Instructions

1. Print these pages.
2. **Simple questions** follow after a few paragraphs of the new code language.
3. Circle the correct answers and transfer the answers to the answer sheets (see last 3 pages).
4. After answering the simple questions you will become familiar with the new code changes.
5. Page down to the last page for the verification form, answer sheets and mailing instructions.

UDC CODE UPDATES PART 3 Fee $50

6 hour course for:
1. Dwelling Contractor Qualifier Certification.
2. UDC Construction Inspector.

Questions call 920-381-6714 or email tmklinka@hotmail.com

SECTION 129. Chapter Comm 22 is repealed and recreated to read:

Subchapter I – Scope and Application

Comm 22.01 Scope. (1) This chapter applies to all one- and 2-family dwellings covered by this code that use any amount of non-renewable energy for heat generation.

Note: Non-renewable energy sources used for heat distribution only will not require compliance with this chapter.

Note: The Public Service Commission has rules regulating "non-essential uses" of natural gas, such as snow melting and lighting in ch. PSC 136 of the Wisconsin Administrative Code.

(2) The equipment efficiency standards in this chapter apply to all one- and 2-family dwellings covered by this code that use the respective equipment.

(**3)** The vapor retarder requirements under s. Comm 22.38 and the moisture control and ventilation requirements under s. Comm 22.39 apply to any dwelling with insulation installed, whether or not the insulation is required under this code.

Comm 22.02 Application. **(1)** This chapter is not intended to conflict with any safety or health requirements. Where a conflict occurs, the safety and health requirements shall govern.

(2) 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.

1. The vapor retarder requirements under s. Comm 22.38 and the moisture control and ventilation requirements under s. Comm 22.39 apply to any dwelling with insulation installed only when the insulation is required under this code.
   a. true
   b. false
2. 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.
   a. true
   b. false
3. This chapter applies to all one- and 2-family dwellings covered by this code that use more than 50 percent of non-renewable energy for heat generation.
   a. true
   b. false

Comm 22.10 Definitions.

(1) “Air-impermeable” means having an air permeance less than or equal to 0.02 L/s-m2 at a pressure differential of 75 pascals when tested according to ASTM E 2178 or ASTM E 283.

(2) “Conditioned floor area” 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.

(3) “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 50° F at design conditions.

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

(5) “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.

(6) “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 12 inches 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.

(7) “Heated slab” 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.

(8) “HVAC” means heating, ventilating and air conditioning.

(9) “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.

(10) “Infiltration” means the uncontrolled inward 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.

(11) “IC-rated” means an electrical fixture tested and listed by an independent testing laboratory as being suitable for installation in a cavity where the fixture may be in direct contact with thermal insulation or combustible materials.

(12) “Mass wall” means a wall of concrete block, concrete, insulated concrete forms, masonry cavity, brick other than brick veneer, earth and solid timber or logs.

(13) “Opaque areas” means all exposed areas of a dwelling envelope which enclose conditioned space except openings for windows, skylights, doors and dwelling service systems.

(14) "Proposed design" means a description of the proposed dwelling used to estimate annual energy use for determining compliance based on total building performance.

(15) “Renewable energy sources” means sources of energy, excluding 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 internal heat of the earth.

(16) “Roof assembly” means all 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 not considered in the area of exterior walls.

(17) "Sun room" means a one-story structure attached to a dwelling with a glazing area in excess of 40% of the gross area of the structure's exterior walls and roof.
Note: A thermally isolated sun room does not count in the calculation of amount of glazing.
(18) "System" means a combination of central or terminal equipment and their components, controls, accessories, interconnecting means, and terminal devices by which energy is transformed so as to perform a specific function such as, HVAC, water heating or illumination.
(19) "Thermal resistance" or "R-value" means a measure of the ability to retard the flow of heat. The R-value is the reciprocal of thermal transmittance or U-factor expressed as R= 1/U.
Note: The higher the R-value of a material, the more difficult it is for heat to be transmitted through the material.
(20) "Thermal transmittance" or "U-factor" means the time rate of heat flow through a body or assembly which is located in between 2 different environments, expressed in Btu/h • $ft.^2$ • °F. The U-factor 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.
Note 1: The lower the U-factor of a material, the more difficult it is for heat to be transmitted through the material.
Note 2: The thermal transmittance is also referred to as the coefficient of heat transfer or the coefficient of heat transmission.
(21) "Thermally isolated" means physically and thermally separated with separate zone or separate equipment controls for space heating.
(22) "Thermostat" means an automatic control device actuated by temperature and designed to be responsive to temperature.
(23) "Ventilation" 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.
(24) "Zone" 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.

4. _____ or "U-factor" means the time rate of heat flow through a body or assembly which is located in between 2 different environments, expressed in Btu/h • $ft.^2$ • °F. The U-factor 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. Thermal resistance
    b. Thermal transmittance
    c. Thermally isolated
    d. Thermostat
    e. Ventilation
    f. Zone
5. _____means physically and thermally separated with separate zone or separate equipment controls for space heating.
    a. Thermal resistance
    b. Thermal transmittance
    c. Thermally isolated
    d. Thermostat
    e. Ventilation
    f. Zone
6. _____ means an automatic control device actuated by temperature and designed to be responsive to temperature.
    a. Thermal resistance

b. Thermal transmittance
c. Thermally isolated
d. Thermostat
e. Ventilation
f. Zone

7. _____ or “R-value” means a measure of the ability to retard the flow of heat. The R-value is the reciprocal of thermal transmittance or U-factor expressed as R= 1/U.

a. Thermal resistance
b. Thermal transmittance
c. Thermally isolated
d. Thermostat
e. Ventilation
f. Zone

8. _____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. Thermal resistance
b. Thermal transmittance
c. Thermally isolated
d. Thermostat
e. Ventilation
f. Zone

9. _____ 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. Thermal resistance
b. Thermal transmittance
c. Thermally isolated
d. Thermostat
e. Ventilation
f. Zone

10. _____ 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. Sun room
b. Roof assembly
c. Exterior wall area
d. Dwelling thermal envelope

11. _____ 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 12 inches 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. Sun room
b. Roof assembly
c. Exterior wall area
d. Dwelling thermal envelope

12. _____ means all 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 not considered in the area of exterior walls.

a. Sun room
b. Roof assembly

c. Exterior wall area
d. Dwelling thermal envelope

13. _____ means a one-story structure attached to a dwelling with a glazing area in excess of 40% of the gross area of the structure's exterior walls and roof.
a. Sun room
b. Roof assembly
c. Exterior wall area
d. Dwelling thermal envelope

14. _____ means the opaque portion of a wall which encloses a crawl space and is partially or totally below grade.
a. Conditioned floor area
b. Air-impermeable
c. Conditioned space
d. Crawl space wall

15. _____ 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 50° F at design conditions.
a. Conditioned floor area
b. Air-impermeable
c. Conditioned space
d. Crawl space wall

16. _____ means having an air permeance less than or equal to 0.02 L/s-m^2 at a pressure differential of 75 pascals when tested according to ASTM E 2178 or ASTM E 283.
a. Conditioned floor area
b. Air-impermeable
c. Conditioned space
d. Crawl space wall

17. _____ 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. Conditioned floor area
b. Air-impermeable
c. Conditioned space
d. Crawl space wall

18. _____ 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. HVAC system
b. HVAC
c. Heated slab
d. Infiltration

19. _____ means heating, ventilating and air conditioning.
a. HVAC system
b. HVAC
c. Heated slab
d. Infiltration

20._____ 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. HVAC system

b. HVAC
c. Heated slab
d. Infiltration

21. _____ means the uncontrolled inward 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. HVAC system
b. HVAC
c. Heated slab
d. Infiltration

22. _____ means a wall of concrete block, concrete, insulated concrete forms, masonry cavity, brick other than brick veneer, earth and solid timber or logs.

a. Mass wall
b. Opaque areas
c. Renewable energy sources
d. System
e. IC-rated

23. _____ means all exposed areas of a dwelling envelope which enclose conditioned space except openings for windows, skylights, doors and dwelling service systems.

a. Mass wall
b. Opaque areas
c. Renewable energy sources
d. System
e. IC-rated

24. _____ means sources of energy, excluding 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 internal heat of the earth.

a. Mass wall
b. Opaque areas
c. Renewable energy sources
d. System
e. IC-rated

25. _____ means an electrical fixture tested and listed by an independent testing laboratory as being suitable for installation in a cavity where the fixture may be in direct contact with thermal insulation or combustible materials

a. Mass wall
b. Opaque areas
c. Renewable energy sources
d. System
e. IC-rated

26. _____ means a combination of central or terminal equipment and their components, controls, accessories, interconnecting means, and terminal devices by which energy is transformed so as to perform a specific function such as, HVAC, water heating or illumination.

a. Mass wall
b. Opaque areas
c. Renewable energy sources
d. System
e. IC-rated

Subchapter III – Insulation Materials and Installation

Comm 22.20 Basic requirements. (1) 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.

(2) COMPUTATION OF R-VALUES. (a) Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component R-value.

(b) The manufacturer's settled R-value shall be used for blown insulation.

(c) Computed R-values may not include values for air films or for building materials other than insulation materials.

Note: The REScheck program will automatically account for air films and other building materials.

(3) 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 shall be obtained using one of the following test methods:

a. ASTM C177, Standard test method for steady state heat flux measurements and thermal transmission properties by means of the guarded-hot-plate apparatus.

b. ASTM C335, Standard test method for steady state heat transfer properties of pipe insulation.

c. ASTM C518, Standard test method for steady state thermal transmission properties by means of the heat flow meter apparatus.

d. ASTM C1363, Standard test method for the thermal performance of building materials and envelope assemblies by means of a hot box apparatus.

(b) *Foam plastic insulation.* 1. When information specified under sub. (1) is not available, or when a different value is claimed, foam plastic insulation that uses a gas other than air as the insulating medium shall use laboratory or field tests conducted on representative samples that have been aged for the equivalent of 5 years or until the R–value has stabilized.

2. The tests shall be conducted by an independent third party using the standards listed under par. (a) and shall be submitted for department review and approval in accordance with s. Comm 20.18.

(c) *Concrete masonry units.* Systems using integrally-insulated concrete masonry units shall be evaluated for thermal performance in accordance with one of the following:

1. Default values as approved by the department with no extrapolations or interpolations.

2. Laboratory or field test measurements specified under par (a).

3. The material approval process specified in s. Comm 20.18.

27. Insulation material used in layers, such as framing cavity insulation and insulating sheathing, may not be summed to compute the component R-value.

a. true

b. false

28. The manufacturer's settled or unsettled R-value may be used for blown insulation.

a. true

b. false

29. The REScheck program will automatically account for air films and other building materials.

a. true

b. false

30. When information specified under sub. (1) is not available, or when a different value is claimed, foam plastic insulation that uses a gas other than air as the insulating medium shall use laboratory or field tests

conducted on representative samples that have been aged for the equivalent of ___ years or until the R–value has stabilized.

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

31. When available, information and values on thermal properties, performance of building envelope sections and components, and heat transfer shall be obtained from the local lumber supplier.

a. true
b. false

32. The tests shall be conducted by an independent third party using the standards listed under par. (a) and shall be submitted for department review and approval in accordance with s.Comm _____.

a. 20.18
b. 21.18
c. 22.18
d. 23.18

33. Systems using integrally-insulated concrete masonry units shall be evaluated for thermal performance in accordance with one of the following:

a. Default values as approved by the department with no extrapolations or interpolations.
b. Laboratory or field test measurements specified under par (a).
c. The material approval process specified in s. Comm 20.18.
d. all of the above

---

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

(b) All insulation materials, caulking and weatherstripping, fenestration assemblies, mechanical equipment and systems components, and water-heating equipment and system components shall be installed in accordance with the manufacturer's installation instructions.

(c) Manufacturer's installation instructions shall be available on the job site at the time of inspection.

(d) Roof and ceiling, floor and wall cavity batt or board insulation shall be installed in a manner which will permit inspection of the manufacturer's R-value identification mark.

(5) IDENTIFICATION. (a) A thermal resistance identification mark shall be applied by the manufacturer to each piece of dwelling envelope insulation 12-inches or greater in width.

(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 300 square feet through the attic space.

2. The markers shall be affixed to trusses or joists marking the minimum initial installed thickness and minimum settled thickness with numbers a minimum of one-inch in height.

3. Each marker shall face the attic access.

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

(6) 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 owner, builder or insulation installer.

(c) The certificate shall list at least the following information:

1. The predominant R-values of insulation installed in or on ceilings or roofs, walls, foundation walls, slabs and any heating ducts that are outside the thermal envelope.

2. The U-factors of all windows, skylights and doors.
(d) If using the REScheck or REM/Rate software programs, the certificate shall be printed from that program.

34. 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 _____ square feet through the attic space
    a. 200
    b. 300
    c. 400
    d. 500
35. A thermal resistance identification mark shall be applied by the manufacturer to each piece of dwelling envelope insulation ___-inches or greater in width.
    a. 10
    b. 12
    c. 8
    d. 16
36. The markers shall be affixed to _____ marking the minimum initial installed thickness and minimum settled thickness with numbers a minimum of one-inch in height.
    a. trusses
    b. joists
    c. neither a or b
    d. both a or b
37. Each marker shall face the attic access.
    a. true
    b. false
38. The thickness of installed insulation shall meet or exceed the minimum initial installed thickness shown by the marker.
    a. true
    b. false
39. A permanent certificate shall be posted on or immediately adjacent to the electrical distribution panel.
    a. true
    b. false
40. The certificate shall be completed by the
    a. owner
    b. builder
    c. insulation installer
    d. all of the above
41. The certificate shall list at least the following information:
    a. The predominant R-values of insulation installed in or on ceilings or roofs, walls, foundation walls, slabs and any heating ducts that are outside the thermal envelope.
    b.. The U-factors of all windows, skylights and doors.
    c. neither a or b
    d. both a & b
42. If using the _____ software programs, the certificate shall be printed from that program.
    a. REScheck
    b. REM/Rate
    c. neither a or b
    d. both a & b

Comm 22.21 Protection of insulation. (1) BLANKET INSULATION. Insulating blankets or batts shall be held in place with a covering or other means of mechanical or adhesive fastening.

Note: If the insulation is on a below-grade wall, s. Comm 22.08 (3) may prohibit the use of vapor retarder material used as the covering.

(2) WIND WASH PROTECTION. (a) Except as provided under s. Comm 22.39 (4) for cathedral ceilings, all air-permeable insulation materials installed in any position other than horizontal, shall 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.

Note: Suitable materials for this purpose include house wrap permanently attached with batten strips, asphalt-impregnated felt or tar paper, plywood, oriented strand board or OSB, siding material, rigid insulation sheathing, etc.

(b) If non-rigid sheet material is used, it shall be water vapor permeable.

Note: Water vapor permeable materials for this purpose include house wrap permanently attached with batten strips and asphalt-impregnated felt or tar paper.

(3) 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 6 inches below grade.

Note: For interior applications, a thermal barrier may be required under s. Comm 21.11.

43. If the blanket or batt insulation is on a below-grade wall, s. Comm 22.08 (3) may prohibit the use of vapor retarder material used as the covering.
    a. true
    b. false

44. (a) Except as provided under s. Comm 22.39 (4) for cathedral ceilings, all air-permeable insulation materials installed in any position other than horizontal, shall be covered on the warm side with a permanently attached material of high air permeability to maintain the U-value of the insulation.
    a. true
    b. false

45. If non-rigid sheet material is used, it shall be water vapor permeable.
    a. true
    b. false

46. Water vapor permeable materials for this purpose include:
    a. house wrap permanently attached with batten strips
    b. asphalt-impregnated felt
    c. tar paper
    d. all of the above

47. The protective covering shall cover the exposed exterior insulation and extend a minimum of ___ inches below grade.
    a. 4
    b. 6
    c. 8
    d. none of the above

48. FOAM PLASTIC INSULATION. For interior applications, a thermal barrier may be required under s. Comm 21.11.
    a. true
    b. false

49. Insulating blankets or batts shall be held in place with a covering or other means of_____ fastening.

a. mechanical
b. adhesive
c. neither a or b
d. both a & b

Subchapter IV Dwelling Thermal Envelope

Comm 22.30 General Design Requirements. (1) GENERAL. Dwelling thermal envelope insulation amounts and details shall be determined using one of the methods described in this subchapter.

(2) 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.

(b) 1. If the proposed design takes credit for a reduced air change per hour level, documentation of the measures providing the reduction or the results of a post-construction blower door test conducted in accordance ASTM E 779 shall be provided to the department.

2. The minimum air change per hour rate may not be less than 0.2, unless mechanical ventilation is provided.

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

(4) 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. Comm 22.38.
3. All building elements shall meet the requirements of s. Comm 22.31.

(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 50°F.
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 50°F.

(5) 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.

50. Infiltration for heating design loads shall be calculated based on a maximum of ___ air change per hour in the heated space.
a. 5.0
b. 0.5
c. 0.25
d. 0.2

51. The minimum air change per hour rate may not be less than ____, unless mechanical ventilation is provided.
a. 5.0
b. 0.5
c. 0.25
d. 0.2

52. Where basement and crawl space walls are part of the dwelling thermal envelope, their R-values and U-factors shall be based on the wall components. Adjacent soil may also be considered in the determination.

a. true
b. false

53. Except as provided under par. (b), a garage may not be provided with any supplemental heat unless all of the following conditions are met:

a. The dwelling shall be thermally isolated from the garage.
b. The garage floor, ceiling and walls shall be provided with a vapor retarder in accordance with s. Comm 22.38.
c. All building elements shall meet the requirements of s. Comm 22.31.
d. all of the above

54. GARAGES. The thermal envelope requirements under par. (a) are not required if all of the following conditions are met:

a. The thermostat is permanently limited to a maximum of 50°F.
b. Heating equipment is either separate from the dwelling unit equipment or installed as a separate zone.
c. Separate heating equipment shall be sized to provide a maximum indoor temperature of 50°F.
d. all of the above

55. When insulation is placed on the exterior of a foundation supporting a masonry veneer exterior, the horizontal foundation surface supporting the veneer is, and always will be required to be insulated to satisfy the foundation insulation requirement.

a. true
b. false

56. If the proposed design takes credit for a reduced air change per hour level, documentation of the measures providing the reduction or the results of a post-construction blower door test conducted in accordance ASTM E 779 shall be provided to the _____.

a. builder
b. contractor
c. Energy Star
d. department

Comm 22.31 Prescriptive insulation and fenestration criteria. (1)

REQUIREMENTS. (a) Except as specifically provided under this subchapter, dwellings using the prescriptive method shall meet the requirements of Table 22.31-1 or 22.31-2.

(b) In Tables 22.31-1 and 22.31-2, zone 2 consists of the following 15 northern counties: Ashland, Bayfield, Burnett, Douglas, Florence, Forest, Iron, Langlade, Lincoln, Oneida, Price, Sawyer, Taylor, Vilas and Washburn. Zone 1 consists of all other counties not included in zone 2.

TABLE 22.31-1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT [a]

Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling R-Value	Wood Frame Wall R-Value	Mass Wall R-Value	Floor R-Value	Basement or Crawl Space Wall R-Value [b]	Heated Slab R-Value [c]	Unheated Slab R-Value [d]
1	0.35	0.60	49[e]	19[f] or 13+5[g]	15	30[h]	10/13	10/15	10
2	0.35	0.60	49[e]	21[f]	19	30[h]	10/13	10/15	10

a R-values are minimums. U-factors are maximums.
b The first R-value applies to continuous insulation. The second R-value applies to framing cavity insulation. Either insulation meets the requirement.
c The first R-value applies under the entire slab, regardless of depth below grade. The second R-value applies to the slab edge. Slab edge insulation shall extend downward from the top of the slab for a minimum of 48 inches or downward to at least the bottom of the slab and then horizontally to the interior or exterior for a minimum total distance of 48 inches.
d The R-value applies to any slab, the bottom of which is less than 12 inches below adjacent grade. Also, see s. Comm 21.16 for protection against frost for slabs with supports less than 4 feet below grade.
e See s. Comm 22.32 (1) for application and permitted reduced R-value.
f R-19 and R-21 may be compressed into a 2X6 cavity.
g "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25% or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25% of the exterior, structural sheathing shall be covered with insulated sheathing of at least R-2.
h. Or insulation sufficient to fill the framing cavity with a minimum of R-19.

TABLE 22.31-2
EQUIVALENT U-FACTORS

Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Wood Frame Wall U-Factor	Mass Wall U-Factor	Floor U-Factor	Basement Wall U-Factor	Crawlspace U-Factor
1	0.35	0.60	0.026	0.060	0.060	0.033	0.065	0.065
2	0.35	0.60	0.026	0.057	0.057	0.033	0.065	0.065

57. Zone 1 consists of Ashland, Bayfield, Burnett, Douglas, Florence, Forest, Iron, Langlade, Lincoln, Oneida, Price, Sawyer, Taylor, Vilas and Washburn.
    a. true
    b. false
58. Except as specifically provided under this subchapter, dwellings using the prescriptive method shall meet the requirements of Table _____.
    a. 22.31-1
    b. 22.31-2
    c. 22.31-3
    d. only a or b
59. Table 22.31-1 states basement wall R value in Zone 2 would be?
    a. 10/15
    b. 10/13
    c. 10
    d. 15
60. Table 22.31-1 states floor R value in Zone 2 would be?
    a. 10/15
    b. 10/13
    c. 30
    d. 15

61. Table 22.31-1 states wood frame wall R value in Zone 2 would be?
    a. 10/15
    b. 10/13
    c. 30
    d. 21
62. Table 22.31-1 states mass wall R value in Zone 2 would be?
    a. 10/15
    b. 10/13
    c. 30
    d. 19
63. Table 22.31-2 states Skylight U value in Zone 1 would be?
    a. .060
    b. .057
    c. .60
    d. 57

---

(2) 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 22.31-2 multiplied by the same assembly area as in the proposed building, the dwelling is in compliance with this chapter. The UA calculation shall be done 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 and REM/Rate are acceptable software programs for determining compliance with this section.
(b) *Software edition*. If the REScheck software program is used to show compliance with this section, the version shall be 4.1.0, or later.
Note: Any version of REScheck with a beginning number of 3 or smaller will not support the requirements of this code.
(3) APPLIANCE EFFICIENCY. (a) Except as allowed under par. (b) and s. Comm 22.46, oil-fired and gas-fired furnaces and boilers shall meet the minimum efficiency requirements in Table 22.31-3.
(b) In new construction, an oil-fired or gas-fired furnace or boiler meeting the federal efficiency standard but not the requirements of Table 22.31-3 may be installed if the dwelling thermal envelope requirements of Table 22.31-4 are met.

64. If the REScheck software program is used to show compliance with this section, the version shall be 4.0 or earlier.
    a. true
    b. false
65. Any version of REScheck with a beginning number of 3 or smaller will not support the requirements of this code.
    a. true
    b. false
66. In new construction, an oil-fired or gas-fired furnace or boiler meeting the federal efficiency standard but not the requirements of Table 22.31-3 may be installed if the dwelling thermal envelope requirements of Table 22.31-4 are met.
    a. true
    b. false

TABLE 22.31-3
WARM AIR FURNACES AND BOILERS, MINIMUM EFFICIENCY REQUIREMENTS

Equipment Type	Minimum Efficiency	Test Procedure
Natural gas and propane furnaces	90% AFUE	DOE 10 CFR Part 430 or ANSI Z21.47
Natural gas and propane hot water boilers	90% AFUE	DOE 10 CFR Part 430
Oil-fired furnaces	83% AFUE	DOE 10 CFR Part 430 or UL 727
Oil-fired hot water boilers	84% AFUE	DOE 10 CFR Part 430

TABLE 22.31-4
COMPONENT DWELLING THERMAL ENVELOPE REQUIREMENTS FOR DWELLINGS USING LOWER EFFICIENCY APPLIANCES [a]

Fenestration U-Factor	Skylight U-Factor	Ceiling R-Value	Wood Frame Wall R-Value	Mass Wall R-Value	Floor R-Value	Basement or Crawl Space Wall R-Value [b]	Heated Slab R-Value [c]	Unheated Slab R-Value [d]
0.30	0.60	49[e]	21[f] or 19+5[g]	19	30[h]	15/19	10/20	15
Equivalent U-factors								
0.30	0.60	0.26	0.057	0.057	0.033	0.045	0.033	0.047

a R-Values are minimums. U-Factors are maximums.
b The first R-value applies to continuous insulation. The second R-value applies to framing cavity insulation.
c The first R-value applies under the entire slab, regardless of depth below grade. The second R-value applies to the slab edge. Slab edge insulation shall extend downward from the top of the slab for a minimum of 48 inches or downward to at least the bottom of the slab and then horizontally to the interior or exterior for a minimum total distance of 48 inches.
d The R-value applies to any slab, the bottom of which is less than 12 inches below adjacent grade. Also, see s. Comm 21.16 for protection against frost for slabs with supports less than 4 feet below grade.
e See s. Comm 22.32 (1) for application and permitted reduced R-value.
f R-21 may be compressed into a 2X6 cavity.
g "19+5" means R-19 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25% or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25% of the exterior, structural sheathing shall be covered with insulated sheathing of at least R-2.
h Or insulation sufficient to fill the framing cavity with a minimum of R-19.

67. Table 22.31-3 requires a ____ percent propane furnace to meet the minimum requirements.
    a. 84
    b. 83
    c. 90
    d. none of the above
68. Table 22.31-3 requires a ____ percent propane hot water boiler to meet the minimum requirements.
    a. 84
    b. 83
    c. 90
    d. none of the above

69. Table 22.31-4 requires an R value of ____ for ceilings to meet the minimum requirements.
    a. 15
    b. 30
    c. 49
    d. none of the above
70. Table 22.31-4 requires an R value of ____ for unheated slabs to meet the minimum requirements.
    a. 15
    b. 30
    c. 49
    d. none of the above
71. Table 22.31-4 requires an U value of ____ for ceilings to meet the minimum requirements.
    a. .33
    b. .047
    c. .26
    d. none of the above
72. Table 22.31-4 requires an U value of ____ for unheated slabs to meet the minimum requirements.
    a. .33
    b. .047
    c. .26
    d. none of the above

Comm 22.32 Specific insulation requirements. (1) CEILINGS WITH ATTIC SPACES. R-38 will satisfy the ceiling R-value requirement for a dwelling where the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves.
(2) CEILINGS WITHOUT ATTIC SPACES. Where the design of the roof or ceiling assembly does not allow sufficient space for the required R-49 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.
(3) MASS WALLS. (a) The requirements of Table 22.31-1 are applicable in a mass wall where at least 50 percent of the required insulation R-value is on the exterior of, or integral to, the wall.
(b) Mass walls that do not meet the specifications under par. (a) for insulation placement shall meet the wood frame wall insulation requirements of Table 22.31-1.
(4) STEEL-FRAME CEILINGS, WALLS AND FLOORS. (a) Steel- frame ceilings, walls and floors shall meet the insulation requirements of Table 22.32 or shall meet the U -factor requirements in Table 22.31-2.
(b) The calculation of the U -factor for a steel-frame envelope assembly shall use a series-parallel path calculation method.

73. Where the design of the roof or ceiling assembly does not allow sufficient space for the required R-49 insulation, the minimum required insulation for the roof or ceiling assembly shall be R-20. This reduction of insulation shall be limited to 400 square feet of ceiling area.
    a. true
    b. false
74. R-38 will satisfy the ceiling R-value requirement for a dwelling where the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves.
    a. true
    b. false

75. MASS WALLS. (a) The requirements of Table 22.31-1 are applicable in a mass wall where at least 50 percent of the required insulation R-value is on the exterior of, or integral to, the wall.

a. true
b. false

76. Mass walls that do not meet the specifications under par. (a) for insulation placement shall meet the wood frame ceiling insulation requirements of Table 22.31-1.

a. true
b. false

77. The calculation of the R -factor for a steel-frame envelope assembly shall use a series-parallel path calculation method.

a. true
b. false

TABLE 22.32
STEEL-FRAME CEILING, WALL AND FLOOR INSULATION R –VALUES

WOOD FRAME *R* -VALUE REQUIREMENT	COLD-FORMED STEEL EQUIVALENT *R* -VALUE [a]
Steel Truss Ceilings [b]	
R-30	R - 38 or R - 30 + 3 or R - 26 + 5
R-38	R - 49 or R - 38 + 3
R-49	R-38+5
Steel Joist Ceilings [b]	
R-30	R - 38 in 2 x 4 or 2 x 6 or 2 x 8 R - 49 in any framing
R-38	R - 49 in 2 x 4 or 2 x 6 or 2 x 8 or 2 x 10
Steel Framed Wall	
R-13	R - 13 + 5 or R - 15 + 4 or R - 21 + 3
R-19	R - 13 + 9 or R - 19 + 8 or R - 25 + 7
R-21	R - 13 + 10 or R - 19 + 9 or R - 25 + 8
Steel Joist Floor	
R-13	R - 19 in 2 x 6 R - 19 + 6 in 2 x 8 or 2 x 10
R-19	R - 19 + 6 in 2 x 6 R - 19 + 12 in 2 x 8 or 2 x 10

a Cavity insulation *R*- value is listed first, followed by continuous insulation *R*- value.
b Insulation exceeding the height of the framing shall cover the framing.

78. When using Table 22.32, cavity insulation R-value is list first, followed by continuous insulation R-value.

a. true
b. false

79. When using Table 22.32, insulation exceeding the height of the framing shall cover the roof members.

a. true
b. false

(**5)** FLOORS. Floor insulation shall be installed to maintain permanent contact with the

underside of the subfloor decking.
(6) BASEMENT WALLS. (a) Walls associated with conditioned basements shall be insulated from the top of the basement wall down to the basement floor.
(b) Walls associated with unconditioned basements shall meet the requirement in par. (a) unless the floor overhead is insulated in accordance with Table 22.31-1.
(c) Where the total basement wall area is less than 50 percent below grade, the entire wall area, including the below-grade portion, is included as part of the area of exterior walls.
(7) BOX SILL AND RIM JOIST SPACES. Box sills and joist spaces at outside walls 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. Comm 22.21 (1)**.**
(8) OVERHANG JOIST SPACES. (a) Joist spaces that extend beyond exterior walls shall be insulated with an *R*-value of 30 or higher with insulation that completely fills the cavity including over the top of the exterior wall supporting the joists.
(b) The joist space insulation shall be air sealed either by using an air-impermeable insulation that is sealed to all framing members or by covering the insulation with a rigid material that is caulked or sealed to all framing members.
(c) If piping that is subject to freezing is located in the joist space, additional insulation shall be provided on the unconditioned side of the space.
(9) WALL INSULATION. Except for closed-cell sprayed foam, wall insulation shall completely fill the wall cavity.

80. Box sills and joist spaces at outside walls 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. Comm 22.21 (1)**.**
a. true
b. false
81. Joist spaces that extend beyond exterior walls shall be insulated with an *R*-value of 20 or higher with insulation that completely fills the cavity including over the top of the exterior wall supporting the joists.
a. true
b. false
82. Walls associated with conditioned basements shall be insulated from the top of the exterior grade down to the basement floor.
a. true
b. false
83. Walls associated with unconditioned basements shall meet the requirement in par. (a) unless the floor overhead is insulated in accordance with Table 22.31-1.
a. true
b. false
84. Where the total basement wall area is less than 75 percent below grade, the entire wall area, including the below-grade portion, is included as part of the area of exterior walls.
a. true
b. false
85. Floor insulation shall be installed to maintain partial contact with the underside of the subfloor decking.
a. true
b. false
86. If piping that is subject to freezing is located in the joist space, additional insulation may be provided on the conditioned side of the space.
a. true

b. false

87. Except for open-cell sprayed foam, wall insulation shall completely fill the wall cavity.

a. true

b. false

Comm 22.33 Slab floors. (1) HEATED OR UNHEATED SLABS. Any slab floor, the bottom of which is less than 12 inches below adjacent grade, shall be insulated in accordance with Table 22.31-1 or Table 22.31-4.
(2) HEATED SLABS. In addition to meeting the requirement under sub. (1), if applicable, heated slabs of any depth below grade shall meet the R-value requirement in accordance with Table 22.31-1 or Table 22.31-4.
(3) DETAILS. (a) The top edge of insulation installed between the exterior wall and the edge of the interior slab may be cut at a 45 degree angle away from the exterior wall.
(b) Horizontal insulation extending outside of the foundation shall be covered by soil a minimum of 10 inches thick or by pavement.

88. HEATED SLABS. In addition to meeting the requirement under sub. (1), if applicable, heated slabs of any depth below grade shall meet the R-value requirement in accordance with Table 22.31-1 or Table 22.31-4.

a. true

b. false

89. Horizontal insulation extending outside of the foundation shall be covered by soil a minimum of 12 inches thick or by 10 inches of pavement.

a. true

b. false

90. The top edge of insulation installed between the exterior wall and the edge of the interior slab may be cut at a 60 degree angle into the exterior wall.

a. true

b. false

Comm 22.34 Crawl spaces. (1) FROST PROTECTION. If the bottom of the crawl space serving as the dwelling foundation is less than 48 inches below adjacent grade, the foundation shall be frost protected in accordance with Table 22.31-1 for frost protected slabs.
(2) VAPOR RETARDER. Any exposed earth in crawl spaces shall be covered with a continuous vapor retarder.
(b) All decayable organic material, including topsoil, shall be removed from crawl space floors prior to placing the vapor retarder.
(c) All joints of the vapor retarder shall overlap by 6 inches and be sealed or taped.
(d) The edges of the vapor retarder shall extend at least 6 inches up the foundation wall and shall be attached to the foundation wall.
(3) UNINSULATED CRAWL SPACES. (a) For crawl spaces that are outside of the thermal envelope, ventilation openings equal to at least 1/1500 of the floor space shall be provided.
(b) At least 50% of the ventilating area shall be provided at opposite sides of the crawl space or as far apart as possible.
(c) The floor above the crawl space shall be insulated in accordance with Table 22.31-1.
(4) INSULATED CRAWL SPACES. (a) As an alternative to insulating floors over unheated crawl spaces, crawl space walls shall be insulated in accordance with Table 22.31-1.
(b) Crawl space wall insulation shall be permanently fastened to the wall and shall extend the entire height of the wall.

(c) The crawl space may not be vented to the outside unless the floor above is insulated in accordance with Table 22.31-1.

91. Vapor retarder required in the crawl space must include:
    a. Any exposed earth in crawl spaces shall be covered with a continuous vapor retarder.
    b. All decayable organic material, including topsoil, shall be removed from crawl space floors prior to placing the vapor retarder.
    c. neither a or b
    d. both a & b
92. Vapor retarder required in the crawl space must include:
    a. All joints of the vapor retarder shall overlap by 6 inches and be sealed or taped.
    b. The edges of the vapor retarder shall extend at least 6 inches up the foundation wall and shall be attached to the foundation wall.
    c. neither a or b
    d. both a & b
93. UNINSULATED CRAWL SPACES. (a) For crawl spaces that are outside of the thermal envelope, ventilation openings equal to at least _____ of the floor space shall be provided.
    a. 1/300
    b. 1/600
    c. 1/1500
    d none of the above
94. UNINSULATED CRAWL SPACES. At least _____% of the ventilating area shall be provided at opposite sides of the crawl space or as far apart as possible.
    a. 25
    b. 50
    c. 33 1/3
    d none of the above

95. UNINSULATED CRAWL SPACES. The floor above the crawl space shall be insulated in accordance with Table _____.
    a. 22.31-1
    b. 22.33-2
    c. 22.33-1
    d none of the above
96. INSULATED CRAWL SPACES. (a) As an alternative to insulating floors over unheated crawl spaces, crawl space walls shall be insulated in accordance with Table_____.
    a. 22.31-1
    b. 22.33-2
    c. 22.33-1
    d none of the above
97. Crawl space wall insulation shall:
    a. be permanently fastened to the wall
    b. extend the entire height of the wall.
    c. neither a or b
    d. both a & b
98. The crawl space may not be vented to the outside unless the floor above is insulated in accordance with Table _____.
    a. 22.31-1
    b. 22.33-2

c. 22.33-1
d none of the above

Comm 22.35 Thermally isolated sunrooms. (1) The minimum opaque ceiling insulation R -value shall be R-24. The minimum opaque wall R -value shall be R-13.
(2) The maximum fenestration U -factor shall be 0.50 and the maximum skylight U -factor shall be 0.75.
(3) New walls, windows and doors separating a sunroom from conditioned space shall meet the building thermal envelope requirements.
(4) The temperature in the conditioned space shall be controlled as a separate zone or shall use separate heating equipment.
(5) Glazing in a thermally-isolated sunroom is not considered to be in the dwelling thermal envelope.

99. The minimum opaque (solid) wall R -value shall be R-_____.
a. 11
b. 13
c. 24
d. 18
100. The minimum opaque (solid) ceiling insulation R -value shall be R-_____.
a. 11
b. 13
c. 24
d. 18
101. The maximum fenestration (glazing) U -factor shall be _____.
a. 0.40
b. 0.50
c. 0.70
d. 0.75
102. The maximum skylight U -factor shall be _____.
a. 0.40
b. 0.50
c. 0.70
d. 0.75
103. Thermally isolated sunroom must include the follow items:
a. New walls, windows and doors separating a sunroom from conditioned space shall meet the building thermal envelope requirements.
b. The temperature in the conditioned space shall be controlled as a separate zone or shall use separate heating equipment.
c. Glazing in a thermally-isolated sunroom is not considered to be in the dwelling thermal envelope.
d. all of the above

Comm 22.36 Fenestration. (1) AVERAGE U-FACTORS. An area-weighted average of fenestration products may be used to satisfy the U-factor requirements.
(2) MAXIMUM FENESTRATION U-FACTOR. The area weighted average maximum fenestration U-factor permitted using trade offs from s. Comm 22.31 (2) or subchapter VI shall be 0.40 for vertical fenestration, and 0.75 for skylights.
(3) GLAZED FENESTRATION EXEMPTION. Up to 15 square feet of glazed fenestration per dwelling unit may be exempt from U-factor requirements of this chapter.

(4) OPAQUE DOOR EXEMPTION. One opaque door assembly is exempted from the U -factor requirements of this chapter.
(5) REPLACEMENT FENESTRATION. Where an existing fenestration unit is replaced with a new fenestration unit, including sash and glazing, the replacement unit shall meet the U -factor requirements of this chapter.
(6) CERTIFIED PRODUCTS. Except as provided in sub. (7), fenestration rating, certification and labeling of U-factors for windows, doors and skylights shall be in accordance with NFRC 100.
(7) DEFAULT VALUES. When a manufacturer has not determined product U-factor in accordance with NFRC 100, U-factors shall be determined by assigning a default value in accordance with Tables 22.36-1 and 22.36-2. Where a composite of materials of two different product types is used, the product shall be assigned the higher U-factor.

104. REPLACEMENT FENESTRATION. Where an existing fenestration unit is replaced with a new fenestration unit, including sash and glazing, the replacement unit shall meet the U -factor requirements of this chapter.
a. true
b. false
105. When a manufacturer has not determined product U-factor in accordance with NFRC 100, U-factors shall be determined by assigning a default value in accordance with _____.
a. Tables 22.36-1
b. Tables 22.36-2
c. neither a or b
d. both a & b
106. Where a composite of materials of two different product types is used, the product shall be assigned the _____ U-factor.
a. lower
b. same
c. higher
d. all of the above
107. Fenestration rating, certification and labeling of U-factors for windows, doors and skylights shall be in accordance with NFRC _____.
a. 1000
b. 100-1
c. 100
d. none of the above
108. OPAQUE DOOR EXEMPTION. One opaque door assembly is exempted from the U-factor requirements of this chapter.
a. true
b. false

TABLE 22.36-1
U-FACTOR DEFAULT TABLE
FOR WINDOWS, GLAZED DOORS AND SKYLIGHTS[a]

	Single Glazed	Double Glazed
Metal without Thermal Break		
Operable	1.27	0.87
Fixed	1.13	0.69
Door	1.26	0.80
Skylight	1.98	1.31
Site-assembled Skylight	1.36	0.82
Metal with Thermal Break		
Operable	1.08	0.65
Fixed	1.07	0.63
Door	1.10	0.66
Skylight	1.89	1.11
Site-assembled Skylight	1.25	0.70
Vinyl or Metal-Clad Wood		
Operable	0.90	0.57
Fixed	0.98	0.56
Door	0.99	0.57
Skylight	1.75	1.05
Wood or Fiberglass		
Operable	0.89	0.55
Fixed	0.98	0.56
Door	0.98	0.56
Skylight	1.47	0.84

[a] Glass block assemblies shall have a default value of 0.60.

109. The maximum U value for a single glazed vinyl skylight would be _____.
    a. 1.05
    b. 1.89
    c. 1.75
    d. 1.47
110. The maximum U value for a single glazed fiberglass skylight would be _____.
    a. 1.05
    b. 1.89
    c. 1.75
    d. 1.47

TABLE 22.36-2
U-FACTOR DEFAULT TABLE FOR NON-GLAZED DOORS

STEEL DOORS (1-3/4 inches thick)	With Foam Core	Without Foam Core
	0.35	0.60
WOOD DOORS (1-3/4 inches thick)	**Without Storm Door**	**With Storm Door**
Panel with 7/16-inch panels	0.54	0.36
Hollowcore flush	0.46	0.32
Panel with 1-1/8-inch panels	0.39	0.28
Solid core flush	0.40	0.26

111. The maximum U value for a wood hollow core flush door with a storm door would be _____.
a. 32
b. 0.32
c. 0.28
d. 0.26
112. . The maximum U value for a wood solid core flush door with a storm door would be _____.
a. 32
b. 0.32
c. 0.28
d. 0.26

Comm 22.37 Air leakage. (1) GENERAL. The requirements of this section apply to those components that separate interior conditioned space from a garage or an unconditioned space.
(2) 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 no more than 0.3 cfm per square foot, and swinging doors no more than 0.5 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.
(b) *Exception.* Site-constructed doors and windows shall be sealed with gasketing or weatherstripping or shall be covered with a storm door or storm window.
(3) JOINT AND PENETRATION SEALING. (a) Exterior joints, seams or penetrations in the dwelling envelope, that 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 walls, roof, ceilings or attic ceiling seals, 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.
(b) Sealing shall be provided at the attic and crawl space panels, at recessed lights and around all plumbing and electrical penetrations, where these openings are located in the dwelling thermal envelope.
(c) The sealing methods between dissimilar materials shall allow for differential expansion and contraction.
(4) 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 3 inches from insulation.
2. If the fixture is non-IC-rated, the box shall be constructed of noncombustible material that does not readily conduct heat.
Note: Cement board meets the requirements of this section. Drywall and metal do not.
(5) FAN HOUSINGS. Gaps between a fan housing and a ceiling or wall that could result in air leaks shall be gasketed, sealed or caulked.

113. The requirements of this section apply to those components that separate interior conditioned space from a _____.
a. garage
b. an unconditioned space.
c. neither a or b
d. both a & b
114. Exterior joints, seams or penetrations in the dwelling envelope, that are sources of air leakage, shall be sealed with _____.
a. durable caulking materials
b. closed with gasketing systems
c. neither a or b
d. both a or b
115. Exterior joints, seams or penetrations in the dwelling envelope, that are sources of air leakage, shall be sealed with _____.
a. taped
b. covered with water-vapor-permeable house wrap.
c. neither a or b
d. both a or b
116. Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than _____ cfm per square foot.
a. 0.3
b. .03
c. 0.5
d. .05
117. Swinging doors shall have an air infiltration rate of no more than _____ cfm per square foot.
a. 0.3
b. .03
c. 0.5
d. .05
118. Site-constructed doors and windows shall be _____.
a. sealed with gasketing
b. weather-stripping
c. neither a or b
d. both a or b

119. Site-constructed doors and windows shall be covered with _____.
    a. storm door
    b. storm window
    c. neither a or b
    d. both a & b
120. Joints to be treated include all of the following:
    a. Openings, cracks and joints between wall cavities and window or door frames.
    b. Between separate wall assemblies or their sill-plates and foundations.
    c. neither a or b
    d. both a & b
121. Joints to be treated include all of the following:
    a. Between walls, roof, ceilings or attic ceiling seals, and between separate wall panel assemblies, including between interior and exterior walls.
    b. Penetrations of utility services through walls, floor and roof assemblies, and penetrations through top and bottom wall plates.
    c. neither a or b
    d. both a & b
122. Sealing shall be provided at the_____ panels, where these openings are located in the dwelling thermal envelope.
    a. attic
    b. crawl space panels
    c. neither a or b
    d. both a & b
123. Sealing shall be provided at the_____, where these openings are located in the dwelling thermal envelope.
    a. recessed lights
    b. plumbing penetrations
    c. electrical penetrations
    d. all of the above
124. 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 ____ cfm of air movement from the conditioned space to the ceiling cavity.
    a. 1.0
    b. 20.
    c. 2.0
    d none of the above
125. 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 3 inches from insulation.
    d. all of the above
126. If the fixture is non-IC-rated, the box shall be constructed of noncombustible material that does not readily conduct heat. **Note:** Both drywall and metal meets the requirements of this section.
    a. true
    b. false

127. FAN HOUSINGS. Gaps between fan housing and a ceiling or wall that could result in air leaks shall be _____.

a. gasketed
b. sealed
c. caulked
d. all of the above

Comm 22.38 Vapor retarders. (1) 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.
(b) *Continuity*. The vapor retarder shall be continuous. All joints in a vapor retarder consisting of sheet material shall be overlapped 6 inches and taped or sealed. Rips, punctures and voids in the vapor retarder shall be patched with vapor retarder materials and taped or sealed.
(2) FRAME ASSEMBLIES. (a) *General*. Except as provided under par. (c), all frame walls, frame floors and frame ceilings that comprise the thermal envelope, shall have a vapor retarder installed on the warm-in-winter side of the thermal insulation.
(b) *Coverage*. The vapor retarder shall cover the exposed insulation and the interior face of the framing.
(c) *Exceptions*. 1. Where the vapor retarder is omitted, as allowed under subds. 2. to 4., all sources of air leakage, such as between double top or bottom plates or between double studs, shall be caulked or sealed.
2. No vapor retarder is required in the box sill.
3. No vapor retarder is required where batt insulation is provided with foil or kraft paper backing on the warm-in-winter side and the nailing tabs are tightly fastened to the warm-inwinter face of the framing members.
4. No vapor retarder is required over cavities that are insulated solely with spray-applied foam unless required by the foam manufacturer.
Note: This requirement does not require the cavity to be completely filled. It only requires that the total required R-value come from the foam, including any exterior foam sheathing, and no other insulation material is present in the cavity.
(3) CONCRETE FLOORS. (a) Except as allowed under par. (e), 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 6 mils in thickness or shall be a reinforced material.
(c) Joints in the vapor retarder shall be overlapped at least 6 inches and taped or sealed.
(d) The edges of the vapor retarder shall extend up the edges of the slab at least to the top of the slab. **The State has backed off on the "at least to the top of the slab"**
(e) A vapor retarder is not required under the slab of an unconditioned attached garage.
(4) CONCRETE OR MASONRY BASEMENT WALLS. A non-rigid sheet vapor retarder with a perm rating of 0.1 or less is prohibited 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.

128. Under this section, a vapor retarder is a material with no intrinsic thermal or structural properties that has a rating of ____ perm or less when tested in accordance with ASTM standard E 96, Procedure A.

a. 0.1
b 1.0
c. >1.0

d. none of the above

129. The vapor retarder shall be continuous. All joints in a vapor retarder consisting of sheet material may be overlapped up to 6 inches or taped or sealed.

a. true
b. false

130. Rips, punctures and voids in the vapor retarder shall be patched or repaired with a _____.

a. vapor retarder material
b. taped
c. seal
d. all of the above

131. All _____ that comprise the thermal envelope, shall have a vapor retarder installed on the warm-in-winter side of the thermal insulation.

a. frame walls
b. frame floors
c. frame ceilings
d. all of the above

132. The vapor retarder shall cover the_____.

a. exposed insulation
b. the interior face of the framing
c. neither a or b
d. both a & b

133. Exceptions to omit a Vapor Retarder include _____.

a. No vapor retarder is required in the box sill.
b. No vapor retarder is required where batt insulation is provided with foil or kraft paper backing on the warm-in-winter side and the nailing tabs are tightly fastened to the warm-inwinter face of the framing members.
c. No vapor retarder is required over cavities that are insulated solely with spray-applied foam unless required by the foam manufacturer
d. all of the above

134. This requirement does not require the cavity to be completely filled. It only requires that the total required R-value come from the foam, including any exterior foam sheathing, and no other insulation material is present in the cavity.

a. true
b. false

135. CONCRETE FLOORS. Requirements for a vapor retarder under the concrete floor include _____.

(a) Except as allowed under par. (e), 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 6 mils in thickness or shall be a reinforced material.
c. neither a or b
d. both a & b

136. CONCRETE FLOORS. Requirements for a vapor retarder under the concrete floor include _____.

a. Joints in the vapor retarder shall be overlapped at least 6 inches and taped or sealed.
b. The edges of the vapor retarder shall extend up the edges of the slab at least to the top of the slab.
c. A vapor retarder is not required under the slab of an unconditioned attached garage.
d. all of the above

137. CONCRETE OR MASONRY BASEMENT WALLS. A non-rigid sheet vapor retarder with a perm rating of 0.1 or less is prohibited 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.
c. neither a or b
d. both a & b

Comm 22.39 Ventilation and moisture control. (1) GENERAL. Design and construction shall prevent deterioration from moisture condensation and ice damming.
(2) 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. At least 50% of the net free ventilating area shall be distributed at the high sides of the roof.
3.The remainder of the net free ventilating area shall be distributed in the lower half of the roof or attic area.
4. If more than 50%, but less than 75% 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.
5. If 75% or more 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.
6. Ventilation is not required for separated roof areas, such as dormers, bump-outs or bays that cover a floor area of 40 ft^2 or less.
(b) Engineered systems that provide equivalent ventilation to that required under this subsection may be used.
(c) Insulation shall not block the free flow of air.
(3) CONDITIONED ATTICS. Attic spaces are not required to be vented where airimpermeable insulation is attached directly to the underside of the roof deck and all of the following conditions are met:
(a) No interior vapor retarders are installed between the living space and the conditioned attic.
(b) The temperature in the attic space is maintained high enough to prevent any moisture condensation on the insulation.
Note: Maintaining the interior surface temperature of the insulation at or above the dew point temperature of the interior air will minimize condensation. Maintaining at least 45^oF on the surface of the insulation will minimize condensation on the surface when the interior air temperature is 70^oF and the interior relative humidity is 45%.
(4) CATHEDRAL CEILINGS. Air-permeable insulation in a cathedral ceiling assembly shall fill the entire cavity space unless an air barrier separates the top of the insulation from the ventilation space.
(5) MECHANICAL VENTILATION. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.
(6) CLOTHES DRYERS. Clothes dryers shall be vented to the outside of the structure.
Note: See s. Comm 23.14 for vent material requirements.

138. Design and construction shall prevent deterioration from_____.
a. moisture condensation
b. ice damming
c. neither a or b
d. both a & b

139. Where non air-permeable ceiling or attic insulation is installed in a vertical position, ventilation shall be provided above the insulation in accordance with this paragraph.

a. true
b. false

140. Ventilation and moisture control in a ventilated attic includes the following requirements _____.
a. At least 50% of the net free ventilating area shall be distributed at the high sides of the roof.
b. The remainder of the net free ventilating area shall be distributed in the lower half of the roof or attic area.
c. If more than 50%, but less than 75% 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.
d. all of the above.

141. Ventilation and moisture control in a ventilated attic includes the following requirements _____.
a. If 75% or more 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.
b. Ventilation is not required for separated roof areas, such as dormers, bump-outs or bays that cover a floor area of 40 ft^2 or less.
c. neither a or b
d. both a & b

142. CONDITIONED ATTICS. Attic spaces are not required to be vented where air impermeable insulation is attached directly to the underside of the roof deck and all of the following conditions are met:
a. No interior vapor retarders are installed between the living space and the conditioned attic.
b. The temperature in the attic space is maintained high enough to prevent any moisture condensation on the insulation.
c. neither a or b
d. both a & b

143. CATHEDRAL CEILINGS. Air-permeable insulation in a cathedral ceiling assembly shall fill the entire cavity space unless an _____ separates the top of the insulation from the ventilation space.
a. vapor retarder
b. air barrier
c. drywall
d. none of the above

144. MECHANICAL VENTILATION. Outdoor air intakes and exhausts shall have _____ that close when the ventilation system is not operating.
a. automatic
b. gravity dampers
c. neither a or b
d. both a or b

145. CLOTHES DRYERS. Clothes dryers shall be vented to the outside of the conditioned space.
a. true
b. false

Subchapter V - Systems

Comm 22.40 Indoor temperatures and equipment sizing. (1) GENERAL. The indoor temperatures listed under sub. (2) shall be used to determine the total dwelling heat loss and to select the size of the of the heating equipment.

(2) INDOOR DESIGN TEMPERATURES. Unheated, non-habitable basement areas shall use a heating design temperature of less than 50°F. All other areas of a dwelling shall use a heating design temperature of 70°F.

(3) EQUIPMENT SIZING. Heating design loads including ventilation loads for the purpose of sizing systems shall be determined in accordance with the REScheck or REM/RATE

software programs or one of the procedures described in Chapter 29 of ASHRAE Handbook of Fundamentals.

Note: Residential heat balance, residential load factor, Canadian F280 and ACCA Manual J are among the methods recognized as equipment sizing protocols under chapter 29.

Comm 22.41 Temperature control. (1) GENERAL. Each system shall be provided with an adjustable thermostat for the regulation of temperature.

(2) CIRCULATING HOT WATER SYSTEMS. Circulating hot water systems shall include an automatic or readily accessible manual switch to turn off the circulating pump when the system is not in use.

(3) MERCURY THERMOSTATS. The installation of thermostats containing mercury is prohibited.

Note: This section does not require the replacement of existing mercury-containing thermostats.

(4) HEAT PUMP SUPPLEMENTARY HEAT. Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.

146. INDOOR DESIGN TEMPERATURES. Unheated, non-habitable basement areas shall use a heating design temperature of less than ____˚F. All other areas of a dwelling shall use a heating design temperature of ____˚F.

a. 55, 68
b. 50, 70
c. >50, >70
d. none of the above

147. EQUIPMENT SIZING. Heating design loads including ventilation loads for the purpose of sizing systems shall be determined in accordance with the

a. REScheck software program
b. REM/RATE software program
c. one of the procedures described in Chapter 29 of ASHRAE Handbook of Fundamentals.
d. all of the above

148. CIRCULATING HOT WATER SYSTEMS. Circulating hot water systems shall include an _____ switch to turn off the circulating pump when the system is not in use.

a. automatic
b. readily accessible manual
c. neither a or b
d. both a or b

149. MERCURY THERMOSTATS. The installation of thermostats containing mercury is prohibited.

a. true
b. false

150. Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplemental heat operation whenever the heat pump compressor can or can not meet the heating load.

a. true
b. false

Comm 22.42 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 R-8.

(2) Building framing cavities may not be used as supply ducts.

Comm 22.43 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.
(2) Sealing shall be accomplished using welds, gaskets, mastics, mastic-plus-embeddedfabric systems or tapes installed in accordance with the manufacturer's instructions.
(3) Insulation that provides a continuous air barrier may be used in lieu of sealing metal ducts.
(4) Tapes and mastics used with rigid fibrous glass ducts shall be listed and labeled as complying with UL 181A.
(5) Tapes and mastics used with flexible air ducts shall be listed and labeled as complying with UL 181B.
(6) 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.

151. Duct systems with joints not located entirely within the conditioned space or with joints located on the unconditioned side of_____, shall be sealed in accordance with this section.
a. stud bays
b. joist cavities
c. similar spaces
d. all of the above
152. Tapes and mastics used with flexible air ducts shall be listed and labeled as complying with _____.
a. Menards
b. Home Depot
c. Lowes
d. UL 181B
153. Tapes with rubber-based adhesives may not be used except for the original duck or duct tape.
a. true
b. false

Comm 22.44 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 75°F.
Comm 22.45 Air conditioner and heat pump efficiencies. (1) Heating and cooling equipment shall meet the minimum efficiency requirements in Table 22.45 when tested and rated in accordance with the applicable test procedure.
(2) The efficiency shall be verified through certification under an approved certification program or, if no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the manufacturer.
(3) Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all efficiency requirements under this chapter.
(4) Where components, such as indoor or outdoor coils, from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrate that the combined efficiency of the specified components meets the requirements under this section.
Comm 22.46 Replacement furnace and boiler efficiencies. (1) 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 ten percent of the furnace manufacturer’s rated air flow across the blower at high speed.
Note: 0.02 inches water gage is equal to approximately 25 pascals.
(2) A replacement boiler in existing construction may meet only the prevailing federal

standard provided there is no installed circulation pump larger than one-twentieth horsepower and no circulation pump runs continuously.

154. Heating pipes in unheated spaces shall be insulated with material providing a minimum thermal resistance of R-____ as measured on a flat surface in accordance with ASTM standard C 335 at a mean temperature of ___°F.

a. 5, 70
b. 4, 75
c. both a & b
d. neither a or b

155. A replacement furnace in existing construction may meet only the prevailing federal efficiency standard provided the duct distribution system is sealed and tested at _____ inches water gage across the entire system,

a. 0.20
b. 0.02
c. both a & b
d. neither a or b

156. 0.02 inches water gage is equal to approximately ___ pascals.

a. .25
b. 25
c. both a & b
d. neither a or b

TABLE 22.45
UNITARY AIR CONDITIONERS AND CONDENSING UNITS
AND UNITARY AND APPLIED HEAT PUMPS,
ELECTRICALLY OPERATED, MINIMUM EFFICIENCY REQUIREMENTS

Equipment Type	Minimum efficiency	Minimum efficiency	Test Procedure
Split system and single package air conditioner, air cooled	13.0 SEER		ARI 210/240
Space constrained product-air conditioner	12 SEER		ARI 210/240
Through-the-wall air conditioner, air cooled, split system	10.9 SEER (before Jan. 23, 2010) 12.0 SEER (as of Jan. 23, 2010)		ARI 210/240
Through-the-wall air conditioner, air cooled, single package	10.6 SEER (before Jan. 23, 2010) 12.0 SEER (as of Jan. 23, 2010)		ARI 210/240
Split system and single package air conditioner, Water and evaporatively cooled	12.1 EER		ARI 210/240
Split system and single package heat pump, air cooled	13.0 SEER	7.7 HSPF	ARI 210/240
Through-the-wall air conditioner and heat pump-split system	10.9 SEER (before Jan. 23, 2010) 12.0 SEER (as of Jan. 23, 2010)	7.1 HSPF (before Jan. 23, 2010) 7.4 (as of Jan. 23, 2010)	ARI 210/240
Through-the-wall air conditioners and heat pumps-single package	10.6 SEER (before Jan. 23, 2010) 12.0 SEER (as of Jan. 23, 2010)	7.0 HSPF (before Jan. 23, 2010) 7.4 (as of Jan. 23, 2010)	ARI 210/240
Space constrained products-heat pumps	12 SEER	7.4 HSPF	ARI 210/240
Water source, heating mode, 68 degree F entering water		4.2 COP	ARI/ASHRAE 13256-1
Groundwater source, heating mode, 50 degree F entering water		3.6 COP	ARI/ASHRAE 13256-1
Ground Source, heating mode, 32 degree F entering water		3.1 COP	ARI/ASHRAE 13256-1

Subchapter VI – Simulated Performance Alternative

Comm 22.50 General. This sub chapter establishes criteria for compliance using simulated energy performance analysis. The analysis shall include heating, cooling, and service water heating energy only.

Comm 22.51 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.

Comm 22.52 Documentation. (1) COMPLIANCE SOFTWARE TOOLS. Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this subchapter shall be provided to the inspector.

(2) COMPLIANCE REPORT. Compliance software tools shall generate a report that documents that the proposed design has annual 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 22.53-1.

2. The inspection checklist shall show the estimated annual energy cost for both the standard reference design and the proposed design.

(c) Name of individual completing the compliance report.

(d) Name and version of the compliance software tool.

(3) ADDITIONAL DOCUMENTATION. The inspector may require any of the following documents:

(a) Documentation of the building component characteristics of the standard reference design.

(b) A certification signed by the builder providing the building component characteristics of the proposed design as given in Table 22.53-1.

157. COMPLIANCE SOFTWARE TOOLS. Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this subchapter shall be provided to the _____.

a. department
b. Energy Star Contractor
c. inspector
d. none of the above

158. ADDITIONAL DOCUMENTATION. The inspector may require any of the following documents:

a. Documentation of the building component characteristics of the standard reference design.
b. A certification signed by the builder providing the building component characteristics of the proposed design as given in Table 22.53-1.
c. both a & b
d. neither a or b

Comm 22.53 Calculation procedure. (1) GENERAL. Except as specifically allowed under this section, the standard reference design and proposed design shall be configured and analyzed using identical methods and techniques.

(2) REFERENCE AND PROPOSED DESIGNS. The standard reference design and proposed design shall be configured and analyzed as specified by Table 22.53-1. Table 22.53–1 shall include by reference all notes contained in Table 22.31-1.

(3) 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:

(a) Computer generation of the standard reference design using only the input for the proposed design. The calculation procedure may not allow the user to directly modify the building component characteristics of the standard reference design.

(b) Calculation of whole-building sizing as a single zone for the heating and cooling equipment in the standard reference design residence in accordance with s. Comm 22.40 (3).
(c) Calculations that account for the effects of indoor and outdoor temperatures and partload ratios on the performance of heating, ventilating and air conditioning equipment based on climate and equipment sizing.
(d) Printed code official inspection checklist listing each of the proposed design component characteristics from Table 22.53 – 1 determined by the analysis to provide compliance, along with their respective performance ratings.

159. 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:

(a) Computer generation of the standard reference design using only the input for the proposed design. The calculation procedure may not allow the user to directly modify the building component characteristics of the standard reference design.
(b) Calculation of whole-building sizing as a single zone for the heating and cooling equipment in the standard reference design residence in accordance with s. Comm 22.40 (3).
c. both a & b
d. neither a or b

160. 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:

a. Calculations that account for the effects of indoor and outdoor temperatures and partload ratios on the performance of heating, ventilating and air conditioning equipment based on climate and equipment sizing.
b. Printed code official inspection checklist listing each of the proposed design component characteristics from Table 22.53 – 1 determined by the analysis to provide compliance, along with their respective performance ratings.
c. both a & b
d. neither a or b

161. The standard reference design and proposed design shall be configured and analyzed as specified by Table:

a. 22.53-1
b. 23.53–1
c. both a & b
d. neither a or b

Comm 23.02 (3) (a) 2. Automatic or gravity dampers that close when the system is not operating shall be provided for outdoor air intake and exhaust.
SECTION 134. Comm 23.02 (3) (d) is amended to read:
Comm 23.02 (3) (d) *Rooms with toilets, tubs or showers*. Any 1. Except as provided under subd. 2., any room with a toilet, tub or shower shall be provided with exhaust ventilation capable of exhausting 50 cubic feet per minute on an intermittent basis or 20 cubic feet on a continuous basis.
2. For dwellings with no electrical service, any room with a toilet, tub or shower shall be provided with an openable window.
SECTION 135. Comm 23.04 (4) is renumbered Comm 23.04 (6) and Comm 23.04 (1) to (3) are renumbered Comm 23.04 (2) to (4).
SECTION 136. Comm 23.04 (intro.) is renumbered 23.04 (1) and amended to read:
Comm 23.04 (1) GENERAL. (a) All heat producing appliances and cooling appliances

shall be listed by a testing agency acceptable to the department.
(b) Installation and maintenance of gas-fueled appliances shall comply with the appliance listing and the requirements of NFPA 54, National Fuel Gas Code, except as otherwise required under this chapter.
(c) The clearances from combustible materials in Tables 23.04-A and 23.04-B shall apply unless otherwise shown on listed appliances.
SECTION 137. Comm 23.04 (5) is created to read:

162. _____dampers that close when the system is not operating shall be provided for outdoor air intake and exhaust.
a. Automatic
b. Gravity
c. both a & b
d. neither a or b

163. Any room with a _____ shall be provided with exhaust ventilation capable of exhausting 50 cubic feet per minute on an intermittent basis or 20 cubic feet on a continuous basis.
a. toilet
b. tub
c. shower
d. all of the above

164. For dwellings with no electrical service, any room with a _____shall be provided with an openable window.
a. toilet
b. tub
c. shower
d. all of the above

165. All heat producing appliances and cooling appliances shall be listed by a testing agency acceptable to the _____.
a. department
b. Energy Star Contractor
c. inspector
d. none of the above

166. The clearances from combustible materials in Tables 23.04-A and 23.04-B shall apply and clearances shown on appliance listed should be ignored.
a. true
b. false

Comm 23.04 (5) WATER HEATERS USED FOR SPACE HEATING. (a) *Listing.* 1. Water heaters used for space heating shall be listed for such use.
2. The data plate shall indicate that the unit is suitable for simultaneous water heating and space heating.
Note: ANSI Z21.10.1 or ANSI Z 21.10.3 are acceptable listing standards for dual use water heaters.
(b) *Sizing.* A dual use water heater shall be sized to provide sufficient hot water to supply both the daily and hourly peak loads of the dwelling.
(c) *Installation.* Dual use water heaters shall be installed to provide both space heating and potable water.
Note: The Wisconsin Uniform Plumbing Code requires dual use water heaters to be installed by a licensed plumber when installed in a new, not-yet-occupied dwelling. The plumbing code also requires that a floor drain be provided, if the water heater is installed on the lowest floor level and that all piping be suitable for potable water.

(d) *Heat exchanger*. A single-wall heat exchanger may not be used with a toxic heat transfer fluid.

SECTION 138. Comm 23.045 (2) (b) is amended to read:

Comm 23.045 (2) (b) *Garages*. Solid-fuel-burning appliances may not be installed in a garage unless listed for that application.

SECTION 139. Comm 23.08 (7) is repealed and recreated to read:

Comm 23.08 (7) DUCT SUPPORT. Rigid metal ductwork shall be supported in accordance with Table 23.08-B.

167. Dual use water heaters shall be installed to provide both _____.
- a. space heating
- b. potable water
- c. both a & b
- d. neither a or b

168. A dual use water heater may be sized to average the normal consumption of hot water to supply both the daily and hourly peak loads of the dwelling
- a. true
- b. false

169. Solid-fuel-burning appliances may not be installed in a garage unless listed for that application.
- a. true
- b. false

170. Rigid metal ductwork shall be supported in accordance with Table_____.
- a. 23.08-B
- b. 22.03-B
- c. both a & b
- d. neither a or b

171. The Wisconsin Uniform Plumbing Code requires dual use water heaters to be installed by a licensed plumber when installed in a new, not-yet-occupied dwelling.
- a. true
- b. false

172. The plumbing code also requires that a floor drain be provided, if the water heater is installed on the lowest floor level and that all piping be suitable for potable water.
- a. true
- b. false

TABLE 23.08-B
DUCT SUPPORTS FOR RIGID DUCTS – 16 GAGE MAXIMUM THICKNESS

Duct Type	Maximum Size	Duct Position	Hanger Type, Size and Spacing[1]
Circular	10" diam.	Vertical	Strap – one 18 ga. galv. steel x 2" @ 12' o.c.
		Horizontal	Strap - one 22 ga. galv. steel x 1" @ 12' o.c. Rod – one ¼" @ 12' o.c. Wire – one 12 ga. @ 12' o.c.
	18" diam.	Vertical	Strap – one 16 ga. galv. steel x 2" @ 12' o.c.
		Horizontal	Strap - one 22 ga. galv. steel x 1" @ 12' o.c. Rod – one ¼" @ 12' o.c. Wire – one 8 ga. @ 12' o.c.; or Wire – two 12 ga. @ 12' o.c.
Rectangular	60" perim.	Vertical	Strap – one 18 ga. galv. steel x 2" @ 12' o.c.
		Horizontal	Strap – pair[2] 22 ga. galv. steel x 1" @ 10' o.c. Rods or Wires – pair[2] 10 ga. @ 10' o.c.; or Rods or Wires – pair[2] 12 ga. @ 5' o.c.
	144" perim.	Vertical	Strap – one 16 ga. galv. steel x 2" @ 12' o.c.
		Horizontal	Strap – pair[2] 18 ga. galv. steel x 1" @ 10' o.c.; or Strap – pair[2] 20 ga. galv. steel x 1" @ 8' o.c.; or Strap – pair[2] 22 ga. galv. steel x 1" @ 5' o.c. Rods or Wires – pair[2] 3/8" @ 10' o.c.; or Rods or Wires – pair[2] ¼" @ 8' o.c.

1 These hangers are the minimum required to support the weight of the duct off of the joist, stud or similar structure. The band, wire or strap cradling the duct shall not cause any deformation of the duct.
2 "Pair" means that there are 2 vertical legs. One continuous strap can form both vertical legs.

173. These hangers are the minimum required to support the weight of the duct off of the _____ .
    a. joist
    b. stud
    c. similar structure
    d. all of the above
174. _____ cradling the duct shall not cause any deformation of the duct.
    a. band
    b. wire
    c. strap
    d. all of the above
175. _____ means that there are 2 vertical legs.
    a. leg
    b. pair
    c. strap
    d. wire
176. One continuous strap can form both vertical legs.
    a. true
    b. false

Comm 23.09 (1) VOLUME AND BACKDRAFT DAMPERS. (a) Volume duct dampers shall be provided to permit balancing of the system.

(b) Volume dampers shall be provided with access.

Note: Acceptable means of access include: a manufactured access panel, an air grille used as a cover, a plastic ceiling cap or a damper accessible through an air diffuser or grille.

(c) Supply ducts may not terminate in a garage unless a backdraft damper is provided.

177. Volume duct dampers shall be provided to permit balancing of the system and shall be provided with access.

a. true
b. false

178. Acceptable means of access include_____.

a. a manufactured access panel
b. an air grille used as a cover
c. both a & b
d. neither a or b

179. Acceptable means of access include_____.

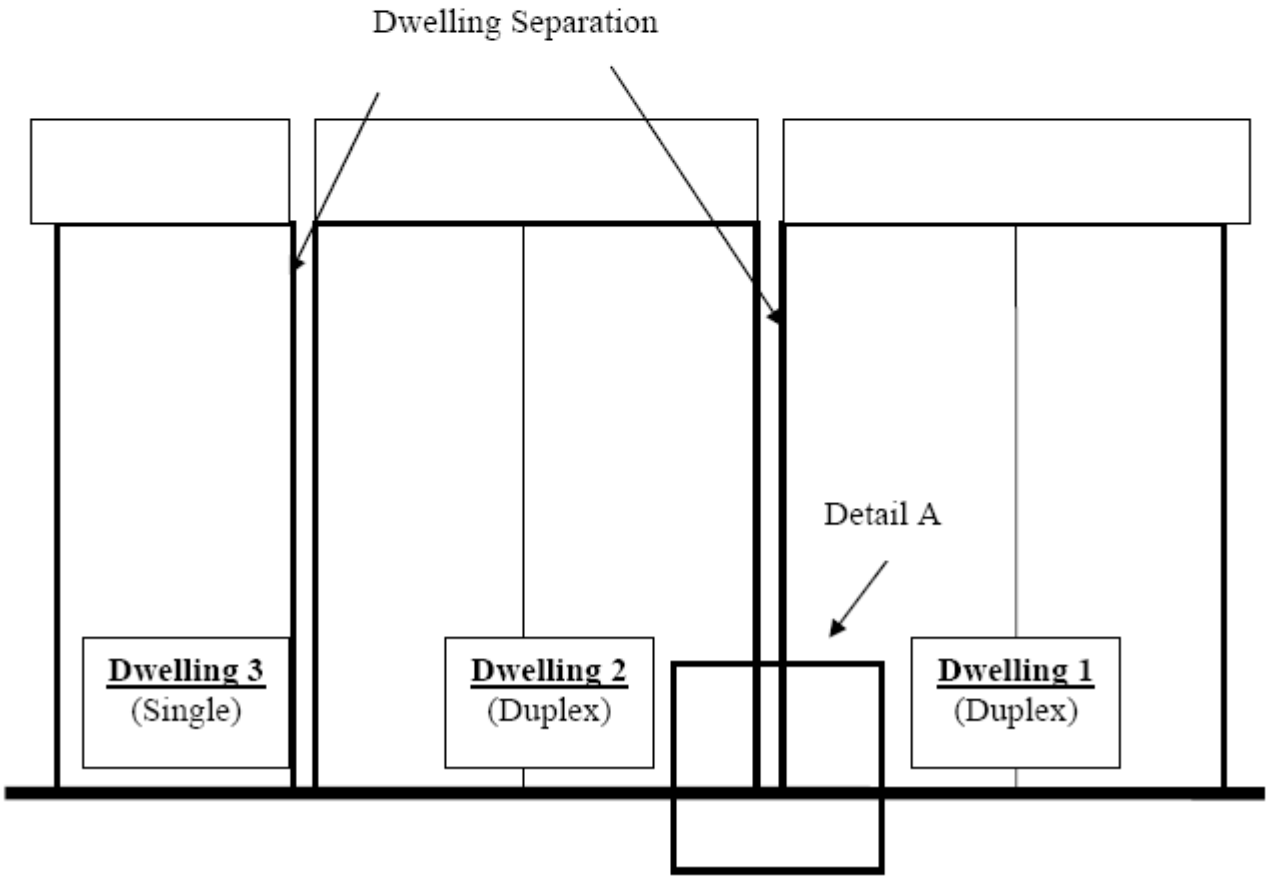
a. a plastic ceiling cap
b. a damper accessible through an air diffuser
c. a damper accessible through an grille.
d. all of the above

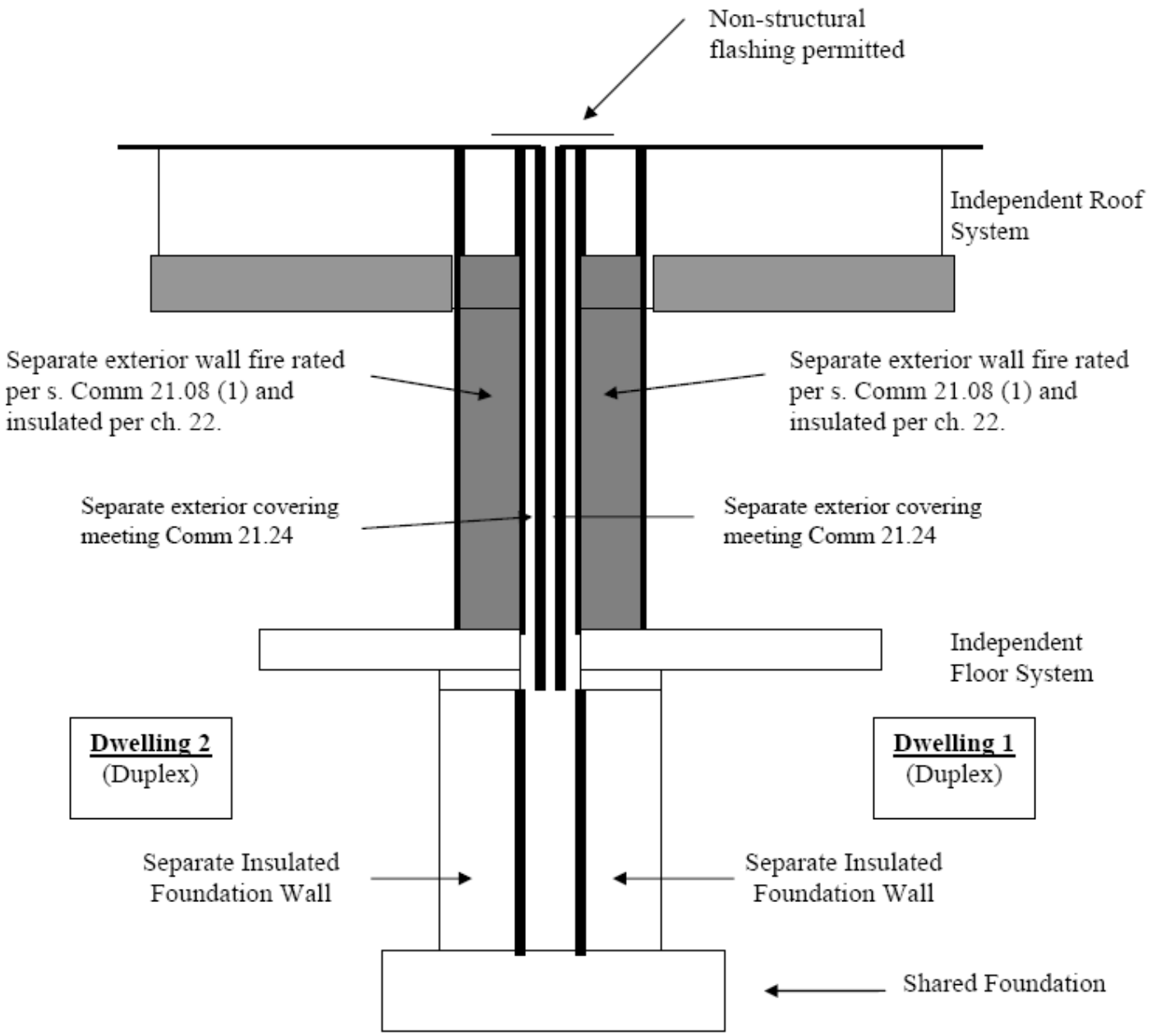
CHANGE TO APPENDIX

APPENDIX section 20.04(6) added:
[Note to Revisor: This material should be the very first page of the appendix.]

Normally, for 3 or more attached dwelling units, the Commercial Building Code (CBC) applies. Attached means some construction (other than footings and their bearing material) is shared by the units.

Where 3 or more adjacent but unattached dwelling units are each built with the outside walls that comply with the Uniform Dwelling Code (UDC), the UDC applies throughout and the CBC does *not* apply, even if those outside walls are adjacent to or adjoin each other. If flashing is added over the top of two such adjoining walls, the UDC would still apply.




Non-structural
flashing permitted
Independent Roof
System
Separate exterior wall fire rated
per s. Comm 21.08 (1) and
insulated per ch. 22.
Separate exterior wall fire rated
per s. Comm 21.08 (1) and
insulated per ch. 22.
Separate exterior covering
meeting Comm 21.24
Separate exterior covering
meeting Comm 21.24
Independent
Floor System
Dwelling 2
(Duplex)
Dwelling 1
(Duplex)
Separate Insulated
Foundation Wall
Separate Insulated
Foundation Wall
Shared Foundation

Detail A

MINIMUM FASTENER SCHEDULE TABLE

Other interior and exterior panel products and finishes installed per manufacturer requirements.

For engineered connectors, use manufacturer's specified fasteners.

Description of Building Materials/Connection	Number and Type of Fastener[1 2 3]
Floor Framing	
Joist to joist, face nailed over support	2-12d
Joist to sill or girder, toe nail	2-16d, 3-8d
Band or rim joist to joist, end nail	3-16d
Band or rim joist to sill or top plate	2-16d at 16″ o.c.
Bridging to joist, toe nail each end	2-8d
Built-up girder and beams, top loaded	10d at 32″ o.c. at top and bottom and staggered and two at ends and at each splice
Built-up girder and beams, side-loaded	16d at 16″ o.c. at top and bottom and staggered and two at ends and at each splice
Ledger strip to beam, face nail	3-16d each joist
Joist on ledger to beam, toe nail	3-8d
Wall Framing	
Sole plate to joist or blocking, face nail	16d at 16″ o.c.
Top or sole plate to stud, end nail	2-16d
Stud to sole plate, toe nail	4-8d or 3-16d
Doubled studs, face nail	16d at 24″ o.c.
Doubled top plates, face nail	16d at 16″" o.c.
Top plates, laps and intersections, face nail	2-16d
Continuous header, two pieces	16d at 16″ o.c. along each edge
Continuous header to stud, toe nail	4-8d
1″ corner brace to each stud and plate, face nail	2-8d or 2 staples, 1 ¾″
Built-up corner studs	16d at 30″ o.c., 16d at 24″ o.c.

180. Minimum fastening requirement for bridging to joist, toe nail each end would be _____.
- a. 3-16d
- b. 2-12d
- c. 2-6d
- d. 2-8d

181. Minimum fastening requirement for stud or sole plate, toe nail would be _____.
- a. 4-8d
- b. 3-16d
- c. 2-16d
- d. both a or b

Roof/Ceiling Framing	
Ceiling joists to plate, toe nail	2-16d, 3-8d
Ceiling joist, laps over partitions, face nail	3-16d
Ceiling joist to parallel rafters, face nail	3-16d
Rafter to plate, toe nail (maximum 6′ rafter span, engineered connector for longer)	2-16d, 3-8d
Roof rafters to ridge, valley or hip rafters, toe nail	4-16d
Roof rafters to ridge, valley or hip rafters, face nail	3-16d
Collar ties to rafters, face nail	3-8d
Boards and planks	
1″ x 6″ subfloor or less to each joist, face nail	2-8d or 2 staples, 1 ¾″
Wider than 1″ x 6″ subfloor toe to each joist, face nail	3-8d or 4 staples 1 ¾″
2″ subfloor to joist or girder, blind and face nail	2-16d
1″ x 6″ roof or wall sheathing to each bearing, face nail	2-8d or 2 staples, 1 ¾″
1″ x 8″ roof or wall sheathing to each bearing, face nail	2-8d or 3 staples, 1 ¾″
Wider than 1″ x 8″” roof sheathing to each bearing, face nail	3-8d or 4 staples, 1 ¾″
2″planks	2-16d at each bearing

182. Minimum fastening requirement for ceiling joist to parallel rafter, face nailing would be _____.
   a. 4-8d
   b. 3-16d
   c. 2-16d
   d. both a & b

183. Minimum fastening requirement for collar ties to rafter, face nailing would be _____.
   a. 4-8d
   b. 3-8d
   c. 2-16d
   d. both a & b

Panel Sheathing

Material	Fastener	Spacing of Fastener	
		Edges	Intermediate Supports
Engineered wood panel for subfloor and roof sheathing and wall corner wind bracing to framing			
5/16-inch to ½-inch	6d common or deformed nail or staple, 1 ½″	6″	12″ [4]
5/8-inch to ¾-inch	8d smooth or common, 6d deformed nail, or staple, 14 ga. 1 ¾″	6″	12″ [4]
7/8-inch to 1-inch	8d common or deformed nail	6″	12″
1 1/8-inch to 1 ¼-inch	10d smooth or common, or 8d deformed nail	6″	12″
Combination subfloor/ underlayment to framing			
¾-inch or less	6d deformed or 8d smooth or common nail	6″	12″
7/8-inch to 1-inch	8d smooth, common or deformed nail	6″	12″
1 1/8-inch to 1 ¼-inch	10d smooth or common or 8d deformed nail	6″	12″
Wood panel siding to framing			
½-inch or less	6d corrosion-resistant siding and casing nails	6″	12″
5/8-inch	8d corrosion-resistant siding and casing nails	6″	12″
½-inch structural cellulosic fiberboard sheathing	1 ½″ galvanized roofing nail; 8d common nail; staple 16 ga., 1 ½″ long	3″	6″
25/32-inch structural cellulosic fiberboard sheathing	1 ¾″ galvanized roofing nail; 8d common nail; staple 16 ga., 1 ¾″ long	3″	6″

½-inch gypsum sheathing[5]	1 ½″ galvanized roofing nail; 6d common nail; staple galvanized 1 ½″ long; 1 ¼″ screws, Type W or S	4″	8″
5/8-inch gypsum sheathing[5]	1 ¾″ galvanized roofing nail; 8d common nail; staple galvanized 1 5/8″ long; 1 5/8″ screws, Type W or S	4″	8″

[1]All nails are smooth-common, box or deformed shank except where otherwise stated.
[2]Nail is a general description and may be T-head, modified round head or round head.

[3]Staples are 16-gauge wire, unless otherwise noted, and have a minimum 7/16-inch o.d. crown width.

[4]Staples shall be spaced at not more than 10 inches o.c. at intermediate supports for floors.

[5]Four-foot-by-8-foot or 4-foot-by-9-foot panels shall be applied vertically

184. Minimum fastening requirement for 7/16" OSB to framing for wall corner wind bracing would be ___ inch edge nailing and _____ inches for intermediate supports.
a. 4, 8
b. 6, 12
c. 3, 6
d. both a & b

185. What is the minimum type of fastener required for the above question _____?
a. 6d common
b. 6d deformed nail 1.5"
c. 16-gauge 1.5" staple
d. all of the above

186. Staples shall be spaced at not more than ____" o.c. at intermediate supports for floors.
a. 8
b. 10
c. 12
d. none of the above.

---

09 UDC CODE UPDATES PART 3-Quiz Answer Sheet

1	a	b	c	d			41	a	b	c	d			81	a	b	c	d		
2	a	b	c	d			42	a	b	c	d			82	a	b	c	d		
3	a	b	c	d			43	a	b	c	d			83	a	b	c	d		
4	a	b	c	d	e	f	44	a	b	c	d			84	a	b	c	d		
5	a	b	c	d	e	f	45	a	b	c	d			85	a	b	c	d		
6	a	b	c	d	e	f	46	a	b	c	d			86	a	b	c	d		
7	a	b	c	d	e	f	47	a	b	c	d			87	a	b	c	d		
8	a	b	c	d	e	f	48	a	b	c	d			88	a	b	c	d		
9	a	b	c	d	e	f	49	a	b	c	d			89	a	b	c	d		
10	a	b	c	d			50	a	b	c	d			90	a	b	c	d		
11	a	b	c	d			51	a	b	c	d			91	a	b	c	d		
12	a	b	c	d			52	a	b	c	d			92	a	b	c	d		
13	a	b	c	d			53	a	b	c	d			93	a	b	c	d		
14	a	b	c	d			54	a	b	c	d			94	a	b	c	d		
15	a	b	c	d			55	a	b	c	d			95	a	b	c	d		
16	a	b	c	d			56	a	b	c	d			96	a	b	c	d		
17	a	b	c	d			57	a	b	c	d			97	a	b	c	d		
18	a	b	c	d			58	a	b	c	d			98	a	b	c	d		
19	a	b	c	d			59	a	b	c	d			99	a	b	c	d		
20	a	b	c	d			60	a	b	c	d			100	a	b	c	d		
21	a	b	c	d			61	a	b	c	d			101	a	b	c	d		
22	a	b	c	d	e		62	a	b	c	d			102	a	b	c	d		
23	a	b	c	d	e		63	a	b	c	d			103	a	b	c	d		
24	a	b	c	d	e		64	a	b	c	d			104	a	b	c	d		
25	a	b	c	d	e		65	a	b	c	d			105	a	b	c	d		
26	a	b	c	d	e		66	a	b	c	d			106	a	b	c	d		
27	a	b	c	d			67	a	b	c	d			107	a	b	c	d		
28	a	b	c	d			68	a	b	c	d			108	a	b	c	d		
29	a	b	c	d			69	a	b	c	d			109	a	b	c	d		
30	a	b	c	d			70	a	b	c	d			110	a	b	c	d		
31	a	b	c	d			71	a	b	c	d			111	a	b	c	d		
32	a	b	c	d			72	a	b	c	d			112	a	b	c	d		
33	a	b	c	d			73	a	b	c	d			113	a	b	c	d		
34	a	b	c	d			74	a	b	c	d			114	a	b	c	d		
35	a	b	c	d			75	a	b	c	d			115	a	b	c	d		
36	a	b	c	d			76	a	b	c	d			116	a	b	c	d		
37	a	b	c	d			77	a	b	c	d			117	a	b	c	d		
38	a	b	c	d			78	a	b	c	d			118	a	b	c	d		
39	a	b	c	d			79	a	b	c	d			119	a	b	c	d		
40	a	b	c	d			80	a	b	c	d			120	a	b	c	d		

09 UDC CODE UPDATES PART 3-Quiz Answer Sheet

121	a	b	c	d	143	a	b	c	d	165	a	b	c	d
122	a	b	c	d	144	a	b	c	d	166	a	b	c	d
123	a	b	c	d	145	a	b	c	d	167	a	b	c	d
124	a	b	c	d	146	a	b	c	d	168	a	b	c	d
125	a	b	c	d	147	a	b	c	d	169	a	b	c	d
126	a	b	c	d	148	a	b	c	d	170	a	b	c	d
127	a	b	c	d	149	a	b	c	d	171	a	b	c	d
128	a	b	c	d	150	a	b	c	d	172	a	b	c	d
129	a	b	c	d	151	a	b	c	d	173	a	b	c	d
130	a	b	c	d	152	a	b	c	d	174	a	b	c	d
131	a	b	c	d	153	a	b	c	d	175	a	b	c	d
132	a	b	c	d	154	a	b	c	d	176	a	b	c	d
133	a	b	c	d	155	a	b	c	d	177	a	b	c	d
134	a	b	c	d	156	a	b	c	d	178	a	b	c	d
135	a	b	c	d	157	a	b	c	d	179	a	b	c	d
136	a	b	c	d	158	a	b	c	d	180	a	b	c	d
137	a	b	c	d	159	a	b	c	d	181	a	b	c	d
138	a	b	c	d	160	a	b	c	d	182	a	b	c	d
139	a	b	c	d	161	a	b	c	d	183	a	b	c	d
140	a	b	c	d	162	a	b	c	d	184	a	b	c	d
141	a	b	c	d	163	a	b	c	d	185	a	b	c	d
142	a	b	c	d	164	a	b	c	d	186	a	b	c	d

To obtain your Continuing Education Credits follow the below instructions.

1. Print out first.
2. Fill in all fields applicable.
3. Include your certification or license number if applicable.
4. We'll take care of crediting with the state and sending you back a verification form.

Send by mail

1. **The answer sheets (2) and this page only.**
2. Fill out this form below completely.
3. Applicable fees by check payable to our business name: **GaryKlinka.com**
4. Mail to: **GaryKlinka.com** at 1316 Cardinal Circle, Neenah, WI 54956
5. Questions: Office 920-381-6714
6. Email: tmklinka@hotmail.com

----------Educational Course Attendance Verification Form ----------

Attendee's Name_____Date_____

Address_____

Credential Number _____Phone#_____

Course Title and Name_____**UDC CODE UPDATES PART 3**_____

List each credential held by attendee _____

_____Credited Hours_____6 hrs $50_____

Email address_____Fax#_____

To be completed by GaryKlinka.com

Course Password_____Course ID#___10545_____

Attendee passed the course with a greater than 70% score on Date_____

Instructor Signature_____