum products. Slab−on−grade concrete garage floors shall be at least _____ thick and placed over at least _____ of granular fill.

a. 3 inches / 4 inches
b. 4 inches / 4 inches
c. 5 inches / 3 inches
d. 6 inches / 5 inches

121. PRECAST CONCRETE FLOORS. Precast concrete floors _____ be designed through structural analysis, or load tables furnished by the precast product fabricator may be used, provided the load tables were developed using structural analysis or load testing.

a. shall
b. should
c. can
d. may

122. WOOD FLOORS IN CONTACT WITH THE GROUND. Wood floors in contact with the ground shall comply with the requirements under s. SPS 321.18 (4).

a. True
b. False

123. WOOD FRAME FLOORS. Unless designed through structural analysis, wood frame floors shall comply with the following requirements:
(1) FLOOR JOISTS. (a) *General.* 1. Floor joists shall comply with the structural requirements and dead load determination under s. SPS 321.02.

a. True
b. False

124. WOOD FRAME FLOORS. *Bearing and End Configuration. (*a) Sawn lumber. 1. 'Joist.' Wood joists made of sawn lumber shall meet the following bearing requirements:
a. Wood joist supported on wood or metal shall have a bearing surface of at least _____ measured from the end of the joist.

a. 1 ½ inches
b. 2 inches
c. 2 ½ inches
d. 3 inches

125. WOOD FRAME FLOORS. *Girders and beams*. (d) Lateral restraint for all wood beams shall be provided at all columns using a saddle or other approved connection where the beam meets one of the following conditions:
1. The beam is not restrained at both ends.
2. The beam is more than 11.25 inches deep using actual measurement.
Note: A saddle supports the beam on the bottom and allows for the through−connection of fasteners into the side of the beam.

a. True
b. False

126. WOOD FRAME FLOORS. *Bearing and End Configuration.* (d) Wood floor joists with ends that intersect over a beam shall have the ends overlap at least _____ and be securely fastened together with at least two 12d common nails or the ends shall be butt−jointed or face−jointed and fastened with ties, straps, plates or solid blocking.

a. 3 inches
b. 4 inches
c. 6 inches
d. 8 inches

127. WOOD FRAME FLOORS. *Other Holes*. Holes bored in floor joists that are not within 2 inches of the top or bottom of the joist shall have their diameter limited to_____.

a. ¼ the depth of the joist
b. 1/3 the depth of the joist
c. ½ the depth of the joist
d. 2/3 the depth of the joist

128. WOOD FRAME FLOORS. *Notching and Boring.* Notching and boring of beams or girders is _____.

a. permissible
b. prohibited
c. prohibited unless determined through structural analysis.
d. allowed provided it is less than a 2-inch notch or bore hole.

129. WOOD FRAME FLOORS. *Floor Openings*. _____ shall be doubled when the span of the header exceeds 4 feet. Headers which span more than 6 feet shall have the ends supported by joist hangers or framing anchors, unless the ends are supported on a partition or beam. Tail joists (joists which frame into headers) more than 8 feet long shall be supported on metal framing anchors or on ledger strips of at least 2 inches by 2 inches nominal.

a. Trimmers
b. Headers
c. Trimmers and headers
d. none of the above

130. (1) Decks attached to dwellings and any detached decks that serve an exit shall comply with the applicable provisions of sub chs. II to X of ch. SPS 321, including _____
(a) Excavation requirements under s. SPS 321.14;
(b) Footing requirements under s. SPS 321.15 (2) (f);
(c) Frost penetration requirements under s. SPS 321.16;
(d) Load requirements under s. SPS 321.02;
(e) Stair, handrail and guard requirements of s. SPS 321.04.
(f) Decay protection requirements of s. SPS 321.10.

a. (a), (c) and (e)
b. (b), (d) and (f)
c. (a), (b), (c), (d), (e) and (f)
d. (a), (c), (d) and (f)

Questions 131 to 160 (Refer to Review Materials SPS 321.23 Wall Design; SPS 321.24 Exterior covering; SPS 321.25 Wood Frame Walls)

131. WALL DESIGN. Walls shall be designed to withstand a horizontal wind pressure of at least 20 pounds per square foot applied to the vertical projection of that portion of the dwelling above grade. _____ wind load reduction shall be permitted for the shielding effect of other buildings.

a. No
b. A
c. A 10%
d. None of the above

132. EXTERIOR COVERING. *During construction.* During construction, wall cavity insulation_____ be installed until a water−resistant covering is in place over the wall cavity and windows, doors and a roof with at least underlayment are installed.
Note: An example of acceptable water−resistant covering for a wall is foam sheathing with permanently taped joints.

a. may
b. can
c. may not
d. should

133. EXTERIOR COVERING. *Flashing*. (c) 1. Any joints between 2 pieces of flashing that form a vertical joint shall be lapped a minimum of 6 inches and sealed.
2. Any joints between 2 pieces of flashing that form a horizontal joint shall be lapped a minimum of 2 inches and sealed unless otherwise specified by the flashing manufacturer.
3. Sealants used for flashing _____ grade and shall be compatible with the materials being sealed.

a. shall be exterior
b. can be exterior
c. can be any
d. none of the above

134. EXTERIOR COVERING. *Water-resistive barrier requirements.* (a) *General.*
1. Exterior walls of wood or metal frame construction shall be provided with a water−resistive barrier from the highest point to the bottom of the permanent weather−resistant covering.
Note: Acceptable water−resistive barrier materials include polymeric−based house wraps and spray−applied water−resistive barriers installed per the manufacturer's instructions, #15 or greater asphalt−saturated felts that comply with ASTM D 226 for type I felt and extruded foam sheathing with permanently taped joints. Duct tape or similar will not result in a permanently taped joint.
2. Structural products with an integral water−resistive barrier may be approved by the department as a complete assembly.
(b) *Material compatibility.* The water−resistive barrier material shall be compatible with the other materials in the wall with which it will come into contact.
Note: Spray−applied water−resistive barriers may not be compatible with foam plastic insulation.

a. True
b. False

135. EXTERIOR COVERING. (d) *Application.*
1. Horizontal seams in sheet or strip material shall be overlapped such that the upper layer extends over the lower layer at least 2 inches.
2. Vertical seams in sheet or strip materials shall be overlapped at least 6 inches.
3. Any rips, tears or voids shall be patched in accordance with subds. 1. and 2.

a. True
b. False

136. EXTERIOR COVERING. (c) *Performance requirements.* 1. Polymer−based house wraps shall meet one of the following requirements:
a. A water vapor permeability rating of 4 perms or higher when tested in accordance with ASTM E96.
b. An acceptable water−resistance rating determined in accordance with ASTM D779, AATCC 127 or CCMC 07112.
Note: Asphalt−saturated felt or "tar paper" is not a polymeric−based house wrap.
Note: For more information on the water−resistance tests and their results, see the International Code Council Evaluation Services Acceptance Criteria AC 38.
2. Spray−applied water−resistive barriers shall be approved under the International Code Council Evaluation Services.
Note: For approval criteria, see ICC−ES acceptance criteria AC 212 or successor document.

a. True
b. False

137. EXTERIOR COVERING. (e) *Penetrations.* 1. Penetrations caused by fasteners of the water−resistive barrier or the weather−resistant exterior covering do require sealing.
2. Penetrations of 3 square inches or less with an annular space of no more than 1/2 inch shall be sealed with caulk or similar material.
3. Penetrations of greater than 5 square inches shall be flashed in accordance with sub. (3).

a. True
b. False

138. WOOD FRAME WALLS. *Notching and boring.* 1. When piping or ductwork is placed in an exterior wall or an interior load−bearing wall, such that at least half of the top plate is removed, the plate shall be reinforced with a steel angle at least _____ by 20 gauge thick.
Note: 20 gauge is approximately 0.036 inch.

a. 2 inches by 2 inches
b. 3 inches by 3 inches
c. 4 inches by 4 inches
d. None of the above

139. WOOD FRAME WALLS. (4) *NOTCHING.* Notching and boring of columns or posts is prohibited unless designed through structural analysis.

a. True
b. False

140. WOOD FRAME WALLS. *(3) WALL OPENINGS. (am)Headers.* Where doors and windows occur, headers can be used to carry the load across the opening.
(bm) *Header size.* The size of headers shall be determined in accordance with the spans and loading conditions listed in Tables 321.25−B, 321.25−C and 321.25−D. Headers for longer spans can be designed by an engineering method under s. SPS 321.02.

a. True
b. False

141. WOOD FRAME WALLS. *Top plates.* (a) *General.* Except as allowed under subd. 3., top plates shall be provided and configured as follows:
1. Studs at bearing walls shall not be capped with double top plates.
2. End joints in double top plates shall be offset at least 3 stud spaces.
3. Double top plates shall be overlapped at the corners and at intersections of partitions.
4. The plate immediately above the stud may have a joint only when directly over the stud.

a. True
b. False

142. WOOD FRAME WALLS. *Posts and Columns.* 4. All columns shall be positively attached to the beams they support using clips, straps or saddles.

a. True
b. False

Refer to Table 321-25-A Size, Height and Spacing of Wood Studs-A
(For questions 143 through 145)

143. Using a Nominal Size 2X4, what is the maximum spacing allowed when supporting a roof and ceiling (only)?

a. 14”
b. 24”
c. 16”
d. 10”

144. Using a Nominal Size 2X4, what is the maximum spacing allowed when supporting one floor, roof and ceiling?

a. 14”
b. 24”
c. 16”
d. 10”

145. Using a Nominal Size 2X6, what is the maximum spacing allowed when supporting one floor, roof and ceiling?

a. 14”
b. 24”
c. 16”
d. 10”

146. WOOD FRAME WALLS. *Foundation Cripple Walls.*
(a) Foundation cripple walls shall be framed with studs at least as large as the studs above.
(b) When more than 4 feet in height, cripple walls shall be framed with studs needed for an additional floor level.
(c) Cripple walls with a stud height of less than 14 inches shall be sheathed on at least one side for its entire length with a wood structural panel that is fastened to both the top and bottom plates or the cripple walls shall be constructed of solid blocking.
(d) Cripple walls with a stud height of 14 inches or greater shall be braced in accordance with sub. (8).
(e) Cripple walls shall be fully supported by a continuous foundation.

a. (a) and (c)
b. (b), (c) and (d)
c. (a), (c), (d) and (e)
d. (a), (b), (c), (d) and (e)

147. WOOD FRAME WALLS. *Wall Bracing.* (a) *General.* Dwellings using wood− framed walls shall be braced in accordance with this section. Where a building, or a portion thereof, does not comply with all of the bracing requirements in this section, those portions shall be designed and constructed in accordance with accepted engineering practice.

a. True
b. False

Refer to Table 321.25-B Allowable Spans for Headers Supporting Roof/Ceiling Assemblies
(For questions 148 through 151)

148. What is the maximum width allowed for header members on a house 26’ in width; using two 2X6’s; in zone 2? (Refer to SPS 321.02 for the counties in each zone)

a. 2’
b. 3’
c. 4’
d. 5’

149. What is the maximum width allowed for header members on a house 28’ in width; using two 2X6’s; in zone 1? (Refer to SPS 321.02 for the counties in each zone)

a. 2’
b. 3’
c. 4’
d. 5’

150. What is the maximum width allowed for header members on a house 28’ in width; using two 2X12’s; in zone 1? (Refer to SPS 321.02 for the counties in each zone)

a. 5’
b. 6’
c. 7’
d. 8’

151. What is the maximum width allowed for header members on a house 26’ in width; using two 2X10’s; in zone 2? (Refer to SPS 321.02 for the counties in each zone)

a. 5’
b. 6’
c. 7’
d. 8’

Refer to Table 321.25-D Allowable Spans for Headers Supporting One Floor and Roof/Ceiling Assembly (F*or questions 152 through 155)*

152. What is the maximum width allowed for header members on a house 26’ in width; using two 2X10’s; in zone 2? (Refer to SPS 321.02 for the counties in each zone)

a. 2.5’
b. 3’
c. 4’
d. 5’

153. What is the maximum width allowed for header members on a house 32’ in width; using two 2X12’s; in zone 1? (Refer to SPS 321.02 for the counties in each zone)

a. 2.5’
b. 3’
c. 4’
d. 5’

154. What is the maximum width allowed for header members on a house 32’ in width; using two 2X8’s; in zone 2? (Refer to SPS 321.02 for the counties in each zone)

a. 2.5’
b. 3’
c. 4’
d. 5’

155. What is the maximum width allowed for header members on a house 32’ in width; using two 2X6’s; in zone 2? (Refer to SPS 321.02 for the counties in each zone)

a. 2.5’
b. 3’
c. 4’
d. 5’

156. WOOD FRAME WALLS. *Wall Bracing.* (c) *Bracing amount.* Bracing methods and materials complying with Table 321.25–G shall be applied to walls in accordance with the following requirement:
6. Balloon−frame walls may be no longer than 21 feet and shall have a maximum height of two floors unless constructed in accordance with an approved design. Wall framing shall be continuous from the lowest floor to the wall top plate at the roof. All edges of sheathing shall be supported on and fastened to blocking or framing. Braced wall panels may not be required on the balloon− frame wall portion provided the bracing amount and brace spacing requirement are satisfied for the building side. Where brace panels are located on the balloon−frame wall portion, they shall have a height−to−width ratio of not more than 2.5:1.

a. True
b. False

157. WOOD FRAME WALLS. *Wall Bracing.* (c) *Bracing amount.* Bracing methods and materials complying with Table 321.25–G shall be applied to walls in accordance with the following requirement:
7. For a gable end wall, if the brace−panel height does not exceed _____ at the highest portion and if the 12½−foot and 21−foot spacing requirements in Figure 321.25–C are met, the wall is adequately braced. Where a brace panel exceeds _____ in height, it shall have a height−to−width ratio of not more than 2.5:1, and comply with Figure 21.25–C.

a. 12 feet / 10 feet
b. 10 feet / 12 feet
c. 12 feet / 12 feet
d. 12 feet / 14 feet

158. WOOD FRAME WALLS. *Wall Bracing.* (c) *Bracing amount.* Bracing methods and materials complying with Table 321.25–G shall be applied to walls in accordance with all of the following requirements:
3. Where used, the number of intermittent brace panels applied to walls parallel to each rectangle side shall comply with Table 321.25–I.
4. Where used, the total length of continuous sheathed brace panels applied to walls parallel to each building side shall comply with Table 321.25–J.
5. The location of brace panels applied to walls parallel to each building side shall comply with Figure 321.25–C.

a. True
b. False

159. WOOD FRAME WALLS. *Wall Bracing.* (c) *Bracing amount.* Bracing methods and materials complying with Table 321.25–G shall be applied to walls in accordance with the following requirement:
2. In no case may the amount of bracing be _____ braced wall panels on walls parallel to each rectangle side for each floor level of the building.

a. determined by
b. less than one
c. less than two
d. none of the above

160. What is the maximum width allowed for header members on a house 28’ in width; using two 2X8’s; in zone 2? (Refer to SPS 321.02 for the counties in each zone)

a. 3’
b. 3.5’
c. 4’
d. 4.5’

Questions 161 to 164 (Refer to Review Materials SPS 321.26 Masonry Walls)

161. MASONRY WALLS. *Types of Mortar*. (a) *Mortar specifications.* The type of mortar shall be determined from Table 321.26−A. The mortar shall conform to the requirements of ASTM C−270.

(b) *Surface bond mortars.* Surface bond mortars for masonry walls shall be mixed in accordance with the proportions specified on the bag.

a. True
b. False

162. MASONRY WALLS. *Cold Weather Work*. When ambient air temperature is below _____, the cold weather construction procedures under ACI 530.1 shall be followed.

Note: The requirements for cold weather work are in sections 1.8 and 1 .8C of the 2005 edition of the ACI standard.

a. 40 degrees
b. 35 degrees
c. 30 degrees
d. 25 degrees

163. MASONRY WALLS. *Flashing*. *(b) Location.* 1. ‘Lintels and chimneys.’ In exterior hollow masonry walls, flashing shall be installed at the backsides of chimneys and at the bottom of the cavity formed by openings such as lintels over doors and windows.

a. True
b. False

164. MASONRY WALLS. *Masonry Veneers. 6.* _____ behind masonry veneer shall be covered with material used to construct the water−resistive barrier as required under s. SPS 321.24 (4).

Note: Acceptable water−resistive barrier materials include polymeric−based house wraps and #15 or greater asphalt−saturated felts that comply with ASTM D 226 for type I felt.

a. Studs
b. Sheathing
c. Studs and sheathing
d. None of the above

Questions 165 to 180 (Refer to Review Materials SPS 321.27 Roof Design and Framing; SPS 321.28 Weather Protection for Roofs; SPS 321.29 Masonry Fireplaces; SPS 321.30 Masonry Chimneys; SPS 321.32 Factory-built Fireplaces; SPS 321.33 Construction in Floodplains and SPS 321.40 Installation of Manufactured Homes/Installation Standards)

165. ROOF DESIGN AND FRAMING. *Structural Design. Applicability of tables.* The joist and rafter tables in the ch.SPS 325 Appendix A are valid for roofs with a minimum slope of 3 in 12. Lesser slopes require engineering analysis or shall be provided with a ridge beam.

a. True
b. False

166. ROOF DESIGN AND FRAMING. *Uplift and Suction Forces. Anchorage.* 1. Roof framing members spanning more than 8 feet measured from the outermost edge of the roof shall be permanently fastened to the top plate of load bearing walls using engineered clips, straps or hangers.
2. Roof framing members spanning 4 feet or less measured from the outermost edge of the roof shall be permanently fastened to the top plate of load bearing walls using toe−nailing or engineered clips, straps or hangers.

a. True
b. False

167. WEATHER PROTECTION FOR ROOFS. *Asphalt Shingles.*
Shingles shall have at least_____ fasteners per strip shingle or 2 fasteners per interlocking shingle, unless the manufacturer has other specifications.

a. 2
b. 3
c. 4
d. 5

168. WEATHER PROTECTION FOR ROOFS. *Reroofing.* New roof coverings may be installed over existing roof coverings where all of the following conditions exist:
(a) The existing roof or roof covering is water−soaked or has deteriorated such that it is inadequate as a base for additional roofing.
(b) The existing roof is wood shake, slate, clay, cement or asbestos−cement tile.
(c) The existing roof has 2 or more applications of any type of permanent roof covering.

a. True
b. False

169. WEATHER PROTECTION FOR ROOFS. *Chimney flashing.*
1. Chimneys shall be flashed and counter−flashed to a height of at least 6 inches.
2. Chimney crickets or saddles shall be installed where the upper side of a chimney is more than _____ wide on a sloping roof.
3. The intersection of the cricket and the chimney shall be flashed and counter−flashed to a height of at least 6 inches.

a. 20 inches
b. 25 inches
c. 30 inches
d. 35 inches

170. MASONRY FIREPLACES. *Termination of chimneys.* Masonry fireplace chimneys shall extend at least 3 feet above the highest point where the chimney passes through the roof and at least 2 feet higher than any portion of the dwelling within _____of the chimney.

a. 8 feet
b. 10 feet
c. 12 feet
d. 14 feet

171. MASONRY FIREPLACES. *Flue Liners*. Flue liners shall start at the top of the fireplace throat and extend to a point at least_____ above the top of the chimney cap.

a. 4 inches
b. 6 inches
c. 7 inches
d. 8 inches

172. MASONRY CHIMNEYS. *Corbeling*. Unless designed through structural analysis, masonry chimneys shall not be corbeled from a wall more than 6 inches nor shall a masonry chimney be corbeled from a wall less than _____ in nominal thickness unless it projects equally on each side of the wall. The corbeling shall not exceed one–inch projection for each brick course.

a. 6 inches
b. 8 inches
c. 10 inches
d. 12 inches

173. FACTORY-BUILT FIREPLACES. Factory built fireplaces consisting of a _____ and other parts shall be tested and listed by a nationally recognized testing laboratory.
1. fire chamber assembly
2. one or more chimney sections
3. a roof assembly

a. #1 and 3
b. # 1and 2
c. # 1, 2 and 3
d. #2 and 3

174. CONSTRUCTION IN FLOODPLAINS. *Protection of Electrical and Mechanical Systems.*
Electrical and mechanical equipment shall be placed _____ the base flood elevation or shall be designed to prevent water contact with the equipment in case of a flood up to the base flood elevation.

a. at
b. below
c. above
d. None of the above.

175. INSTALLATION OF MANUFACTURED HOMES. INSTALLATION STANDARDS. *Compliance.* A manufactured home produced on or after April 1, 2007 shall be installed in accordance with 24 CFR Part 3285 except as otherwise provided by this subsection.

a. True
b. False

176. INSTALLATION OF MANUFACTURED HOMES. INSTALLATION STANDARDS. *Produced Before April 1, 2007.* (a) Except as provided in par. (b), the installation of a manufactured home produced before April 1, 2007 shall be installed in conformance with the requirements in effect at the time the manufactured home was produced.

a. True
b. False

177. INSTALLATION OF MANUFACTURED HOMES. INSTALLATION STANDARDS. *Produced Before April 1, 2007.* Piers shall be placed under the main frame of the chassis at intervals of not more than _____ and no more than 3 feet from the exterior side of each end wall. The 7–foot spacing requirement may be varied as permitted by footing, spacing and soil capacity tables provided by the home manufacturer.

a. 5 feet on-center
b. 6 feet on-center
c. 7 feet on-center
d. 8 feet on-center

178. INSTALLATION OF MANUFACTURED HOMES. INSTALLATION STANDARDS. *Produced Before April 1, 2007.* The home site may be graded to permit water to drain from under the home and away from the home for a minimum of 3 feet from the home.

a. True
b. False

179. INSTALLATION OF MANUFACTURED HOMES. INSTALLATION STANDARDS. *Produced Before April 1, 2007.* Wood caps and shims shall be at least equal to No. 2 spruce pine fir having a minimum fiber bending stress rating of 1400 psi. All wood caps shall be the same species of wood, and all shims shall be the same species of wood.

a. True
b. False

180. INSTALLATION OF MANUFACTURED HOMES. INSTALLATION STANDARDS. *Produced Before April 1, 2007.* 5. Each footing shall consist of one of the following: c. An 18–inch diameter hole bored to below the frost line or to unfractured bedrock and filled with poured concrete.

a. True
b. False

Questions 181 to 204 (Refer to Review Materials–SPS 322.01 Scope to SPS 322.10 Definitions)

181. SCOPE. This chapter applies to all construction covered by this code that use any amount of renewable energy for heat generation.
Note: Non−renewable energy sources used for heat distribution only will also require compliance with this chapter.
Note: Although the actual source of heat delivered by a heat pump is renewable, a dwelling using a heat pump is not exempt from the requirements of this chapter due to the required input of electricity to run the pump and compressor.

a. True
b. False

182. APPLICATION. This chapter allows the designer the option of using various methods to demonstrate compliance with thermal performance requirements. The designer shall identify on the plan submittal form what method or subchapter is being used, and indicate the design criteria and how it is being applied. Unless specifically exempted, all requirements of this chapter apply regardless of the method used.

a. True
b. False

183. DEFINITIONS. "Mass wall" means a wall of concrete block, concrete, insulated concrete forms, masonry cavity, _____, earth and solid timber or logs.

a. styrofoam composite
b. brick or brick veneer
c. brick other than brick veneer
d. none of the above

184. DEFINITIONS. "_____" means a floor slab in which an uninsulated heating element, uninsulated hydronic tubing or uninsulated hot air distribution system is in contact with the slab or placed within the slab or the subgrade.

a. Heated slab
b. Cooled slab
c. Sizzling slab
d. none of the above

185. DEFINITIONS. "Conditioned space" means space within the dwelling thermal envelope which is provided with heated air or surfaces to provide a heated space capable of maintaining the temperature of the space to at least _____ at design conditions.

a. 45°F
b. 50°F
c. 55°F
d. 60°F

186. APPLICATION. This chapter is not intended to conflict with any safety or health requirements. Where a conflict occurs, the safety and health requirements _____ govern.

a. may
b. might
c. shall
d. should

187. DEFINITIONS. "Infiltration" means the controlled inward and outward air leakage through cracks and interstices in any dwelling element and around windows and doors of a dwelling caused by the pressure effects of wind, and the effect of differences in the indoor and outdoor air density.

a. True
b. False

188. DEFINITIONS. “Opaque areas” means all exposed areas of a dwelling envelope which enclose conditioned space except openings for _____ and dwelling service systems.

a. windows
b. skylights
c. doors
d. windows, skylights and doors

189. DEFINITIONS. “_____” means the sum of areas of all floors in conditioned space in the structure, including basements, cellars, and intermediate floored levels measured from the exterior faces of exterior walls or from the center line of interior walls, excluding covered walkways, open roofed−over areas, porches, exterior terraces or steps, chimneys, roof overhangs and similar features.

a. opaque areas
b. Conditioned space
c. Conditioned floor area
d. none the above

190. DEFINITIONS. “HVAC system” means the equipment, distribution network, and terminals that provide either collectively or individually the processes of heating, ventilating, or air conditioning to a building.

a. True
b. False

191. DEFINITIONS. “Dwelling thermal envelope” means the elements of a dwelling with enclosed conditioned space through which thermal energy may be transferred to or from unconditioned space or the exterior.

a. True
b. False

192. DEFINITIONS. “Exterior wall area” means the normal projection of the dwelling envelope wall area bounding interior space which is conditioned by an energy−using system including opaque wall, window and door area. Any skylight shaft walls that are _____ or more in depth, measured from the ceiling plane to the roof deck, are considered in the area of exterior walls and are not considered part of the roof assembly.

a. 6 inches
b. 8 inches
c. 10 inches
d. 12 inches

193. DEFINITIONS. “IC−rated” means an electrical fixture tested and listed by an independent testing laboratory as being _____ for installation in a cavity where the fixture may be in direct contact with thermal insulation or combustible materials.

a. unfitting
b. unacceptable
c. suitable
d. improper

194. DEFINITIONS. “Crawl space wall” means the opaque portion of a wall which encloses a crawl space and is partially or totally below grade.

a. True
b. False

195. DEFINITIONS. “Renewable energy sources” means sources of energy, including minerals and petroleum products, derived from incoming solar radiation, trees and other plants, wind, waves and tides, lake or pond thermal differences and from the external heat of the earth.

a. True
b. False

196. DEFINITIONS. “Sun room” means a one–story structure attached to a dwelling with a glazing area in excess of _____ of the gross area of the structure’s exterior walls and roof.

a. 30%
b. 35%
c. 40%
d. 50%

197. DEFINITIONS. “_____” means a space or group of spaces within a dwelling with heating requirements sufficiently similar so that comfort conditions can be maintained throughout by a single controlling device.

a. Segment
b. Section
c. Sphere
d. Zone

198. DEFINITIONS. “_____” means the process of supplying or removing air by natural or mechanical means to or from any space. The air may or may not have been conditioned.

a. Ventilation
b. Oxygenation
c. Purification
d. Aeration

199. DEFINITIONS. “Thermal transmittance” or “_____” means the time rate of heat flow through a body or assembly which is located between 2 different environments, expressed in Btu/h • ft.^{2} • °F. The _____ applies to combinations of different materials used in series along the heat flow path and also to single materials that comprise a dwelling section, including cavity air spaces and air films on both sides of a dwelling element.

a. R-factor/ U-factor
b. U-factor/U-factor
c. T-factor/ R-factor
d. S-factor/T-factor

200. DEFINITIONS. “Thermal resistance” or “_____” means a measure of the ability to retard the flow of heat. The _____ is the reciprocal of thermal transmittance or U−factor expressed as R = 1/U.

a. R-value/ R-value
b. U-factor/ R-value
c. T-factor/ R-value
d. S-factor/ T-factor

201. DEFINITIONS. “Roof assembly” means some components of the roof and ceiling envelope through which heat flows, thus creating a building transmission heat loss or gain, where such assembly is exposed to outdoor air and encloses a heated space. Any skylight shaft walls less than 12 inches in depth, as measured from the ceiling plane to the roof deck, are considered in the roof assembly and are considered in the area of exterior walls.

a. True
b. False

202. DEFINITIONS. “System” means a combination of central or terminal equipment and their _____ by which energy is transformed so as to perform a specific function, such as HVAC, water heating, or illumination.

a. components and controls
b. accessories
c. interconnecting means and terminal devices
d. accessories, components and controls, interconnecting means and terminal devices

203. DEFINITIONS. “Thermally isolated” means physically and thermally separated with separate zone or separate equipment controls for space heating.

a. True
b. False

204. DEFINITIONS. “Proposed design” means a description of the proposed dwelling used to estimate annual energy use for determining compliance based on total building performance.

a. True
b. False

Questions 205 to 214 (Refer to Review Materials – SPS 322.20 Basic requirements and SPS 322.21 Protection of insulation)

205. "LABORATORY OR FIELD TEST MEASUREMENTS. (a) *General dwelling thermal envelope materials.* When information specified under sub. (1) is not available, or when a different value is claimed, supporting data _____ be obtained using one of the following test methods:
1. ASTM C177, Standard test method for steady state heat flux measurements and thermal transmission properties by means of the guarded−hot−plate apparatus.
2. ASTM C335, Standard test method for steady state heat transfer properties of pipe insulation.
3. ASTM C518, Standard test method for steady state thermal transmission properties by means of the heat flow meter apparatus.
4. ASTM C1363, Standard test method for the thermal performance of building materials and envelope assemblies by means of a hot box apparatus.

a. may
b. might
c. shall
d. should

206. IDENTIFICATION. (b) 1. The thickness of blown−in roof and ceiling insulation shall be identified by thickness markings that are labeled in inches and installed at least one for every _____ through the attic space.

a. 200 square feet
b. 300 square feet
c. 350 square feet
d. 400 square feet

207. GENERAL. When available, information and values on thermal properties, performance of building envelope sections and components, and heat transfer shall be obtained from the ASHRAE Handbook of Fundamentals.

a. True
b. False

208. GENERAL INSTALLATION. (a) Materials, equipment and systems shall be identified in a manner that will allow a determination of their _____ with the applicable provisions of this code.

a. denial
b. defiance
c. nonconformity
d. compliance

209. IDENTIFICATION. The thickness of installed insulation shall meet or exceed the minimum initial installed thickness shown by the marker.

a. True
b. False

210. CERTIFICATE. (a) A permanent certificate shall be posted on or immediately adjacent to the electrical distribution panel.
(b) The certificate shall be completed by the _____.

a. owner or builder
b. builder or insulation installer
c. owner, builder or insulation installer
d. owner or insulation installer

211. COMPUTATION OF R-VALUES. Insulation material used in layers, such as framing cavity insulation and insulating sheathing, _____ be summed to compute the component R−value.
(b) The manufacturer's settled R−value shall be used for blown insulation.

a. may
b. can
c. shall
d. should

212. CONCRETE MASONRY UNITS. Systems using integrally−insulated concrete masonry units can be evaluated for thermal performance in accordance with both:

1. Default values as approved by the department with no extrapolations or interpolations.
2. Laboratory or field test measurements specified under par. (A)

a. True
b. False

213. FOAM PLASTIC INSULATION. (a) Exterior foam plastic insulation shall be protected from physical damage and damage from ultraviolet light with a permanent, opaque, weather−resistant covering or coating.
(b) The protective covering shall cover the exposed exterior insulation and extend a minimum of _____ below grade, except the covering is not required below a brick ledge.

a. 2 inches
b. 3 inches
c. 4 inches
d. 5 inches

214. WIND WASH PROTECTION. (a) Except as provided under s. SPS 322.39 (4) for cathedral ceilings, all air−permeable insulation materials installed in any position other than horizontal, _____ be covered on the cold−in−winter side with a permanently attached material of low air permeability to maintain the R−value of the insulation.

a. can
b. shall
c. could
d. should

Questions 215 to 229 (Refer to Review Materials – Subchapter IV Dwelling Thermal Envelope. SPS 322.30 General Design requirements to SPS 322.32 Specific insulation requirements)

215. BASEMENTS AND CRAWL SPACES. Where basement and crawl space walls are not part of the dwelling thermal envelope, their R−values and U−factors shall be based on the wall components. Adjacent soil may be considered in the determination.

a. True
b. False

216. MASONRY VENEER. When insulation is placed on the exterior of a foundation supporting a masonry veneer exterior, the horizontal foundation surface supporting the veneer is not required to be insulated to satisfy the foundation insulation requirement.

a. True
b. False

217. GARAGES. (a) Except as provided under par. (b), a garage may not be provided with any supplemental heat unless all of the following conditions are met:
Note: Because of the scope of this chapter, the requirements under this subsection apply only to heat generated from non−renewable sources.
1. The dwelling shall be thermally isolated from the garage.
2. The garage floor, ceiling and walls shall be provided with a vapor retarder in accordance with s. SPS 322.38.
3. All building elements shall meet the requirements of s. SPS 322.31.

(b) The thermal envelope requirements under par. (a) are not required if all of the following conditions are met:
1. The thermostat is permanently limited to a maximum of _____.
2. Heating equipment is either separate from the dwelling unit equipment or installed as a separate zone.
3. Separate heating equipment shall be sized to provide a maximum indoor temperature of ____.

a. 40°F
b. 45°F
c. 50°F
d. 60°F

218. INFILTRATION. (a) Infiltration for heating design loads shall be calculated based on a maximum of 0.5 air change per hour in the heated space.

a. True
b. False

219. APPLIANCE EFFICIENCY. (a) Except as allowed under par. (b) and s. SPS 322.46, oil−fired and gas−fired furnaces and boilers shall meet the minimum efficiency requirements in Table 322.31−3.

a. True
b. False

220. THERMAL ENVELOPE. (a) *General.* If the total dwelling thermal envelope UA is less than or equal to the total UA resulting from using the U−factors in Table 322.31−2 multiplied by the same assembly area as in the proposed building, the dwelling is in compliance with this chapter. The UA calculation _____ using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials.
Note: UA is equal to the product of the U−factor times the assembly area.
Note: REScheck is an acceptable software program for determining compliance with this section.

a. may be done
b. can be dome
c. shall be done
d. will be done

221. CEILINGS WITH ATTIC SPACES. _____ will satisfy the ceiling R−value requirement for a dwelling where the full height of uncompressed _____ insulation extends over the wall top plate at the eaves.

a. R-24
b. R-28
c. R-32
d. R-38

222. BOX SILL AND RIM JOIST SPACES. Box sills and joist spaces at _____ shall be insulated to the required wall R−value with air−impermeable insulation that is sealed on all sides to all framing members and the foundation, or with air−permeable insulation held in place as required under s. SPS 322.21 (1).

a. inside walls
b. outside walls
c. inside and outside walls
d. none of the above

223. FLOORS. Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking.

a. True
b. False

224. BASEMENT WALLS. Where the total basement wall area is less than _____ below grade, the entire wall area, including the below−grade portion, is included as part of the area of exterior walls.

a. 50 percent
b. 60 percent
c. 70 percent
d. 75 percent

225. WALL INSULATION. Except for closed−cell sprayed foam, wall insulation shall _____ the wall cavity.

a. partially fill
b. completely fill
c. either partially or completely fill
d. none of the above

226. OVERHANG JOIST SPACES. (a) Joist spaces that extend beyond exterior walls shall be insulated with an R−value of _____or higher with insulation that completely fills the cavity including over the top of the exterior wall supporting the joists.

a. 24
b. 26
c. 28
d. 30

227. OVERHANG JOIST SPACES. If piping that is subject to freezing is located in the joist space, additional insulation does not need to be provided on the conditioned side of the space.

a. True
b. False

228. STEEL−FRAME CEILINGS, WALLS AND FLOORS. (a) Steel−frame ceilings, walls and floors _____ meet the insulation requirements of Table 322.32 or _____ meet the U−factor requirements in Table 322.31−2.

a. can/may
b. shall/shall
c. could/will
d. should/shall

229. CEILINGS WITHOUT ATTIC SPACES. Where the design of the roof or ceiling assembly does not allow sufficient space for the required ____ insulation, the minimum required insulation for the roof or ceiling assembly shall be R−30. This reduction of insulation shall be limited to 500 square feet of ceiling area.

a. R-28
b. R-38
c. R-49
d. R-55

Questions 230 to 238 (Refer to Review Materials – SPS 322.33 Slab floors to SPS 322.36 Fenestration)

230. HEATED OR UNHEATED SLABS. Any heated or unheated slab floor, the bottom of which is less than _____ below adjacent grade, shall be provided with perimeter insulation in accordance with Table 322.31−1 or Table 322.31−4, except as provided in par. (b).

a. 12 inches
b. 14 inches
c. 16 inches
d. 18 inches

231. THERMALLY ISOLATED SUNROOMS. (1) The minimum opaque ceiling insulation R−value shall be _____. The minimum opaque wall R−value shall be R−13.

a. R-24
b. R-28
c. R-32
d. R-38

232. GLAZED FENESTRATION EXEMPTION. Up to _____ feet of glazed fenestration per dwelling unit may be exempt from U−factor requirements of the chapter.

a. 10 square feet
b. 12 square feet
c. 15 square feet
d. 18 square feet

233. CRAWL SPACES. (a) Crawl space walls shall be insulated in accordance with Table 322.31−1.
(b) Crawl space wall insulation shall be _____ to the wall and shall extend the entire height of the wall.

a. fixed
b. attached
c. temporarily fastened
d. permanently fastened

234. DETAILS. (b) Horizontal insulation extending outside of the foundation shall be covered by soil a minimum of _____ thick or by pavement.

a. 6 inches
b. 8 inches
c. 10 inches
d. 12 inches

235. THERMALLY ISOLATED SUNROOMS. New walls, windows and doors separating a sunroom from conditioned space do not need to meet the building thermal envelope requirements.

a. True
b. False

236. VAPOR RETARDER. The edges of the vapor retarder shall extend at least _____ up the foundation wall and shall be attached and sealed to the foundation wall or insulation.

a. 6 inches
b. 8 inches
c. 10 inches
d. 12 inches

237. MAXIMUM FENESTRATION U−FACTOR. The area weighted average maximum fenestration U−factor permitted using tradeoffs from s. SPS 322.31 (2) or subchapter VI shall be 0.40 for vertical fenestration, and 0.75 for skylights.

a. True
b. False

238. VAPOR RETARDER. All decayable organic material, including topsoil, _____be removed from crawl space floors prior to placing the vapor retarder.

a. can
b. shall
c. could
d. should

Questions 239 to 253 (Refer to Review Materials – SPS 322.37 Air leakage to SPS 322.39 Ventilation and moisture control)

239. VAPOR RETARDERS. *General*. (a) *Definition.* Under this section, a vapor retarder is a material with no intrinsic thermal or structural properties that has a rating of 1.0 perm or less when tested in accordance with ASTM standard E 96, Procedure A.

a. True
b. False

240. AIR LEAKAGE. *Window and Door Assemblies.* (a) *General.* Except as specified in par. (b), windows, skylights and sliding glass doors shall have an air infiltration rate of 3 cfm per square foot, and swinging doors 5 cfm per square foot, when tested according to NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and listed and labeled by the manufacturer.

a. True
b. False

241. VAPOR RETARDERS. *Continuity.* The vapor retarder shall be continuous. All joints in a vapor retarder consisting of sheet material shall be overlapped _____ and taped or sealed, except as provided in subd. 2. Rips, punctures and voids in the vapor retarder shall be patched with vapor retarder materials and taped or sealed.

a. 2 inches
b. 4 inches
c. 6 inches
d. 8 inches

242. AIR LEAKAGE. *Fan Housings*. Gaps between a fan housing and a ceiling or wall that could result in air leaks shall be _____.

a. sealed
b. sealed or caulked
c. gasketed
d. gasketed, sealed or caulked

243. VAPOR RETARDERS. *Coverage.* The vapor retarder _____ cover the exposed insulation and the interior face of the framing.

a. shall
b. should
c. may
d. can

244. AIR LEAKAGE. *Joint and Penetration Sealing*. (a) Exterior joints, seams or penetrations in the dwelling envelope, which are sources of air leakage, shall be sealed with durable caulking materials, closed with gasketing systems, taped, or covered with water-vapor-permeable house wrap. Joints to be treated include all of the following:

1. Openings, cracks and joints between wall cavities and window or door frames.

2. Between separate wall assemblies or their sill−plates and foundations.

3. Between _____ and between separate wall panel assemblies, including between interior and exterior walls.

4. Penetrations of utility services through walls, floor and roof assemblies, and penetrations through top and bottom wall plates.

a. walls, roofs
b. ceilings or attic ceiling seals
c. walls, roofs, ceilings or attic ceiling seals
d. none of the above

245. AIR LEAKAGE. *Recessed Lighting.* When installed in the dwelling envelope, recessed lighting fixtures shall be sealed to limit air leakage between conditioned and unconditioned spaces by one of the following means:

(a) The fixture shall be IC−rated and labeled with enclosures that are sealed or gasketed to prevent air leakage to the ceiling cavity or unconditioned space.

(b) The fixture shall be IC−rated and labeled as meeting ASTM E 283 when tested at 1.57 psi pressure differential with no more than 2.0 cfm of air movement from the conditioned space to the ceiling cavity.

(c) 1. The fixture shall be located inside an airtight sealed box with clearances of at least 0.5 inch from combustible material and _____ from insulation.

a. 2 inches
b. 3 inches
c. 4 inches
d. 5 inches

246. VAPOR RETARDERS. *Concrete or masonry basement walls.* A non−rigid sheet vapor retarder with a perm rating of 0.1 or less is _____ in all of the following locations:

(a) On a concrete or masonry wall which is below grade to any extent.

(b) On an insulated frame wall constructed in front of a concrete or masonry wall which is below grade to any extent.

a. allowed
b. permitted
c. prohibited
d. none of the above

247. VAPOR RETARDERS. *Concrete floors*. (a) Except as allowed under par. (d), a vapor retarder shall be installed directly under the concrete floor slab or under the base course of concrete floor slabs.

(b) Vapor retarder material shall be at least _____ in thickness or shall be a reinforced material.

a. 4 mils
b. 6 mils
c. 8 miles
d. 9 mils

248. VENTILATION AND MOISTURE CONTROL. *Vented Attics*. (a) 1. Except as allowed under subd. 6., where air−permeable ceiling or attic insulation is installed in a horizontal position, ventilation shall be provided above the insulation in accordance with this paragraph.

2. _____ of the net free ventilating area shall be distributed at the high sides of the roof.

a. No more than 40%
b. At least 40%
c. No more than 50%
d. At least 50%

249. VENTILATION AND MOISTURE CONTROL. *Mechanical Ventilation*. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

a. True
b. False

250. VENTILATION AND MOISTURE CONTROL. *Vented Attics*. (a) 1. Except as allowed under subd. 6., where air−permeable ceiling or attic insulation is installed in a horizontal position, ventilation shall be provided above the insulation in accordance with this paragraph.

4. _____ of the net free ventilating area is provided at the high sides of the roof, the total net free ventilating area shall be a minimum of 1/300 of the horizontal area of the ceiling.

a. If more than 60%, but less than 75%
b. If more than 50%, but less than 65%
c. If more than 50%, but less than 75%
d. If more than 60%, but less than 65%

251. VENTILATION AND MOISTURE CONTROL. *Cathedral Ceilings*. Air−permeable insulation in a cathedral ceiling assembly _____ fill the entire cavity space unless an air barrier separates the top of the insulation from the ventilation space.

a. should
b. shall
c. may
d. might

252. VENTILATION AND MOISTURE CONTROL. *Conditioned Attics*. Attic spaces are required to be vented where air−impermeable insulation is attached directly to the underside of the roof deck and one of the following conditions are met:

(a) Interior vapor retarders are installed between the living space and the conditioned attic.
(b) The temperature in the attic space is maintained low enough to prevent any moisture condensation on the insulation.

a. True
b. False

253. VENTILATION AND MOISTURE CONTROL. *Vented Attics*. If _____ of the net free ventilating area is provided at the upper sides of the roof, the total net free ventilating area shall be at least 1/150 of the horizontal area of the ceiling.

a. 55% or more
b. 65% or more
c. 75% or more
d. None of the above

Questions 254 to 258 (Refer to Review Materials – Subchapter V – Systems. SPS 322.40 Indoor temperatures and equipment sizing to SPS 322.43 Duct and plenum sealing)

254. TEMPERATURE CONTROL. *Mercury Thermostats*. The installation of thermostats containing mercury is _____.
Note: This section does not require the replacement of existing mercury−containing thermostats.

a. allowed
b. permitted
c. prohibited
d. none of the above

255. DUCT SYSTEMS. (1) Supply and return heating ducts, or portions thereof, that are not located completely within the thermal envelope, shall be provided with insulation with a thermal resistance of at least _____.

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

256. INDOOR TEMPERATURES AND EQUIPMENT SIZING. *Indoor design temperatures*. Unheated, non−habitable basement areas shall use a heating design temperature of less than _____. All other areas of a dwelling shall use a heating design temperature of 70°F.

a. 65°F
b. 60°F
c. 55°F
d. 50°F

257. DUCT AND PLENUM SEALING. (1) Duct systems with joints not located entirely within the conditioned space or with joints located on the unconditioned side of stud bays, joist cavities and similar spaces, shall be sealed in accordance with this section.

a. True
b. False

258. DUCT AND PLENUM SEALING. Tapes with rubber−based adhesives may not be used.
Note: Standard duct tape or "duck tape" has a rubber−based adhesive and does not comply with the requirements of this section.

a. True
b. False

Questions 259 to 263 (Refer to Review Materials – SPS 322.44 Pipe insulation to SPS 332.49 Lighting Equipment)

259. PIPE INSULATION. Heating pipes in unheated spaces shall be insulated with material providing a minimum thermal resistance of R−4 as measured on a flat surface in accordance with ASTM standard C 335 at a mean temperature of _____.

a. 65°F
b. 70°F
c. 75°F
d. 80°F

260. AIR CONDITIONER AND HEAT PUMP EFFICIENCIES. Heating and cooling equipment _____ meet the minimum efficiency requirements in Table 322.45 when tested and rated in accordance with the applicable test procedure.

a. shall
b. should
c. may
d. might

261. AIR CONDITIONER AND HEAT PUMP EFFICIENCIES. Where components, such as indoor or outdoor coils, from different manufacturers are used, _____ shall be furnished by the designer that demonstrate that the combined efficiency of the specified components meets the requirements under this section.

a. calculations
b. guesstimations
c. estimates
d. calculations and supporting data

262. REPLACEMENT FURNACE AND BOILER EFFICIENCIES. A replacement furnace in existing construction may meet only the prevailing federal efficiency standard provided the duct distribution system is sealed and tested at 0.02 inches water gage across the entire system, including the manufacturer's air handler enclosure, to have air leakage less than _____ of the furnace manufacturer's rated air flow across the blower at high speed.

a. 10 percent
b. 15 percent
c. 20 percent
d. 25 percent

263. LIGHTING EQUIPMENT. A minimum of 50 percent of the lamps in permanently installed lighting fixtures shall be high−efficacy lamps.

a. True
b. False

Questions 264 to 267 (Refer to Review Materials Subchapter VI Simulated Performance Alternative. SPS 322.50 General to SPS 322.53 Calculation procedures)

264. DOCUMENTATION. *Compliance report.* Compliance software tools shall generate a report that documents that the proposed design has _____ energy costs less than or equal to the annual energy costs of the standard reference design. The compliance documentation shall include all of the following information:

(a) Address of the dwelling.

(b) 1. An inspection checklist documenting the building component characteristics of the proposed design as listed in Table 322.53−1.

a. quarterly
b. semi-annual
c. annual
d. none of the above

265. PERFORMANCE-BASED COMPLIANCE. Compliance based on simulated energy performance requires that a proposed dwelling be shown to have an annual energy cost that is less than or equal to the annual energy cost of the standard reference design.

a. True
b. False

266. CALCULATION PROCEDURE. *General.* Except as specifically allowed under this section, the standard reference design and proposed design does not need to be configured and analyzed using identical methods and techniques.

a. True
b. False

267. CALCULATION PROCEDURE. *Calculation software tools.* Calculation procedures used to comply with this section shall be capable of calculating the annual energy consumption of all building elements that differ between the standard reference design and the proposed design and shall include the following capabilities:

(c) Calculations that account for the effects of _____ and part−load ratios on the performance of heating, ventilating and air conditioning equipment based on climate and equipment sizing.

a. indoor temperatures
b. indoor and outdoor temperatures
c. outdoor temperatures
d. none of the above

Questions 268 to 330 (Refer to Review Materials – UDC Commentary Chapter SPS 322 – "Introduction" and "Some Energy Basics")

268. INTRODUCTION. The standards attempt to satisfy the human comfort needs of _____ as well as economical and building-preserving construction and operation. To assist you in better understanding these standards, we've included the following energy basics section. Following that is the code section-by-section commentary.

a. proper temperature
b. air movement
c. humidity
d. all of the above

269. INTRODUCTION. Note that the effective date of the original energy conservation standards was December 1, 1978, differing from the June 1, 1980, effective date of the other chapters of the UDC.

a. True
b. False

270. SOME ENERGY BASICS. Chapter SPS 322 requirements can be put into the four categories of _____ with some overlap between the four.

a. heat loss control, radiation, ventilation design and moisture control
b. R-values, radiation, ventilation design and heating equipment requirements
c. heat loss control, moisture control, ventilation design and heating equipment requirements
d. heat loss control, moisture control, r-values and ventilation design

271. SOME ENERGY BASICS. The heat loss control requirements of Ch. SPS 322 are meant to limit heat transfer. Heat transfer is the tendency of heat or energy to move from a warmer space to a cooler space until both spaces are the same temperature. Obviously, the greater the difference in temperatures, the greater the heat flow.

a. True
b. False

272. SOME ENERGY BASICS. Conduction - transfer of heat through a material. An example is your warm hand held against the _____ surface of a cold exterior wall.

a. outside
b. exterior
c. inside
d. none of the above

273. SOME ENERGY BASICS. Radiation –transfer of heat through space. An example is your body heat radiating out a closed window on a winter night. The glass is cold so there is no radiation to you and it is a ____ reflector of your own heat back to you. Another example is sunshine coming in through a window.

a. good
b. poor
c. excellent
d. outstanding

274. SOME ENERGY BASICS. Convection - transfer of heat by moving masses of air. An example is _____ air leaking out through door and window openings.

a. heated
b. water laden
c. moist
d. none of the above

275. HEAT LOSS BY CONDUCTION. *C-Values and k-values*. A measure of a material's ability to Conduct heat is its _____ which is expressed in BTUs per (hour)(oF).

a. k-value
b. C-value
c. R-value
d. none of the above

276. HEAT LOSS BY CONDUCTION. *C-Values and k-values* Another term to be familiar with is a _____ which is merely the C-value for one inch of material.

a. k-value
b. C-value
c. R-value
d. none of the above

277. HEAT LOSS BY CONDUCTION. *R-values*. _____ is a measure of a material's Resistance to heat flow and is the inverse or reciprocal of the material's C-value (R=1/C).

a. k-value
b. C-value
c. R-value
d. none of the above

278. HEAT LOSS BY CONDUCTION. *C-Values and k-values*. A BTU is a _____ which is the heat required to raise one pound (about a pint) of water by one degree Fahrenheit and is roughly equal to the heat given off by the burning of one kitchen match.

a. British Thermal Union
b. British Thermal Unit
c. Burning Thermal Unit
d. none of the above

279. HEAT LOSS BY CONDUCTION. *R-values*. Usually materials are labeled or tables are written so that the material's _____ is given [see SPS 322.20(5)(a)], which relieves you of finding the inverse of the material's C-value.

a. k-value
b. C-value
c. R-value
d. none of the above

280. HEAT LOSS BY CONDUCTION. *C-Values and k-values*. You <u>can</u> add C-values to find the "series" value.

a. True
b. False

281. HEAT LOSS BY CONDUCTION. *U-Values*. For thermal heat loss calculations, we normally use "U"-values (U for _____ heat flow or transmittance) which is a material's C-value but also includes the insulating effect of the air films on either side of the material. So it is, therefore, a smaller number (less heat flow).

a. Unrestrained
b. Unresponsive
c. Underground
d. Unusual

282. HEAT LOSS BY CONDUCTION. *Heat Loss Calculations.* The purpose of these C-, k-, R- and U-values is to be able to calculate heat loss through a building component (_____). The basic equation is U x A x TD = Heat Loss or U x Area (ft2) x Temperature Difference (oF) = Conduction Heat Loss (BTU/hr).

a. wall
b. ceiling
c. floor
d. wall, ceiling, floor

283. HEAT LOSS BY CONDUCTION. *U-Values*. A U-value can also refer to thermal transmittance of a series of materials in layers. To obtain a U-value for such an assembly, you add the individual R-values of the layers and the air films on either side of the assembly. Then you take the reciprocal of the total R-value to get the total U-value of the assembly (U = 1/R).

a. True
b. False

284. HEAT LOSS BY CONDUCTION. *Heat Loss Calculations.* If you wanted to know the total envelope loss for a heating season, you do a degree-day calculation. A degree-day is the difference between _____ and the average temperature for a day if it was below _____. If this calculation is done for each day of the heating season, you can find the total heating degree-days for the year.

a. 55°F
b. 60°F
c. 65°F
d. 70°F

285. HEAT LOSS BY CONDUCTION. *Heat Loss Calculations.* To find the heat loss per hour through a building section of wall, you:
- determine its U-value by finding the inverse of the sum of individual R-values for each layer of material;
- decide on the inside and outside temperatures (in the case of the UDC, the winter design temperatures are mandated– see SPS 322.40(c) and the UDC Appendix A 323.02(1));
- measure the surface area of the building section;
- multiply these numbers together and get a result in BTUs per hour.

a. True
b. False

286. HEAT LOSS BY CONDUCTION. *U-Overall.* One more term to know is U-overall or U_o which refers to the overall U-value of a building component such as a wall or ceiling.

a. True
b. False

287. HEAT LOSS BY CONVECTION. The other mechanism of heat loss addressed by the UDC is convection, or heat loss by air movement. In homes, this is principally heat loss by _____.

a. infiltration
b. exfiltration
c. infiltration and exfiltration
d. none of the above

288. HEAT LOSS BY CONDUCTION. *U-Overall.* The U-overall value is calculated by taking the weighted average of the U-values and R-values of the different parallel paths through the different component (wall, ceiling or other) that you're dealing with.

a. True
b. False

289. HEAT LOSS BY CONVECTION. _____ is the loss of heated air through building cracks and other openings.

a. infiltration
b. Exfiltration
c. infiltration and exfiltration
d. none of the above

290. HEAT LOSS BY CONDUCTION. *System Design.* As an alternative, the system design method can be used so that more insulation is put in the ceiling to make up for the extra windows. However, it is not a one-for-one tradeoff because of the thermal transfer properties and mathematics of reciprocals involved. Let's say you have an R-10 (U = 0.1) wall and R-10 (U = 0.1) ceiling of equal area. If you transfer half of the wall insulation, to the ceiling, the wall becomes R-5 (U = 0.2) and the ceiling becomes R-15 (U = 0.07). However, you can see that the wall U-value increased by 0.1 and the ceiling U-value only decreased by 0.03. (Remember U-values are used to calculate heat losses.)

a. True
b. False

291. HEAT LOSS BY CONVECTION. _____ is the introduction of outside cold air into the building.

a. Infiltration
b. Exfiltration
c. infiltration and exfiltration
d. none of the above

292. HEAT LOSS BY CONVECTION. Air pressure differences are _____ caused by wind pressures and the "stack" effect of warm inside air that tends to rise. Mechanically induced air pressure differences can also occur due to such things as exhaust fans and furnace venting.

a. secondarily
b. principally
c. unexceptionally
d. none of the above

293. HEAT LOSS BY CONVECTION. The volume exchanged can be determined by measuring or judging how many air changes that a house goes through in an hour. To do this, you calculate the volume of the heated space and multiply by an air change rate. For a UDC home, you can assume a rate between 0.2 and 0.5 air changes per hour [see SPS 322.30(2)], usually with a lower rate for basements with little outside air exposure, and higher rates for living areas or exposed basements. If you have a 1500 square foot house on a crawl space with 8-foot ceilings, the calculation of the volume exchanged can be: 1500 sq. ft. x 8 ft. x 0.5 Air Changes/hr = 6,000 cu. ft./hr

a. True
b. False

294. HEAT LOSS BY CONVECTION. Another method of determining heat loss by convection is the _____ method.

a. crevice
b. cranny
c. crack
d. cut

295. TOTAL DWELLING HEAT LOSS. If you add the heat losses by conduction and convection, you arrive at the total dwelling heat loss for purposes of the UDC. Of course this figure is approximate and ignores other means of heat loss. However, it also ignores the major heat gain from secondary sources such as _____ etc. So the figure tends to overstate the heat loss but this ensures an adequately sized heating plant.

a. electric lights
b. human bodies
c. cooking
d. electric lights, human bodies, cooking

296. HEAT LOSS BY CONVECTION. For this method (crack) you obtain the air leakage rates in cubic feet per minute for the doors and windows from their manufacturers and multiply by the lineal feet of sash crack or square feet of door area. (A more exact analysis would multiply the door infiltration rates by 1 or 2 due to open/close cycles and add 0.07 cfm per lineal feet of foundation sill crack.) This gives an air change rate per minute. This has to be converted to an hourly rate by multiplying by _____. Then you substitute this figure for the air change rate in the infiltration heat loss equation above.

a. 40
b. 50
c. 60
d. 70

297. MOISTURE CONTROL. There are _____ methods of reducing the possibility of condensation--vapor retarders and cold-side venting.

a. two
b. three
c. four
d. unlimited

298. MOISTURE CONTROL. *Vapor Retarders and Air Barriers*. A perm is at least two grains of water per (30 minutes) (square foot) (inch of mercury vapor). The higher the number, the more resistant is the material to moisture flowing through it.

a. True
b. False

299. MOISTURE CONTROL. The second area of concern addressed by the UDC is control of moisture. The occupancy of a dwelling produces a large amount of water vapor. As you may recall from weather forecasts, warmer air can hold more moisture than cold air. In the winter, the inside air is warmer than the outside, so if moisture moving outside by convection or dispersion (similar to conduction) reaches too cold of air, it will "condense out." This occurs at the dew point for that water vapor/air mixture. This condensation can be damaging to the building if it happens inside part of the wall or ceiling construction. It can promote structural member decay and lessening of the insulation's effective _____.

a. k-value
b. C-value
c. R-value
d. none of the above

300. MOISTURE CONTROL. *Vapor Retarders and Air Barriers*. The temperature _____ is generally cooler due to the fact that it is difficult to insulate at this location due to the method of construction. The insulation may be further reduced due to the roof system allowing less insulation to be placed above the corner.

a. in the curve
b. at the corners
c. none of the above

301. MOISTURE CONTROL. *Vapor Retarders and Air Barriers*. The required continuity of the vapor retarder over the warm-in-Winter surface provides the required barrier to bulk movement of moist air through the assembly. This means the retarder also needs to be continuous with seams and holes lapped or sealed.

a. True
b. False

302. MOISTURE CONTROL. *Vapor Retarders and Air Barriers*. A vapor retarder (sometimes called a vapor barrier) acts to slow down the movement of moisture through a section of the building envelope by water vapor diffusion and bulk movement of moist air. A vapor retarder's efficiency at improving moisture movement by water vaper diffusion is measured by its permeability in "berms."

a. True
b. False

303. MOISTURE CONTROL. *Vapor Retarders and Air Barriers*. Vapor condenses when it comes in contact with material that is at a temperature lower than its dew point. This temperature typically occurs within the wall cavity and thus would condense out water vapor before it can escape from the dwelling. This moisture can cause decay of building materials and a reduction in insulating value.

a. True
b. False

304. MOISTURE CONTROL. *Vapor Retarders and Air Barriers*. Additional areas where condensation occurs are generally at corners of rooms at the exterior walls. This area is subject to condensation for only one reason. Condensation never occurs in areas with poor air circulation such as closets.

a. True
b. False

305. MOISTURE CONTROL. *Cold-side venting*. The other means of controlling moisture is cold-side venting. This is usually employed in _____.

a. attics
b. unheated crawlspaces
c. heated crawlspaces
d. attics and unheated crawlspaces

306. MOISTURE CONTROL. *Moisture Control During Construction*. Unless proper construction techniques are utilized during construction, serious problems can occur as a result of water vapor that is trapped inside and then causes deterioration of gypsum wallboard.

a. True
b. False

307. MOISTURE CONTROL. *Cold -Side Venting.* The venting removes all moisture created in the ceiling or in the crawl space. This venting is usually done by mechanical means through the use of grills or louvers from the space to the outside.

a. True
b. False

308. MOISTURE CONTROL. *Impervious Insulation*. Use of closed-cell foam plastic insulation or similar non-absorbent insulating materials that are unaffected by moisture condensation is another effective method used for some designs of dwellings to deal with this issue.

a. True
b. False

309. MOISTURE CONTROL. *Cold-Side Venting*. Cold-side attic venting also keeps the roof cooler so that there is less melting of snow and contributes to less creation of ice dams at the eaves in the winter. It also helps dissipate summertime attic heat, which increases comfort and reduces cooling costs.

a. True
b. False

310. MOISTURE CONTROL. We offer the following suggestions to incorporate in construction procedures, especially during winter months:

4. Make sure _____ required attic ventilation is installed and operable to remove any water vapor trapped in the attic.

a. only one
b. some
c. all
d. none of the above

311. MOISTURE CONTROL. Most building codes are only a reflection of our latest achievements in _____. The vapor retarder requirements in the Uniform Dwelling Code are a reflection of state-of-the-art insulation techniques.

a. technology and architecture
b. technology and engineering
c. technology and manufacturing
d. engineering and manufacturing

312. MOISTURE CONTROL. We offer the following suggestions to incorporate in construction procedures, especially during winter months:

3. Make sure all heating appliances, i.e., _____ etc., are vented to the outside of the home. Builders who do not follow this warning are adding additional water vapor created by combustion of heating fuels.

a. furnaces
b. temporary heaters
c. salamanders
d. furnaces, temporary heaters, salamanders

313. MOISTURE CONTROL. *Post-Construction Moisture Control Problems*. Additional recommendations above and beyond the UDC minimums are included for homeowners who may experience more severe moisture problems.

a. True
b. False

314. MOISTURE CONTROL. We offer the following suggestions to incorporate in construction procedures, especially during winter months:

2. Make sure attics are insulated _____ to putting heat into the home for gypsum board taping and finishing. Many builders neglect to do this and create condensation problems when the water vapor condenses upon hitting the cold, attic air above the gypsum board. Gypsum board ceilings should be hung and insulated _____ to putting heat into the home.

a. after
b. later
c. prior
d. none of the above

315. MOISTURE CONTROL. *How can you determine if a home has a moisture problem?* Extensive condensation on windows during the heating season. Some condensation is normal. Condensation that streams off the window and puddles on the frame and sill when outside temperatures are 10°F or above and inside temperatures are above _____ indicates humidity levels are probably too high.

a. 50°F
b. 55°F
c. 60°F
d. 65°F

316. MOISTURE CONTROL We offer the following suggestions to incorporate in construction procedures, especially during winter months:

5. Provide a means for the _____ in the home to escape; such as periodic opening of windows, doors, etc. Perhaps the installation of a humidistatically controlled exhaust fan is necessary, particularly where electric baseboard heat or heat pump systems are utilized.

a. water vapor
b. heat
c. cold air
d. none of the above

317. MOISTURE CONTROL. *What are typical causes of moisture problems in homes?* In most older homes there is enough movement of air into and out of the house that moisture does not build up and only small amounts of condensation occurs. However, when air leaks into and out of a house it _____. In order to make homes more energy efficient, builders have been trying to seal cracks and cut air leaks.

a. only takes moisture.
b not only takes moisture but heat as well
c. only takes heat
d. none of the above

318. MOISTURE CONTROL. *How can you determine if a home has a moisture problem?* Staining and mold on window frames.

a. True
b. False

319. MOISTURE CONTROL. *How can you determine if a home has a moisture problem?* Mold or water spots in numerous locations on the inside surface of outside walls. Common trouble spots include _____ or other areas where air circulation is limited.

a. closets on outside walls
b. corners between two outside walls or between an outside wall and ceiling
c. outside walls behind furniture
d. closets on outside walls, outside walls behind furniture, corners between two outside walls or between an outside wall and ceiling

320. MOISTURE CONTROL. *Besides the UDC requirements, what measures can help prevent moisture problems?* Other ways you can reduce moisture generation:

- Vent clothes dryers outdoors;
- Don't line dry clothes indoors;
- Limit the number of houseplants;
- Cover kettles when cooking;
- Limit the length of showers; and
- Do not operate a humidifier in the wintertime unless your indoor relative humidity is below _____.
- Be sure any crawlspace floors have a vapor retarder covering.

a. 25 percent
b. 30 percent
c. 35 percent
d. 40 percent

321. MOISTURE CONTROL. *Besides the UDC requirements, what measures can help prevent moisture problems?* One way to substantially reduce the chances that condensation will occur either on _____ is to keep indoor moisture levels low. The first step is to reduce the amount of moisture produced in the home.

a. inside surfaces
b. within walls
c. inside surfaces or within walls
d. none of the above

322. MOISTURE CONTROL. *Besides the UDC requirements, what measures can help prevent moisture problems?* Prevent moisture from entering through basements. Many basements feel damp in the summer due to condensation of moisture from the air on cool basement surfaces. However, in some cases damp basements may be due to _____ entering the home through basement walls. Cracks or stains on basement walls and floors are signs of dampness entering through these surfaces.

a. run-off
b. ground moisture
c. humidity
d. rain

323. MOISTURE CONTROL. *Besides the UDC requirements, what measures can help prevent moisture problems?* Do not store large amounts of firewood in the basement. Even seasoned wood can contain large amounts of moisture. It also may be a source of fungus.

a. True
b. False

324. MOISTURE CONTROL. *Besides the UDC requirements, what measures can help prevent moisture problems? Mechanical Ventilation.* A widely recommended ventilation rate for homes is one half air change per hour. In a 1,200-square-foot house with 8-foot high ceilings, there are about 9,600 cubic feet of air. To meet the ventilation standard, half of that amount or 4,800 cubic feet of air must be exchanged every hour. This roughly equals _____ of air exchange. Even in a tight house some of this air exchange occurs naturally.

a. 100 cubic feet per minute (cfm)
b. 200 cubic feet per minute (cfm)
c. 300 cubic feet per minute (cfm)
d. 400 cubic feet per minute (cfm)

325. RELATIVE HUMIDITY. In winter, the ideal relative humidity range for comfort is _____. A lower humidity may cause excessive skin evaporation which in turn will cause an undesired cooling effect. For the sake of protecting the structure from damage due to excessive moisture, an ideal relative humidity range of less than 45 percent is recommended. Therefore, to provide comfort and still protect the building, a relative humidity range between _____ is recommended.

a. 35 percent - 45 percent.
b. 30 percent - 45 percent.
c. 30 percent - 50 percent.
d. 35 percent - 50 percent.

326. RELATIVE HUMIDITY. In summer, the ideal comfort range is _____. Higher humidity won't allow adequate skin evaporation and the resulting desired cooling effect.

a. 35 percent - 45 percent.
b. 30 percent - 45 percent.
c. 30 percent - 50 percent.
d. 35 percent - 50 percent.

327. MOISTURE CONTROL. *Besides the UDC requirements, what measures can help prevent moisture problems? Mechanical Ventilation.* As the code has mandated tighter home construction, the UDC has had to provide increase of mechanical ventilation as an alternative to infiltration to maintain indoor air quality so excessive humidity or other pollutant levels are checked. This has taken the form of required exhaust ventilation for rooms with a _____.

a. toilet
b. tub or shower
c. kitchen exhaust
d. all of the above

328. MOISTURE CONTROL. *Besides the UDC requirements, what measures can help prevent moisture problems? Mechanical Ventilation.* A designer may decide to use an air-to-air heat exchanger to satisfy the exhaust requirement, while at the same time recovering heat from the exhausted air. This is done by moving the exhausted air past the intake air with a heat exchanging barrier between the two air streams.

a. True
b. False

329. MOISTURE CONTROL. *Besides the UDC requirements, what measures can help prevent moisture problems? Mechanical Ventilation.* Stop Moisture At The Inside Wall Surface (In Addition To The Required Moisture Vapor Retarder). In addition to reducing moisture levels of the interior air, carefully seal all openings in the inside surface of all exterior walls to prevent moist air penetration. This includes _____ and any other penetrations. Gaskets for electrical penetrations are now commonly available, be sure that they extend to the outside edge of the cover plate of electrical devices.

a. joints around window and door casings, baseboards
b. baseboards, electrical outlets and switches
c. joints around window and door casings, baseboards, electrical outlets and switches
d. none of the above

330. MOISTURE CONTROL. *Mechanical Ventilation.* Negative pressure could cause exhaust gases from your furnace or water heater, which should be going up your chimney or out a vent, to be sucked into the living space.

a. True
b. False

Questions 331 to 360 (Refer to Review Materials – UDC Commentary Chapter SPS 322 – Subchapter I – Scope and Application to Subchapter VI – Simulated Performance Alternative)

331. SCOPE AND APPLICATION. As there are _____ method, submitters of plans & calculations should clearly communicate which method of compliance is being provided for the dwelling.

a. just one
b. more than one
c. not more than one
d. none of the above

332. MATERIALS AND EQUIPMENT. *Material Installation.* This section requires all _____ to be installed per the manufacturer's installation instructions which are to be available at job sites during inspection.

a. insulation,
b. mechanical equipment and systems
c. venting
d. insulation, mechanical equipment and systems

333. SCOPE AND APPLICATION. Dwellings that use non-renewable sources of energy, such as wood or solar, for heat generation, including for what is used by any heat pumps, are not exempt from the building envelope insulation requirements.

a. True
b. False

334. DWELLING THERMAL ENVELOPE. *Ceilings with Attic Spaces*. This section permits the use of _____in the attic space in lieu of R-49 specified in Table 321.23-1 as long as the _____ insulation covers the entire attic area including over the exterior wall top plates. This could be accomplished with the use of "energy heel" trusses. The height of the heel would depend on the type of insulation used to attain the _____ insulation value.

a. R-28
b. R-30
c. R-38
d. R-45

335. MATERIALS AND EQUIPMENT. *Protection of Insulation*. This section now requires blanket insulation to be held in place by a covering or mechanical fastening. SPS 322.2 1(2) requires cold-in-Winter side windwash protection of air-permeable insulation, thus also keeping insulation in place and maintaining the _____ of that insulation. Normally the exterior sheathing would do this, but where that is not present, some other vapor- permeable material, such as house wrap would be required.

a. R-value
b. U-value
c. T-value
d. S-value

336. MATERIALS AND EQUIPMENT. *Building Certification*. This section requires that a permanent certificate of insulation R-values and fenestration _____ be provided on or immediately adjacent to the electrical distribution panel.

a. R-factors
b. U-factors
c. T-factors
d. S-factors

337. DWELLING THERMAL ENVELOPE. *Envelope Compliance*. Envelope compliance may be by prescriptive method of SPS 322.31(1) by either complying with Table 322.31-1 or Table 322.31-4 or alternatively, per SPS 322.3 1(2) by showing the overall envelope U-value multiplied by Area complies. The latter method may be done by hand calculation or more typically by the use of the free software program, Rescheck, available from the federal government at www.energycodes.gov .

a. True
b. False

338. DWELLING THERMAL ENVELOPE. *Sun Rooms vs. Screen Porch*. This option for increased insulation levels is available to heated sunrooms with opaque walls and glazing as well as heated screen rooms with only screens for a portion of the walls.

a. True
b. False

339. DWELLING THERMAL ENVELOPE. *Fenestration*. Different types of window operating hardware will produce different U-values for similar-sized windows. Therefore, a 3'-0" x 3'-0" double hung window would have a different U-value from a 3'-0" x 3'-0" fixed window sash. Similar size windows produced by two different manufacturers would most likely also have _____ U-values. Averaging of U-values is by area-weighting per SPS 322.36(1).

a. similar
b. the same
c. identical
d. different

340. DWELLING THERMAL ENVELOPE. *Crawl Spaces.* This section requires a vapor retarder on the floor of a crawl space. Per Table 332.37, it shall be a Class I vapor retarder, which is defined by the IBC as having a perm rating of 0.1 or less. Note that requirement to run the vapor retarder _____ wall is applicable when there is no floor present to maintain the vapor retarder in place.

a. 4" up the foundation
b. 5" up the foundation
c. 6" up the foundation
d. up to the

341. DWELLING THERMAL ENVELOPE. *Slab Floors.* _____ less than 12" below grade must meet Table 322.31-1 or 322.31-4 for Unheated Slab R-value with perimeter insulation. Heated slabs of any depth with embedded, uninsulated heating ducts or pipes require slab insulation throughout, with additional insulation at the perimeter.

a. Unheated slabs
b. Shallow slabs
c. Horizontal slabs
d. Heated slabs

342. DWELLING THERMAL ENVELOPE. *Air Leakage*. Air leakage at fenestration and at other penetrations in the envelope are to be sealed properly per SPS 322.37(3), (4) & (6)(b) requirements or pass a blower door test per (6)(a). SPS 322.37(4) provides specific guidance on recessed lighting installed at envelope areas, without leading to overheating fires.

a. True
b. False

343. DWELLING THERMAL ENVELOPE. *Slab Floors.* _____ insulation that projects away from the building shall be protected by either pavement or a minimum of 10 inches of soil. See UDC Appendix drawings showing acceptable and unacceptable perimeter insulation in terms of ensuring the edge of the slab is properly insulated.

a. Unheated slab
b. Shallow slab
c. Horizontal slab
d. Heated slab

344. DWELLING THERMAL ENVELOPE. *Air Infiltration Barrier*. The UDC does not define materials to be used as an infiltration barrier. It does require them to:

1. Be installed on the interior face, typically as part of the vapor retarder, or on the exterior face of the wall, typically as a house wrap or caulked building panels.
2. Form a continuous barrier over the walls of the building from the bearing points of the roof to the top of the foundation.
3. Have all _____ sealed.

    a. joints and tears
    b. seams and punctures
    c. joints, seams and tears
    d. seams, joints, tears and punctures

345. DWELLING THERMAL ENVELOPE. *Fenestration*. Fenestration is an architectural term for _____.

    a. windows and doors
    b. doors and patios
    c. windows and patios
    d. none of the above

346. DWELLING THERMAL ENVELOPE. *Paint as a Vapor Retarder*. The following is the recommended procedure to be followed by building inspection agencies to assure compliance with the vapor retarder requirement:
3. At the time the insulation/rough energy inspection is made, the inspector will be able to determine where the standard vapor retarder was applied in the dwelling.

    a. True
    b. False

347. DWELLING THERMAL ENVELOPE. *Paint as a Vapor Retarder*. Certain paints have been tested per ASTM E-96 to provide a vapor retarder with a _____ or labeled as Class II (Class I would also be acceptable) when applied at specified rates and coats for certain surfaces.

    a. perm of 1 or lower
    b. perm of 2 or lower
    c. perm of 3 or lower
    d. perm of 4 or lower

348. DWELLING THERMAL ENVELOPE. *Paint as a Vapor Retarder*. In order to assure building officials and owners that vapor retarder paint has in fact been installed and the intent of SPS 322.38 met, a certificate of compliance may be filled out and submitted to the Building official with a copy to the owner.

    a. True
    b. False

349. DWELLING THERMAL ENVELOPE. *Vapor Retarder Continuity.* Vapor retarder continuity is important for purposes of preventing bulk movement of warm, moist air into building assemblies, which is a more significant source of moisture than diffusion through the vapor retarder.

a. True
b. False

350. DWELLING THERMAL ENVELOPE. *Vapor Retarders Not on In-Winter Warm Side.* Occasionally it occurs that a wall will have two materials or layers that may act as vapor retarders. It is important in this situation that the better vapor retarder (lower perm rating) be placed closer to the warm side. Also, extreme care _____ to make the interior vapor retarder continuous with good joint and penetration sealing. This will help avoid condensation of moisture in the wall.

a. shall be taken
b. may be taken
c. can be taken
d. should be taken

351. DWELLING THERMAL ENVELOPE. *Vapor Retarders Prohibited on Concrete or Masonry Walls.* The code prohibits installing a non-rigid vapor retarder of a _____, such as roll polyethylene sheeting ("Visqueen"), on or in front of masonry or concrete below grade foundation walls. This is avoiding the potential for moisture from adjoining earth being trapped between an interior vapor retarder and the wall and possibly causing degradation and mold.

a. perm rating appropriate for the wall
b. 0.1 perm or more rating
c. 0.1 perm or less rating
d. none of the above

352. DWELLING THERMAL ENVELOPE. *Exceptions to Vapor Retarder*. If the exceptions in this section to a continuous vapor retarder at boxsills or over spray-applied foam are used, you are also required to stop air leakage at those locations that would have been otherwise provided by a continuous vapor retarder.

a. True
b. False

353. SYSTEMS. *Ducts in Unconditioned Spaces.* Ducts located outside conditioned space, including those in _____ shall be insulated to at least R-8. Per SPS 322.10(3), conditioned is defined as being heated to 50 degrees or more at design conditions.

a. attics and unheated garages
b. vented crawl spaces and under slabs
c. attics, unheated garages, and vented crawl spaces and under slabs,
d. none of the above

354. SYSTEMS. *Duct Sealing and Testing.* Any part of the supply and return duct system that is outside the conditioned space, including those in unconditioned attics, unheated garages, insulated floors, exterior stud spaces and vented crawl spaces and under slabs, _____ per this section. Additionally, the whole duct system, including the air handler and both supply and return ducts, shall be tested for air tightness at either the rough-in or post-construction testing.

a. can be tested
b. shall be tested
c. shall be sealed
d. can be sealed

355. SYSTEMS. *Pipe Insulation.* Subsection (1) requires hydronic heating pipes in all areas to have at least _____ and subsection (3) requires hydronic spaces in unheated spaces to have at least _____. Generally, basements are not considered unheated spaces, even without radiators installed.

a. R-3 insulation/ R-3 insulation
b. R-4 insulation/ R-4 insulation
c. R-4 insulation/ R-5 insulation
d. R-3 insulation / R-4 insulation

356. SYSTEMS. *Duct Sealing and Testing.* Duct tightness, especially relative to the outdoors, is important in that any air lost to the outdoors causes negative dwelling pressure as the result of the air handler drawing in outside air to replace the leaked duct air. Negative dwelling pressure potentially causes backdrafting of any open combustion appliances and infiltration of unconditioned air into the dwelling

a. True
b. False

357. SYSTEMS. *Replacement Furnace & Boiler Efficiencies.* Alternatively, the replacement equipment is required to comply with the less stringent Wisconsin heating equipment efficiency requirements of Table 322.31-3 (as for new construction that is permitted reduced thermal envelope insulation levels) without duct sealing or circulating motor limits.

a. True
b. False

358. SYSTEMS. *Pipe Insulation.* The requirement for insulating circulating service hot water piping is applicable to systems mechanically circulated with pumps, not to thermosiphon systems that use convection to circulate the water.

a. True
b. False

359. SYSTEMS. *Replacement Furnace & Boiler Efficiencies*. Normally replacement equipment may meet the code at the time of their original installation per s. SPS 320.07(61) definition of repair, as opposed to alterations that need to meet the current code. (Note that the federal government has evolving minimum heating appliance efficiencies that apply to all residential installations, new or replacement.) However, this section requires that replacement furnaces also comply with specified duct sealing criteria and that replacement boilers comply with circulating motor limits.

a. True
b. False

360. SIMULATED PERFORMANCE ALTERNATIVE. *Documentation of Simulated Performance Alternative.* Acceptance of SPS 322.52 is typically required by REMrate software that models the whole house energy usage. REM/Rate software is proprietary to certain providers. The version 12.6.2.1 or earlier is required to show compliance with the current code.

a. True
b. False