AN ORDINANCE AMENDING TITLE 51 TULSA REVISED ORDINANCES, THE BUILDING CODE OF THE CITY OF TULSA, OKLAHOMA, CHAPTER 2; ADOPTING THE ICC INTERNATIONAL RESIDENTIAL CODE FOR ONE- AND TWO- FAMILY DWELLINGS, 2015 EDITION AND AS AMENDED HEREAFTER – REPLACING THE 2009 EDITION AS SHOWN; PROVIDING FOR SEVERABILITY; REPEALING ORDINANCES IN CONFLICT AND DECLARING AN EMERGENCY.

BE IT ORDAINED BY THE CITY OF TULSA:

Section 1. That Title 51 Chapter 2, Tulsa Revised Ordinances, be and the same is hereby amended to read as follows:

“CHAPTER 2. ICC INTERNATIONAL RESIDENTIAL CODE FOR ONE- AND TWO- FAMILY DWELLINGS, 2015 EDITION ADOPTED.


A certain document, one (1) copy of which is on file in the Office of the City Clerk, being marked and designated as the International Residential Code for One- and Two-Family Dwellings, 2015 Edition, as published by the International Code Council (ICC) and amended or revised as stated in Title 748 Uniform Building Code Commission—Chapter 20, is hereby adopted as a part of the Building Code of the City of Tulsa, Oklahoma, for regulating the design, construction, quality of materials, erection, installation, alteration, repair, location, relocation, replacement, addition to, or use of one- and two-family dwellings and townhouses not more than three (3) stories in height with separate means of egress in the City of Tulsa. Consistent with the adoption of this International Residential Code, 2015 Edition, there is hereby provided for the related issuance of permits and collection of fees. Each and all of the terms, conditions, regulations, and provisions of the International Residential Code, 2015 Edition, published by the ICC, as supplemented and amended, on file in the Office of the City Clerk of the City of Tulsa are hereby referred to, adopted and made a part of the Tulsa Revised Ordinances, as if fully set out in this chapter, with its amendments, as prescribed in Section 201 of this chapter and, as used in this Chapter 2, may be referred to as the "code."

The following provisions of the *International Residential Code for One- and Two-Family Dwellings*, 2015 Edition, are hereby added or amended to read as follows:

**R101.1 Title - Amendatory.** These provisions shall be known and may be cited as the Residential Code for One- and Two-Family Dwellings of the City of Tulsa" or as the "Tulsa Residential Building Code."

**R103.1 Enforcement agency - Amendatory.** The term "Department of Building Safety," as used within the *International Residential Code for One- and Two-Family Dwellings*, 2015 Edition shall mean the Planning and Development Department Development Services Division of the City of Tulsa or other department, division or section of the City of Tulsa authorized and directed to enforce the provisions of this code.

**R103.2 Appointment - Amendatory.** The "building official" or "code official," as used in this chapter and *International Residential Code for One- and Two-Family Dwellings*, 2015 Edition, as adopted by the City of Tulsa, shall be the official in charge of the enforcement of this code as appointed or otherwise designated by the Mayor.

**R103.4 Conflict of Interest Prohibited - Added.** Code officials shall ascribe to and be guided in professional conduct as City of Tulsa representatives as provided in Title 12, Chapter 6 "Ethics Code," Tulsa Revised Ordinances.

**R105.1.1 By Whom Application is Made - Added.** The application for a permit shall be made by the owner or lessee of the building or structure, or the agent of either or by the licensed engineer or architect employed in connection with the proposed work. If an application is made by a person other than the owner in fee, it shall be accompanied by an affidavit of the owner or the qualified applicant or a signed statement of the qualified applicant witnessed by the building official or designee informing that the proposed work is authorized by the owner in fee and that the applicant is authorized to make such application. The full names and addresses of the owner, lessee, applicant, and the responsible officers, if the owner or lessee is not a natural person, shall be stated on the application. The owner of the building or structure shall at all times retain ownership rights and authority for use and control of such application and any related subsequent permits issued pursuant to this code.

**R105.1.2 Zoning Clearance Required - Added.** The code official shall not issue a building permit for any building or other structure until and unless the code official is furnished a Zoning Clearance Permit issued by the zoning official stating that the use or occupancy of such building or structure complies with, or, upon completion, will comply with applicable zoning ordinances of the City of Tulsa.

**R105.1.3 Fire Sprinkler Permit - Added.** A permit shall be obtained before installing, altering or removing any portion of an automatic fire sprinkler system. The code official shall not issue a fire sprinkler permit for the installation of an automatic sprinkler system until the person, firm, corporation, or Limited Liability Company or other entity installing the same shall have on file with the City of Tulsa a surety bond in the amount of Two Thousand Five Hundred Dollars ($2,500.00). Such bond shall be on a form satisfactory to
the City, guaranteeing payment of all obligations and guaranteeing installation in accordance with the provisions of this code. No person, firm, corporation, limited liability company or other entity shall install fire sprinkler systems unless licensed as provided in 59 O.S.2001, §§ 1800.1, et seq., as amended, and related rules and regulations.

R105.3 Application for permit - Amendatory. To obtain a building permit, the applicant shall first file an application therefore in writing on a form furnished by the City of Tulsa for that purpose. Such application shall:

1. Identify and describe the work to be covered by the permit for which application is made.
2. Describe the land on which the proposed work is to be done by legal description, street address or similar description that will readily identify and definitely locate the proposed building or work.
3. Indicate the use and occupancy for which the proposed work is intended.
4. Be accompanied by construction documents and other information as required in Section R106.1.
5. State the valuation of the proposed work.
6. Be signed by the applicant or the applicant's authorized agent.
7. Give such other data and information as required by the building official.

R105.3.(a) License - Added. All Electrical permits and required licensing shall be administered as described in Title 52, Tulsa Revised Ordinances. All Mechanical permits and required licensing shall be administered as described in Title 59, Tulsa Revised Ordinances. All Plumbing and required licensing shall be administered as described in Title 56, Tulsa Revised Ordinances.

Exception: Any homeowner may perform water supply and drainage plumbing work only, on the homeowner-occupied residence and property, provided all permits required pursuant to this code are obtained, without requiring the homeowner to possess a plumbing license.

R105.3.1.1 Determination of substantially improved or substantially damaged existing buildings in flood hazard areas – Amendatory. For applications for reconstruction, rehabilitation, addition, alteration, repair or other improvement of existing buildings or structures located in a flood hazard area as established by Table 301.2(1), the building official shall examine or cause to be examined the construction documents and shall make a determination with regard to the value of the proposed work. For buildings that have sustained damage of any origin, the value of the proposed work shall include the cost to repair the building or structure to its pre-damaged condition. If the building official finds that the value of the proposed work equals or exceeds fifty (50) percent of the market value of the building or structure before the damage has occurred or the improvement is started, the proposed work is a substantial improvement or restoration of substantial damage regardless of whether or not the proposed work affects the external dimensions of the building or structure and the building official shall require existing portions of the entire building or structure to comply with the requirements of Section R322.
For the purpose of this determination, a substantial improvement shall mean any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds fifty (50) percent of the market value of the building or structure before the improvement or repair is started. Where the building or structure has sustained substantial damage, repairs necessary to restore the building or structure to its pre-damaged condition shall be considered substantial improvements regardless of the actual repair work performed. The cost used in the substantial improvement determination shall be the cumulative costs of all previous improvements for a specific building or structure occurring during the immediate past 10-year period. The term shall not include either of the following:

1. Improvements to a building or structure that are required to correct existing health, sanitary or safety code violations identified by the building official and that are the minimum necessary to ensure safe living conditions.

2. Any alteration of a historic building or structure, provided that the alteration will not preclude the continued designation as a historic building or structure. For the purposes of this exclusion, a historic building shall be any of the following:

   2.1 Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places or State Inventory of Historic Places.

   2.2 Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district.

   2.3 Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

R105.3.3 Payment of Fees - Added. Upon receipt of an application for a building permit, an application fee shall be paid. Upon approval the applicant shall then be notified the permit is ready and advised of what remaining fees are due. In order for the permit to be valid, it shall have been paid in full and posted at the job site prior to beginning construction. Payment for permits is due upon notification to applicant that the permit has been approved and is ready for issuance. Any permit not paid within thirty (30) days after notification may be deemed void by the code official and the application fee shall then be forfeited. An amendment to a permit shall not be released until the additional fee, if any, has been paid.

R105.7 Placement of Permit - Amendatory. A copy of the building permit shall be posted on the site of operations, visible from the street, and open to public inspection during the entire time of execution of the work and until the completion of the same.

R106.2 Site plan or plot plan – Amendatory. The construction documents submitted with the application for permit shall be accompanied by a site plan showing to scale the size and location of new construction and existing structures on the site; distances between structures and lot lines; property boundaries; established grades and proposed finished grades; easements; rights-of-way; utilities; and as applicable, flood hazard areas and limits, floodways, design flood elevations and finished floor elevations; in accordance with an accurate boundary line survey. In the case of demolition, the site plan shall show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot. The building official is authorized to
waive or modify the requirement for a site plan where the application for permit is for alteration, repair, or demolition or where otherwise warranted.

R108.1.1 Accounts - Added. Every person or entity shall be issued an account number at the time of an initial permit application as established by Title 49, Tulsa Revised Ordinances.

R108.2 Schedule of Permit Fees - Amendatory. On buildings, structures, electrical, gas, mechanical and plumbing systems or alterations requiring a permit, a fee for each permit shall be paid as required, in accordance with the schedule as established by Title 49, Tulsa Revised Ordinances.

R109.1.3 Floodplain Inspections, Finished Floor Elevation and Flood Vents - Amendatory. When a minimum finished floor elevation is specified in a permit for structures located in a flood hazard area or areas prone to flooding, as established by the current City of Tulsa Regulatory Floodplain Map Atlas, no further vertical construction shall be performed after construction of the slab or floor until an elevation certificate, verifying the lowest floor elevation, and the size and location of any required flood vents, has been received and approved by the code official. The elevation certificate shall be prepared by a land surveyor or engineer licensed by the State of Oklahoma, using an appropriate form provided by the code official.

R109.1.3.1 Final Floodplain Elevation Certificate - Added. Prior to the final inspection, a final elevation certificate shall be required for those structures located in flood hazard areas or areas prone to flooding, as established by Table R301.2(1) of this code. The certificate, as approved by the code official, shall confirm the finished floor elevation, the size and location of flood vents, and shall verify the lowest elevation of mechanical, electrical and utility equipment. The certificate shall be prepared by a land surveyor or engineer licensed by the State of Oklahoma and shall be provided to the code official for approval. A Certificate of Occupancy shall not be issued unless the final elevation certificate is approved by the code official.

R109.1.5.2 Placement of Erosion Control Inspection (PEC) - Added. After issuance of a permit for work that involves disturbance of earth, and before any other earthwork begins, the permit applicant or the applicant's authorized agent shall (1) identify and mark property lines, easements and floodplains, (2) implement erosion control in accordance with the approved plan and/or Storm Water Pollution Prevention Plan, and (3) request a Placement of Erosion Control Inspection (PEC). No other work may be performed until the building official authorizes further construction activity. All construction including development, excavation, grading, regrading, paving, landfilling, berming, and diking of land shall be conducted so as to minimize erosion and prevent the discharge of pollutants (including, but not limited to rock, sand, and soil) into the municipal storm sewer system or onto adjacent occupied property. Persons conducting construction shall implement and maintain acceptable structural and/or nonstructural barriers for controlling erosion. Failure to install and maintain adequate erosion control may result in issuance of a stop work order on all trades by the building official.
R109.1.6 Final Inspection - Amendatory. Final inspection shall be made after the permitted work is complete and prior to occupancy. It shall be unlawful and an offense for any person, firm, corporation, or limited liability company, whether as owner, lessee, sub-lessee, or occupant, to use or occupy any structure regulated by this code or part thereof, or cause same to be done, until all required final inspections on all open permits have been made, except as authorized by the IRC 2015, Section R110.4.

R109.4 Approval Required - Amendatory. Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the code official. The code official upon notification shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or shall notify the permit holder or an agent of the permit holder wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the code official. Work that is covered or concealed, or a residence that is occupied without approval of the code official shall be in violation of this code and be penalized by the imposition of a civil fine in accordance with Title 49, Tulsa Revised Ordinances for each occurrence and may result in a hearing before the Board of Appeals as provided in Title 51, Chapter 1, Tulsa Revised Ordinances. The assessment or payment of this penalty shall not relieve any person, firm, corporation, or limited liability company from fully complying with all the requirements of this code nor shall such payment exempt the person, firm, corporation, or limited liability company or other entity from further penalty provided by law.

SECTION R112 BOARD OF APPEALS

R112.1 General - Amendatory. Appeals of orders, decisions or determinations made by the code official relative to the application and interpretation of this code, shall be made to the Board of Appeals as provided in Title 51, Chapter 1, Tulsa Revised Ordinances.

R112.3 Qualifications - Amendatory. The Board of Appeals shall consist of members who are qualified by experience and training to pass on matters pertaining to building construction. The membership of the Board shall be as established in Title 51, Chapter 1 Tulsa Revised Ordinances.

R113.4 Violation Penalties - Amendatory. It shall be unlawful and a misdemeanor offense for any person, firm, corporation, limited liability company or other entity to violate any of the provisions of this code, fail to comply with any of the requirements thereof, or to erect, construct, alter, repair or change the occupancy of any building or structure in violation of an approved plan or directive of the building official or of a permit or certificate issued under the provisions of this code. Any person, firm, corporation, limited liability company or other entity convicted of a violation of this code shall be guilty of a misdemeanor offense and shall be punished by a fine of not more than One Thousand Two Hundred Dollars ($1,200.00), excluding costs, fees, and assessments, or by imprisonment for a period not exceeding six (6) months, or by both such fine and imprisonment. Each day, or portion
thereof, during which a violation is committed, or continued, shall be deemed a separate offense.

CHAPTER 2 DEFINITIONS

SECTION R202 DEFINITIONS - Amendatory. Definitions amended, deleted or added.

BUILDING DRAIN - Amendatory. That part of the lowest piping of a drainage system that receives the discharge from soil, waste, and other drainage pipes inside the building or structure and that extends 5 feet (1524 mm) in developed length of pipe beyond the exterior walls of the building and conveys the drainage to the building sewer.

FLOOD HAZARD AREA - Added. For all buildings or structures located inside the corporate limits of the City of Tulsa, the flood hazard area shall be as designated on the adopted City of Tulsa Regulatory Floodplain Map Atlas and the currently effective Flood Insurance Rate Maps (FIRM) established by the most current Tulsa Revised Ordinances Title 11-A incorporating the areas of special flood hazard.

FLOODWAY - Added. The channel of the river, creek or other watercourse and the adjacent land areas that must be reserved in order to discharge a base flood without cumulatively increasing the water surface elevation as prescribed by applicable City ordinances.

RE] HIGH-EFFICACY LAMPS - Amendatory. Compact fluorescent lamps, light emitting diode (L.E.D.) type lamps, T-8 or smaller diameter linear fluorescent lamps, or lamps with a minimum efficacy of:

1. 60 lumens per watt for lamps over 40 watts;

2. 50 lumens per watt for lamps over 15 watts to 40 watts; and

3. 40 lumens per watt for lamps 15 watts or less.

RE] INSULATED SHEATHING - Added. An insulating board having a thermal resistance of not less than R-2 of the core material.

NATIONALLY RECOGNIZED TESTING LABORATORY - Added. A testing facility given this designation from the United States Occupational Safety and Health Administration (OSHA) that provides product safety testing and certification services to manufacturers.

RB] ROOF RECOVER - Amendatory. The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.
SAFE ROOM - Added. A building or structure or portions thereof, constructed in accordance with ICC/NSSA Standard for the design and construction of Storm Shelters®, (ICC 500®), and constructed to provide near- absolute protection for its occupants from severe wind storm events such as tornados or hurricanes.


2. Other Safe Room. A safe room designed and constructed in accordance with FEMA P-361® "Design and Construction Guidance for Community Safe Rooms" or FEMA P-320® entitled "Taking Shelter from the Storm: Building a Safe Room for your Home or Small Business®", located in a residence or non-residential building or structure, intended to provide life-safety protection for 16 persons or less.

[RE] SKYLIGHT - Deleted.

[RE] SLEEPING UNIT - Deleted.

STORM SHELTER - Added. A building, structure, or portions thereof, constructed in accordance with ICC 500® and designated for use during a severe wind storm event such as a hurricane or tornado.

1. Community storm shelter. A storm shelter not defined as a "Residential storm shelter."

2. Residential storm shelter. A storm shelter serving occupants of dwelling units and having an occupant load not exceeding 16 persons.

SUBSTANTIAL IMPROVEMENT - Added. See Section R105.3.1.1.

[RB] SUNROOM - Amendatory. A one-story structure attached to a dwelling with a glazing area in excess of 40 percent of the gross area of the structure's exterior walls and roof.

[RB] THERMAL ISOLATION - Amendatory. Physical and space conditioning separation from conditioned space(s) consisting of existing or new walls, doors, or windows. The conditioned space(s) shall be controlled as separate zones for heating and cooling or conditioned by separate equipment.

[RE] U-FACTOR, THERMAL TRANSMITTANCE - Amendatory. The coefficient of heat transmission (air to air) through a building envelope component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cool side air films (BTU/h x square feet x Fahrenheit).

VENTILATION - Amendatory. The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.
WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM - **Amendatory.** An exhaust system, supply system or combination thereof that is designed to mechanically exchange indoor air for outdoor air where operating continuously or through a programmed intermittent schedule to satisfy the whole-house ventilation rate.

**CHAPTER 3 BUILDING PLANNING**
**TABLE 301.2(1) - Amendatory.**
**CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA**

<table>
<thead>
<tr>
<th>GROUNDWATER LOAD</th>
<th>WIND DESIGN</th>
<th>SUBJECT TO DAMAGE FROM</th>
<th>ICE BARRIER UNDERLAYMENT REQUIRED</th>
<th>FLood HAZARDS</th>
<th>AIR FREEZING INDEX</th>
<th>MEAN ANNUAL TEMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed (mph)</td>
<td>Topographic effects</td>
<td>Weathering Frostline Depth Termite</td>
<td>WINTER DESIGN TEMP</td>
<td>FLood</td>
<td>AIR FREEZING INDEX</td>
<td>MEAN ANNUAL</td>
</tr>
<tr>
<td>10 PSF</td>
<td>115</td>
<td>Yes</td>
<td>A</td>
<td>MODE RATE 18”</td>
<td>YES</td>
<td>12°F</td>
</tr>
</tbody>
</table>

a. Flood hazard areas within the corporate limits of the City of Tulsa shall include, at a minimum, special flood hazard areas as identified by the Federal Emergency Management Agency (FEMA) in the current effective Flood Insurance Studies for the City of Tulsa, as amended or revised with the accompanying Flood Insurance Rate Maps (FIRM) and related supporting data, together with any amendments or revisions; including the City of Tulsa Regulatory Floodplain Map Atlas and related supporting data; established by the most current Tulsa Revised Ordinances Title 11-A incorporating the areas of special flood hazard identified by FEMA in the scientific and engineering report entitled “Flood Insurance Study for Tulsa County, Oklahoma and Incorporated Areas” dated September 30, 2016; “Flood Insurance Study for Osage County, Oklahoma and Incorporated Areas” dated December 17, 2013; “Flood Insurance Study for Rogers County, Oklahoma and Incorporated Areas” dated September 30, 2016; “Flood Insurance Study for Wagoner County, Oklahoma and Incorporated Areas” dated September 30, 2016; with the accompanying FIRM include the following FIRM Panels; with any amendments or revisions.
**TABLE R302.1 (1) EXTERIOR WALLS - Amendatory.**

<table>
<thead>
<tr>
<th>EXTERIOR WALL ELEMENT</th>
<th>MINIMUM FIRE-RESISTANCE RATING</th>
<th>MINIMUM FIRE SEPARATION DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td>Fire-resistance rated</td>
<td>1 hour-tested in accordance with ASTM E 119 or UL 263 with exposure from both sides</td>
</tr>
<tr>
<td></td>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
</tr>
<tr>
<td>Projections</td>
<td>Fire-resistance rated</td>
<td>1 hour on the underside&lt;sup&gt;a,b&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
</tr>
<tr>
<td>Openings in walls</td>
<td>Not allowed</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Unlimited</td>
<td>0 hours</td>
</tr>
<tr>
<td>Penetrations</td>
<td>All</td>
<td>Comply with Section R302.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>None required</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable.

a. Roof eave fire resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

b. Roof eave fire resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided that gable vent openings are not installed.
### TABLE R302.1(2) EXTERIOR WALLS – DWELLINGS WITH FIRE SPRINKLERS-
Amendatory.

<table>
<thead>
<tr>
<th>EXTERIOR WALL ELEMENT</th>
<th>MINIMUM FIRE-RESISTANCE RATING</th>
<th>MINIMUM FIRE SEPARATION DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour-tested in accordance with ASTM E 119 or UL 263 with exposure from both sides</td>
<td>0 feet</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>3 feet^a</td>
</tr>
<tr>
<td>Projections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire-resistance rated</td>
<td>1 hour on the underside^b,c</td>
<td>2 feet^a</td>
</tr>
<tr>
<td>Not fire-resistance rated</td>
<td>0 hours</td>
<td>3 feet</td>
</tr>
<tr>
<td>Openings in walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not allowed</td>
<td>N/A</td>
<td>&lt; 3 feet</td>
</tr>
<tr>
<td>Unlimited</td>
<td>0 hours</td>
<td>3 feet^a</td>
</tr>
<tr>
<td>Penetrations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>Comply with Section R302.4</td>
<td>&lt; 3 feet</td>
</tr>
<tr>
<td>None required</td>
<td></td>
<td>3 feet^a</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable.

a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with Section P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

b. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fireblocking is provided from the top wall plate to the underside of the roof sheathing.
c. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on
the underside of the eave provided that gable vent openings are not installed.

R303.1 Habitable rooms - Amendatory. Habitable rooms shall have an aggregate glazing
area of not less than 8 percent of the floor area of such rooms. Natural ventilation shall be
through windows, skylights, doors, louvers or other approved openings to the outdoor air.
Such openings shall be provided with ready access or shall otherwise be readily controllable
by the building occupants. The openable area to the outdoors shall not be less than 4 percent
of the floor area being ventilated.

Exceptions:

1. The glazed areas need not be openable where the opening is not required by Section
   R310 and an approved mechanical ventilation system capable of producing 0.35 air
   change per hour in the room is installed or a whole-house mechanical ventilation
   system is installed capable of supplying outdoor ventilation air of 15 cubic feet per
   minute (cfm) per occupant on the basis of two occupants for the first bedroom and one
   occupant for each additional bedroom.

2. The glazed areas need not be installed in rooms where Exception 1 is satisfied and
   artificial light is provided that is capable of producing an average illumination of 6 foot
   candles (65 lux) over the area of the room at a height of 30 inches (762 mm) above the
   floor level.

3. Use of sunroom and patio covers, as defined in Section R202, shall be permitted for
   natural ventilation if in excess of 40 percent of the exterior sunroom walls are open, or
   are enclosed only by insect screening.

R309.3 Garages and Carports in Flood Hazard Areas – Amendatory. For buildings
located in flood hazard areas as established by Table 301.2(1), garage and carport floors
shall be:

1. Elevated at least one (1) foot above the design flood elevation as determined in Section
   R322.2; or

2. Located below the design flood elevation, provided that they are at or above grade on
   not less than one side; are used solely for parking, building access, or storage; comply
   with the requirements of Section R322; are structurally attached or connected to the
   residential structure by covered walkway or enclosed walkway; and constructed in
   accordance with this and the City of Tulsa zoning code. The building shall not be
   converted to living space and used for human habitation without first becoming fully
   compliant with the provisions of this code and Title 11-A Chapter 3 Tulsa Revised
   Ordinances.

R311.1 Means of egress - Amendatory. Dwellings and garages (attached or detached from
the dwelling) shall be provided with a means of egress in accordance with this section. The
means of egress shall provide a continuous and unobstructed path of vertical and horizontal
egress travel from all portions of the dwelling to the required egress door without traveling
through a garage. The means of egress from the garage may travel through the adjacent dwelling. The required egress door shall open directly into a public way or to a yard or court that opens to a public way.

R311.2 Egress door - Amendatory. Not less than one egress door shall be provided for each dwelling unit or garage. The egress door shall be side-hinged, and shall provide a clear width of not less than 32 inches (813 mm) where measured between the face of the door and the stop, with the door open 90 degrees (1.57 rad). The clear height of the door opening shall not be less than 78 inches (1981 mm) in height measured from the top of the threshold to the bottom of the stop. Other doors shall not be required to comply with these minimum dimensions. Egress doors shall be readily openable from the inside of the dwelling or garage without the use of a key or special knowledge or effort.

R311.7.5.1 Risers - Amendatory. The riser height shall be not more than 7 3/4 inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm) at rough-in. Risers shall be vertical or sloped from the underside of the nosing of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted provided that the openings located more than 30 inches (762 mm), as measured vertically, to the floor or grade below do not permit the passage of a 4-inch-diameter (102 mm) sphere.

Exceptions:

1. The openings between adjacent treads is not limited on spiral stairways.

2. The riser height of spiral stairways shall be in accordance with Section R311.7.10.1.

3. The top and bottom riser in each flight of stairs may vary by 3/4 inch (19 mm)

R313.2 One- and two-family dwellings automatic fire systems. - Deleted; Section number retained but unused.

R313.2.1 Design and installation. - Deleted; Section number retained but unused.

R314.2.2 Alterations, repairs and additions - Amendatory. Where alterations, repairs, or additions requiring a permit occur, or where one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with smoke alarms located as required for new dwellings.

Exceptions:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, the addition or replacement of windows or doors, or the addition of a porch or deck, are exempt from the requirements of this section.

2. Installation, alteration, or repairs of electrical, plumbing or mechanical systems are exempt from the requirements of this section.
R314.6 Power source - Amendatory. Smoke alarms shall receive their primary power from
the building wiring when such wiring is served from a commercial source, and when
primary power is interrupted, shall receive power from a battery. Wiring shall be permanent
and without a disconnecting switch other than those required for overcurrent protection.
Smoke alarms shall be interconnected. All required smoke alarms in the individual unit shall
be connected to the same luminaire circuit.

Exceptions:

1. Smoke alarms shall be permitted to be battery operated when installed in buildings
   without commercial power.
2. Smoke alarms installed in accordance with Section R314.2.2 shall be permitted to be
   battery powered.

R315.2.2 Alterations, repairs and additions - Amendatory. Where alterations, repairs, or
additions requiring a permit occur, or where one or more sleeping rooms are added or
created in existing dwellings, the individual dwelling unit shall be equipped with carbon
monoxide alarms located as required for new dwellings.

Exceptions:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing
   or siding, the addition or replacement of windows or doors, or the addition of a porch or
   deck, are exempt from the requirements of this section.

2. Installation, alteration, or repairs of electrical, plumbing or mechanical systems are
   exempt from the requirements of this section.

R322.1.6 Protection of mechanical, plumbing and electrical systems – Amendatory.
Electrical systems, equipment and components; heating, ventilating, air conditioning;
plumbing appliances and plumbing fixtures; duct systems; and other service equipment shall
be located at least one (1) foot above the elevation required in Section R322.2. If replaced as
part of a substantial improvement, electrical systems, equipment and components; heating,
ventilating, air conditioning; plumbing appliances and plumbing fixtures; duct systems; and
other service equipment shall meet the requirements of this section. Systems, fixtures, and
equipment and components shall not be mounted on or penetrate through walls intended to
break away under flood loads.

Exception: Locating electrical systems, equipment and components; heating, ventilating,
air conditioning; plumbing appliances and plumbing fixtures; duct systems; and other
service equipment below the elevation required in Section R322.2 is permitted provided that
they are designed and installed to prevent water from entering or accumulating within the
components and to resist hydrostatic and hydrodynamic loads and stresses, including the
effects of buoyancy, during the occurrence of flooding to the design flood elevation in
accordance with ASCE 24. Electrical wiring systems are permitted to be located below the
required elevation provided that they conform to the provisions of the electrical sections of
this code for wet locations.
R322.1.9 Manufactured homes – Amendatory. The bottom of the frame of new and replacement manufactured homes on foundations that conform to the requirements of Section R322.2, shall be elevated at least one (1) foot above the elevations as specified in Section R322.2. The anchor and tie-down requirements of the applicable state and federal requirements shall apply. The foundation and anchorage of manufactured homes to be located in identified floodways shall be designed and constructed in accordance with ASCE 24.

R322.1.10 As-built elevation documentation – Amendatory. A registered land surveyor or engineer licensed by the State of Oklahoma shall prepare and seal documentation of the elevations specified in Sections R109.1.3, R109.1.3.1, and R322.2.

R322.2.1 Elevation Requirements - Amendatory.

1. Buildings and structures in flood hazard areas shall have the lowest floors (including basement floors) elevated at least one (1) foot above the base flood elevation or the design flood elevation, whichever is higher.
2. In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including a basement) elevated at least as high above the highest adjacent grade as the depth number specified in feet (mm) on the FIRM plus one (1) foot, or at least three (3) feet if a depth number is not specified.
3. Basement floors that are below grade on all sides shall be elevated at least one (1) foot above the base flood elevation, or the design flood elevation, whichever is higher. Exception: Enclosed areas below the design flood elevation, including basements whose floors are not below grade on all sides, shall meet the requirements of Section R322.2.2 of this code.
4. Electrical systems, equipment and components; heating, ventilation, air conditioning; plumbing appliances and plumbing fixtures; duct systems; and other service equipment shall be located at least one (1) foot above the base flood elevation, or design flood elevation, whichever is higher. If replaced as part of a substantial improvement, electrical systems, equipment and components; heating, ventilation, air conditioning; plumbing appliances and plumbing fixtures; duct systems; and other service equipment shall meet the requirements of this section. Systems, fixtures, and equipment and components shall not be mounted on or penetrate through walls intended to break away under flood loads.

R322.3 Coastal High Hazard Areas – Deleted; Section number retained but unused.

R323.1 General - Amendatory. This section applies to the construction of above or below ground storm shelters and safe rooms constructed as separate detached buildings or rooms within buildings, structures, or portions thereof for the purpose of providing safe refuge from storms that produce high winds, such as tornados. Any room or structure, as may be used as a place of refuge during a severe wind storm event, shall not be defined as a storm shelter or safe room unless specifically designed and built to the requirements listed in Section 323. In addition to other applicable requirements in this code, storm shelters shall be constructed in accordance with ICC/NSSA 500.
R323.2 Definitions - Added. The following definitions are defined in Chapter 2 of this code:

1. SAFE ROOM  
   a. Community safe room.  
   b. Other safe room.

2. STORM SHELTER  
   a. Community storm shelter.  
   b. Residential storm shelter.

R326.1 General - Amendatory. The design and construction of pools and spas shall comply with Title 51, Tulsa Revised Ordinances, Chapter 5

R402.2 Concrete - Amendatory. Concrete shall have a minimum specified compressive strength of f_c as shown in Table R402.2. Concrete subject to moderate or severe weathering as indicated in Table R301.2 (1) shall be air entrained as specified in Table R402.2. The maximum weight of fly ash, other pozzolans, silica fume, slag or blended cements that is included in concrete mixtures for garage floor slabs and for exterior porches, carport slabs and steps that will be exposed to deicing chemicals shall not exceed the percentages of the total weight of the cementitious materials specified in Section 19.3.3.4 of ACI 318. Materials used to produce concrete and testing thereof shall comply with the applicable standards listed in Chapters 19 and 20 of ACI 318 or ACI 332.

Exception: Interior concrete slabs on grade and enclosed garage slabs are not required to be air entrained.

Table R403.1(1) Minimum width and thickness for concrete footings for light-frame construction (inches). – Amendatory. Footnote “b” is deleted.

Table R403.1(2) Minimum width and thickness for concrete footings for light-frame construction with brick veneer (inches). – Amendatory. Footnote “b” is deleted.

Table R403.1(3) Minimum width and thickness for concrete footings with cast-in-place concrete or fully grouted masonry wall construction (inches). – Amendatory. Footnote “b” is deleted.

Figure R403.1(1) Plain concrete footings with masonry and concrete stem walls in SDC A, B, and C u, b, c, d, e, f, g – Amendatory; footnote “g” added.

   g. See Section R403.1.1.1 and Section R403.1.1.2 for minimum reinforcement bar requirements.

R403.1.1 Reinforcement of Footings - Added. A minimum of four (4) five-eighths (5/8) inch reinforcement bars shall be placed horizontally, two (2) at the top and two (2) at the bottom, in each continuous footing. The continuous footing shall extend across below the garage door openings, unless otherwise designed by an engineer. Reinforcements shall be installed at the time of footing inspections.
R403.1.1.2 Dowels in Footings - Added. Unless otherwise designed by an engineer, dowels shall be required as follows and shall be installed at the time of footing inspection:

1. All cold joints between footings and foundation walls (stem walls) shall be tied together with a minimum size number four (4) dowels at every corner, and not to exceed four (4) feet (1828 mm) on center along the wall, with minimum embedment of 12 inches (304 mm) each into the footing and the foundation (stem) wall.

2. All cold joints between continuous footings and grade slab shall be tied together with a minimum size one-half (½) inch dowels at four (4) feet on center which shall extend from three (3) inches above the bottom of the footing and turn into the slab a minimum embedment of twenty-four (24) inches.

3. All cold joints between foundation (stem) walls and grade slab shall be tied together with a minimum size one-half (½) inch dowels at four (4) feet on center, with minimum embedment of 12 inches (304 mm) into the foundation (stem) wall and minimum embedment of twenty-four (24) inches into the slab.

R403.1.6 Foundation anchorage - Amendatory. Wood sill plates and wood walls supported directly on continuous foundations shall be anchored to the foundation in accordance with this section.

1. Cold formed steel framing shall be anchored directly to the foundation or fastened to wood sill plates anchored to the foundation. Anchorage of cold-formed steel framing shall be in accordance with this section and Section R505.3.1 or R603.3.1.

2. Wood sole plates at the exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with minimum 1/2-inch-diameter (12.7 mm) anchor bolts spaced a maximum of 6 feet (1829 mm) on center or approved anchors or anchor straps spaced as required to provide equivalent anchorage to 1/2-inch-diameter (12.7 mm) anchor bolts. Bolts shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. The bolts shall be located in the middle third of the width of the plate. A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates that are not part of a braced wall panel shall be positively anchored with approved fasteners. Hand driven cut or concrete nails are not approved fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Section R317 and R318.

Exceptions:

1. Walls 24 inches (610 mm) total length or shorter connecting offset braced wall panels shall be anchored to the foundation with a minimum of one anchor bolt located in the center third of the plate section and shall be attached to adjacent braced wall panels at corners as shown in Item 9 of Table R602.3(1).
2. Connection of walls 12 inches (305 mm) total length or shorter connecting offset braced wall panels to the foundation without anchor bolts shall be permitted. The wall shall be attached at corners as shown in Item 9 of Table R602.3(1).

3. Wood sole plates of braced wall panels at building interiors on monolithic slabs may be anchored using connector(s) with a shear capacity of 2300 pounds and a tensile capacity of 800 pounds over a maximum span of 6 feet.

R403.1.7.3 Foundation Elevation - Deleted; Section number retained but unused.

R403.1.9. Protection of footings - Added. Trenching for work including but not limited to plumbing, electrical, storm shelters, and pools shall comply with this section. Trenching installed parallel to footings and walls shall not extend into the bearing plane of a footing wall. The upper boundary of the bearing plane is a line that extends downward, at an angle of 45 degrees from horizontal, from the outside bottom edge of the footing wall.

R406.2 Concrete and masonry foundation waterproofing - Amendatory. In areas where a high water table or other severe soil-water conditions are known to exist, exterior foundation walls that retain earth and enclose interior spaces and floors below grade shall be waterproofed from the higher of:

(a) the top of the footing or

(b) 6 inches (152mm) below the top of the basement floor, to the finished grade.

Walls shall be waterproofed in accordance with one (1) of the following:

1. Two-ply hot-mopped felts.
2. Fifty-five (55) pound (25 kg) roll roofing.
3. Six-mil (0.15 mm) polyvinyl chloride.
4. Six-mil (0.15 mm) polyethylene.
5. Forty-mil (1 mm) polymer-modified asphalt.
6. Sixty-mil (1.5 mm) flexible polymer cement.
7. One-eighth inch (3 mm) cement-based, fiber-reinforced, waterproof coating.
8. Sixty-mil (0.22 mm) solvent-free liquid-applied synthetic rubber.
9. Bentonite

Exception: Organic-solvent-based products such as hydrocarbons, chlorinated hydrocarbons, ketones and esters shall not be used for ICF walls with expanded polystyrene form material. Use of plastic roofing cements, acrylic coatings, latex coatings, mortars and pargings to seal ICF walls is permitted. Cold-setting asphalt or hot asphalt shall conform to type C of ASTM D 449. Hot asphalt shall be applied at a temperature of less than 200 degrees Fahrenheit (93° Celsius).
All joints in membrane waterproofing shall be lapped and sealed with an adhesive compatible with the membrane.

R506.2.1 Fill - Amendatory. Fill material shall be free of vegetation and foreign material. The fill shall be compacted in 8 to 12 inch (203 mm to 305 mm) lifts to ensure uniform support of the slab, and except where approved, the fill depths shall not exceed 48 inches (1220 mm) for clean sand or gravel and 8 inches (203 mm) for earth.

R506.2.3 Vapor retarder - Amendatory. A six (6) mil (0.006 inch; 152 micrometers) polyethylene sheeting, other industry accepted vapor retarder products installed per manufacturer specifications or approved vapor retarder with joints lapped not less than six (6) inches (152 mm) shall be placed between the concrete floor slab and the base course or the prepared subgrade where no base course exists.

Exception: The vapor retarder may be omitted:

1. From detached garages, utility buildings and other unheated accessory structures.
2. From unheated storage rooms having an area of less than seventy (70) square feet (6.5 m²) and carports.
3. From driveways, walks, patios and other flatwork not likely to be enclosed and heated at a later date.
4. Where approved by the building official, based on local site conditions.

Table R602.3(1) Fastening schedule - Amendatory. Footnote “j” added. Item 16 Top or bottom plate to stud:

j. When 7/16 inch structural sheathing is used with a minimum nailing spacing of 6 inches (152 mm) on the edge and 12 inches (305 mm) in the field, two-3 inch x 0.131 inch nails are acceptable for end nail conditions for the top and bottom plate to stud connection.

Table R602.3(3) Requirements for wood structural panel wall sheathing used to resist wind pressures - Amendatory. Footnote “d” added.

d. The following alternative fasteners will be acceptable with a wind exposure category of C or D, 0.099 inch x 2-1/4 inches at 3 inches on center along the edge and 6 inches on center in the field. Or, 0.113 inch x 2-3/8 inches at 6 inches on center along the edge and 12 inches on center in the field.

R602.10.5 Minimum length of a braced wall panel - Amendatory. The minimum length of a braced wall panel shall comply with Table R602.10.5. For methods CS-WSP and CS-SFB, the minimum panel length shall be based on the adjacent clear opening height in accordance with Table R602.10.5 and Figure R602.10.5. Where a panel has an opening on either side of differing heights, the taller opening height shall be used to determine the panel length. For method CS-PF, it is permissible to begin the portal frame at 12 1/2 feet (3810 mm) from the wall line end.
R602.10.8 Braced wall panel connections - Amendatory. Braced wall panels shall be connected to floor framing or foundations as follows:

1. Where joists are perpendicular to a braced wall panel above or below, a rim joist, band joist or blocking shall be provided along the entire length of the braced wall panel in accordance with Figure R602.10.8(1). Fastening of top and bottom wall plates to framing, rim joist, band joist and/or blocking shall be in accordance with Table R602.3(1).

2. Where joists are parallel to a braced wall panel above or below, a rim joist, end joist or other parallel framing member shall be provided directly above and below the braced wall panel in accordance with Figure R602.10.8(2). Where a parallel framing member cannot be located directly above and below the panel, full-depth blocking at sixteen (16) inch (406 mm) spacing shall be provided between the parallel framing members to each side of the braced wall panel in accordance with Figure R602.10.8(2). Fastening of blocking and wall plates shall be in accordance with Table R602.3(1) and Figure R602.10.8(2).

3. Connections of braced wall panels to concrete or masonry shall be in accordance with Section R403.1.6.

4. Wood sole plates of braced wall panels at building interiors on monolithic slabs may be anchored using connector(s) with a shear capacity of two thousand three hundred (2,300) pounds and a tensile capacity of eight hundred (800) pounds over a maximum span of six (6) feet.

R602.12 Simplified wall bracing - Amendatory. Buildings meeting all of the conditions listed below shall be permitted to be braced in accordance with this section as an alternate to the requirements of Section R602.10. The entire building shall be braced in accordance with this section; the use of other bracing provisions of Section R602.10, except as specified herein, shall not be permitted.

1. There shall be not more than three stories above the top of a concrete or masonry foundation or basement wall. Permanent wood foundations shall not be permitted.

2. Floors shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.

3. Wall height shall not be greater than 12 feet (3658 mm)

4. The building shall have a roof eave-to-ridge height of 20 feet (6096 mm) or less.

5. Exterior walls shall have gypsum board with a minimum thickness of 1/2 inch (12.7 mm) installed on the interior side fastened in accordance with Table R702.3.5.

6. The structure shall be located where the ultimate design wind speed is less than or equal to 115 mph (51.4 m/s), and the exposure category is B or C.

7. The structure shall be located in Seismic Design Category A, B, or C for detached one- and two-family dwellings or Seismic Design Category A or B for townhouses.

R602.12.2 Sheathing materials – Amendatory. The following sheathing materials installed on the exterior side of exterior walls shall be used to construct a bracing unit as defined in Section R602.12.3. Mixing materials is prohibited.

1. Wood structural panels with a minimum thickness of 7/16 inch (11.11 mm) fastened in accordance with Table R602.3(3).

2. Structural fiberboard sheathing with a minimum thickness of 1/2 inch (12.7 mm) fastened in accordance with Table R602.3(1).

R703.4 Flashing - Amendatory. Approved corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Six (6) mil polyethylene sheeting is an approved corrosion-resistant flashing when not exposed to UV rays. Self-adhered membranes used as flashing shall comply with AAMA 711. Fluid-applied membranes used as flashings in exterior walls shall comply with AAMA 714. The flashing shall extend to the surface of the exterior wall finish. Approved corrosion-resistant flashings shall be installed at the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistant barrier complying with Section R703.2 for subsequent drainage. Mechanically attached flexible flashings shall comply with AAMA 712. Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:

   1.1. The fenestration manufacturer's installation instructions and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, flashing to be installed per 1.2, 1.3, 1.4 or, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in a such a manner as to direct water to the surface of the exterior wall finish or to the water-resistant barrier for subsequent drainage. Openings using pan flashing shall incorporate flashing or protection at the head and sides.

   1.2. In accordance with the flashing design or method of a registered design professional.

   1.3. In accordance with other approved methods.

   1.4. Flashing above doors are not required where it is unlikely to have rain or other moisture accumulation occur above the door.

2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.

3. Under and at the ends of masonry, wood or metal copings and sills.

4. Continuously above all projecting wood trim.

5. Where exterior porches, decks, or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.

7. At built-in gutters.

Figure R703.8 Typical Masonry Veneer Wall Details\textsuperscript{c, f, g} - Amendatory. Footnotes “f” and “g” added.

f. Flashing to be done per Section R703.4, in accordance with a design from a registered design professional or in accordance with other approved methods or standard industry practices.

g. Flashing depicted under sill and above windows are not required with windows that have nailing flanges for their primary attachment. Flange type windows should be counter flashed into the weather resistant barrier or installed per Section R703.4.

Figure R703.8.2.1 Exterior Masonry Veneer Support by Steel Angles\textsuperscript{a} – Amendatory. Footnote “a” added.

a. Flashing to be done per Section R703.4, in accordance with a design from a registered design professional or in accordance with other approved methods or standard industry practices.

Figure R703.8.2.2 Exterior Masonry Veneer Support by Roof Members\textsuperscript{a} - Amendatory. Footnote “a” added.

a. Flashing to be done per Section R703.4, in accordance with a design from a registered design professional or in accordance with other approved methods or standard industry practices.

R703.8.3.1 Allowable span – Amendatory. The allowable span shall not exceed the values set forth in Table R703.8.3.1. Additionally a 3 inches x 3 inches x 3/16 inch (76 mm x 76 mm x 4.8 mm) steel angle 6 feet (1829 mm) long may be used to support 3 vertical feet (914 mm) of masonry veneer and a 3 inches x 3 inches x 3/16 inch (76 mm x 76 mm 4.8 mm) steel angle 5 feet (1524 mm) long may be used to support 4 1/4 vertical feet (1295 mm) of masonry veneer.

R801.3 Roof drainage - Deleted.

R802.3 Framing details - Amendatory. Rafters shall be framed to ridge board or to each other with a gusset plate as a tie. Ridge board shall be either at least one (1) inch (25 mm) nominal thickness and not less in depth than the cut end of the rafter or at least 2-inches (51 mm) nominal thickness and one size greater than the rafters attached to it. Where a 1-inch (25 mm) nominal thickness ridge is used, all rafters shall be framed not more than 1.5 inches (38 mm) offset from each other at the ridge board or if no ridge is used they should be framed directly opposite from each other with a gusset plate as a tie. When a nominal 2-inch rafter is used they may be offset with no limitations. At all valleys and hips there shall be a valley or hip rafter not less than two (2) inch (51 mm) nominal thickness and not less in depth than the cut end of the rafter. Hip and valley rafters shall be supported at the ridge by a brace to a bearing partition or beam or be designed to carry and distribute the specific load at that point.

Definition of brace includes:
1. A triangular configuration of framing members with a horizontal tie and rafter members, and

2. King post or similar. Where the roof pitch is less than three (3) units vertical in twelve (12) units horizontal (twenty-five (25) percent slope), structural members that support rafters and ceiling joists, such as ridge beams, hips and valleys, shall be designed as beams.

**Exception:** The use of a "Blind Valley", also known as a "Farmers Valley" or "California Valley" will be allowed. In this type of valley the main roof is framed as usual, it may or may not be sheathed, and the intersecting roof is framed on top of the main roof. The two (2) valley plates or sleepers lie on top of the main roof rafters or sheathing and provide a nailing base for the jack rafters and ridge board of the intersecting roof.

**R802.3.1 Ceiling joists and rafter connections - Amendatory.**

1. Ceiling joists and rafters shall be nailed to each other every 4 feet (1219 mm) on center in accordance with Table R802.5.1(9), and the rafter shall be nailed to the top wall plate in accordance with Table R602.3(1). Ceiling joists shall be continuously or securely joined in accordance with Table R802.5.1(9) where they meet over interior partitions and are nailed to adjacent rafters to provide a continuous tie across the building where such joists are parallel to the rafters.

2. Where ceiling joists are not connected to the rafters at the top wall plate, joists connected higher in the attic shall be installed as rafter ties, or rafter ties shall be installed to provide a continuous tie. Where ceiling joists are not parallel to rafters, the rafter ties shall be installed every 4 feet (1219 mm) on center. Rafter ties shall be not less than 2 inches by 4 inches (51 mm by 102 mm) (nominal), installed in accordance with the connection requirements in Table R802.5.1(9), or connections of equivalent capacities shall be provided. Where ceiling joists or rafter ties are not provided, the ridge formed by these rafters shall be supported by a wall, beam, or girder constructed in accordance with this code.

3. Collar ties or ridge straps to resist wind uplift shall be connected in the upper third of the attic space in accordance with Table R602.3(1).

4. Collar ties shall be not less than 1 inch by 4 inches (25 mm by 102 mm) (nominal), spaced not more than 4 feet (1219 mm) on center.

**R802.5 Allowable rafter spans - Amendatory.** Spans for rafters shall be in accordance with Tables R802.5.1(1) through R802.5.1(8). For other grades and species and for other loading conditions, refer to the AWC STJR. The span of each rafter shall be measured along the horizontal projection of the rafter. The tabulated rafter spans in Tables R802.5.1(1) through R802.5.1(8) assume ceiling joists are located at the bottom of the attic space or some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans in these tables shall be multiplied by the following rafter reduction factors: Where ceiling joists or rafter ties are located at one third the span of the
rafter the adjustment factor is 0.67, at one quarter of the span of the rafter the adjustment factor is 0.76, at one fifth of the span of the rafter the adjustment factor is 0.83, at one sixth of the span of the rafter, the adjustment factor is 0.90 and at two fifteenths of the rafter or less, there is no need for adjusting the rafter capacity.

**Exception:** Collar Ties. Installation of collar ties to reduce the span of the rafters is permitted as shown in Figure R802.5.1. Collar ties shall be sized not less than the required size of the rafters they are connected to.

**R802.5.1 Purlins - Amendatory.** Installation of purlins to reduce the span of rafters is permitted as shown in Figure R802.5.1. Purlins shall be sized no less than the required size of the rafters that they support. Purlins shall be continuous and shall be supported by two (2) inch by four (4) inch (51 mm by 102 mm) braces installed to bearing walls at a slope not less than forty-five (45) degrees from the horizontal. The braces shall be spaced not more than four (4) feet (1219 mm) on center and the unbraced length of braces shall not exceed eight (8) feet (2438 mm).

**Exception:** Braces may be spaced not more than six (6) feet (1,829 mm) on center if:
1. The purlin brace is two (2) inch by six (6) inch (51 mm by 153 mm)
2. Purlins shall be sized one (1) nominal size larger than the rafter they support, and
3. Unbraced length of braces shall not exceed eight (8) feet (2,438 mm).

**R802.7.1.2 Ceiling joists taper cut - Amendatory.** Taper cuts at the ends of the ceiling joists shall not exceed one-fourth the depth of the member in accordance with Figure R802.7.1.2.

**Exception:** For ceiling joists not carrying more than 25 pounds of tributary load (limited attic storage) then taper cut at end of joint may be able to be increased to D/2.

**R905.2.1 Sheathing requirements - Amendatory.** Asphalt shingles shall be fastened to solidly sheathed decks in accordance with Section R803 or to the asphalt shingles manufacturer's installation instructions.

**R905.2.8.5 Drip edge - Amendatory.** A drip edge shall be provided at eaves and rake edges of shingle roofs. Adjacent segments of drip edge shall be overlapped not less than 2 inches (51 mm). Drip edges shall extend not less than 1/4 inch (6.4 mm) below the roof sheathing and extend up back onto the roof deck not less than 2 inches (51 mm). Drip edges shall be mechanically fastened to the roof deck at not less than 12 inches (305 mm) on center with fasteners as specified in Section R905.2.5. Underlayment shall be installed over the drip edge along eaves and under the underlayment along rake edges.

**Exception:** If a nominal 1 inch by 2 inch (25 mm by 51 mm) shingle mold is used, attached to the fascia and the starter course of shingles is extended a minimum of 1/4 inch (6.35 mm) and not more than 1 inch (25 mm) then a metal drip edge is not required.

**R908.3.1.1. Roof re-cover - Amendatory.** A roof re-cover shall not be permitted where any of the following conditions occur:

1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.
4. Where the existing roof has one or more application of asphalt shingles additional applications of asphalt shingles shall not be permitted.

R1005.7 Factory-built chimney offsets – Amendatory. Where a factory-built chimney assembly incorporates offsets, no part of the chimney shall be at an angle of more than 30 degrees (0.52 rad) from vertical at any point in the assembly and the chimney assembly shall not include more than four elbows.

Exception: Where chimneys are part of a listed and labeled factory-built fireplace they may be installed in accordance with the fireplace and chimney manufacturer’s installation instructions.

N1101.1 Scope - Amendatory. This chapter regulates the energy efficiency for the design and construction of buildings regulated by this code.

Exception: This chapter does not apply to portions of the building envelope that do not enclose conditioned space.

N1101.2 (R101.3) Intent - Deleted.

N1101.3 (R101.5.1) Compliance materials - Deleted.

N1101.4 Above code programs - Amendatory. The building official or other authority having jurisdiction shall be permitted to deem a national, state, or local energy-efficiency program to exceed the energy efficiency required by this chapter. Buildings approved in writing by such an energy-efficiency program shall be considered in compliance with this chapter.

N1101.5 (R103.2) Information on construction documents. – Deleted.

N1101.5.1 (R103.2.1) Thermal envelope depiction. – Deleted.

N1101.6 (R202) Defined Terms. – Deleted.

N1101.7 Climate zones. – Amendatory. Climate zones from Figure N1107.1 or Table N1101.7 shall be used in determining the applicable requirements in Sections N1101 through N1111.

Figure N1101.7 Climate zones. – Amendatory.

Table N1101.7 Climate zones, moisture regimes, and warm-humid designations by state, county and territory. – Amendatory.
N1101.7.1 Warm humid counties. – Amendatory. Warm humid counties are identified in Table N1101.7 by an asterisk.

N1101.7.2 (R301.3) International climate zones. – Deleted.

Table N1101.7.2(1) (R302.3.(1) International climate zone definitions. – Deleted.

N1101.7.2(2) (R301.3(2) International climate zone definitions. - Deleted.

N1101.8 (R301.4) Tropical climate zone. – Deleted.

N1101.9 (R302.1) Interior design conditions. – Deleted.

N1101.10 Identification. – Amendatory. Materials, systems and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this chapter.

N1101.10.1 Building thermal envelope insulation. – Amendatory. An R-value identification mark shall be applied by the manufacturer to each piece of building thermal envelope insulation 12 inches (305 mm) or more wide. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and R-value of the insulation installed in each element of the building thermal envelope. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled R-value, installed density, coverage area and number of bags installed shall be listed on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the area covered and R-value of installed thickness shall be listed on the certificate. The insulation installer shall sign, date and post the certificate in a conspicuous location on the job site.

N1101.10.1.1 Blown or sprayed roof/ceiling insulation. – Amendatory. The thickness of blown-in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches (mm) on markers that are installed at least once for every 300 square feet (28 square meters) throughout the attic space. The markers shall be affixed to the trusses or joists and marked with a minimum initial installed thickness with numbers not less than of 1 inch (25 mm) high. Each marker shall face the attic access opening. Spray polyurethane foam thickness and installed R-value shall be listed on the certificate provided by the insulation installer.

N1101.10.2 Insulation mark installation. – Amendatory. Insulating materials shall be installed such that the manufacturer's R-value mark is readily observable upon inspection.

N1101.10.3 Fenestration product rating. – Amendatory.
U-factors of fenestration products (windows, glazed doors, and skylights) shall be determined in accordance with NFRC 100 by an accredited, independent laboratory, and labeled and certified by the manufacturer.
Products lacking such a labeled U-factor shall be assigned a default U-factor from Table N1101.10.3(1) or N1101.10.3(2). The solar heat gain coefficient (SHGC) of glazed
fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC shall be assigned a default SHGC from Table 1103.10.3(3).

Table N1101.10.3(1) Default glazed fenestration U-factors – Amendatory.

<table>
<thead>
<tr>
<th>FRAME TYPE</th>
<th>SINGLE PANE</th>
<th>DOUBLE PANE</th>
<th>SKYLIGHT Single</th>
<th>SKYLIGHT Double</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal</td>
<td>1.20</td>
<td>0.80</td>
<td>2.00</td>
<td>1.30</td>
</tr>
<tr>
<td>Metal with Thermal Break</td>
<td>1.10</td>
<td>0.65</td>
<td>1.90</td>
<td>1.10</td>
</tr>
<tr>
<td>Nonmetal or Metal Clad</td>
<td>0.95</td>
<td>0.55</td>
<td>1.75</td>
<td>1.05</td>
</tr>
<tr>
<td>Glazed Block</td>
<td></td>
<td></td>
<td>0.60</td>
<td></td>
</tr>
</tbody>
</table>

Table N1101.10.3(2) Default door U-factors. – Amendatory.

<table>
<thead>
<tr>
<th>DOOR</th>
<th>U-FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uninsulated Metal</td>
<td>1.20</td>
</tr>
<tr>
<td>Insulated Metal</td>
<td>0.60</td>
</tr>
<tr>
<td>Wood</td>
<td>0.50</td>
</tr>
<tr>
<td>Insulated, nonmetal edge, max 45%</td>
<td>0.35</td>
</tr>
<tr>
<td>glazing, any glazing double pane</td>
<td></td>
</tr>
</tbody>
</table>

Table N1101.10.3(3) Default glazed fenestration SHGC. – Amendatory.

<table>
<thead>
<tr>
<th>DEFAULT GLAZED FENESTRATION SHGC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHGC</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>SHGC</td>
</tr>
</tbody>
</table>

N1101.10.4 Insulation product rating. – Amendatory. The thermal resistance (R-value) of insulation shall be determined in accordance with the CFR Title 16, Part 460 in units of h x square foot x Fahrenheit/ BTU at a mean temperature of 75 degrees Fahrenheit (24 degrees Celsius).

N1101.10.4.1 (R303.1.4.1) Insulated siding. – Deleted.
N1101.11 Installation. — Amendatory. All materials, systems and equipment shall be
installed in accordance with the manufacturer's instructions and the provisions of this code.

N1101.11.1 Protection of exposed foundation installation. — Amendatory. Insulation
applied to the exterior basement walls, crawlspace walls, and the perimeter of slab-on-grade
floors shall have a rigid, opaque and weather-resistance protective covering to prevent the
degradation of the insulation's thermal performance. The protective covering shall cover the
exposed exterior insulation and extend not less than 6 inches (153 mm) below grade.

N1101.12 (R303.3) Maintenance information. — Deleted.

N1101.13 Compliance. — Amendatory. Compliance shall be demonstrated by either
meeting the requirements of the 2009 International Energy Conservation Code® or meeting
the requirements of this chapter. Climate zones from figure N1101.7 or Table 1101.7 shall
be used in determining the applicable requirements from this chapter.

N1101.13.1 (R401.2.1). Tropical zone. — Deleted.

N1101.14 (R401.3) Certificate. - Deleted; Section number retained but unused.

N1102.1 (R402.1) General. - Deleted.

N1102.1.1 (R402.1.1) Vapor retarder. —Deleted.

N1102.1.2 Insulation and fenestration criteria. — Amendatory. The building thermal
envelope shall meet the requirements of Table N1102.1.2 based on the climate zone
specified in Section 1101.7.

TABLE N1102.1.2 (R402.1.2)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>FENESTRATION U-FACTOR</th>
<th>SKYLIGHT U-FACTOR</th>
<th>GLAZED FENESTRATION SHGC</th>
<th>CEILING R-VALUE</th>
<th>WOOD FRAME WALL R-VALUE</th>
<th>MASS WALL R-VALUE</th>
<th>FLOOR R-VALUE</th>
<th>BASEMENT WALL R-VALUE</th>
<th>SLAB R-VALUE &amp; DEPTH</th>
<th>CRAWL SPACE WALL R-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0.40</td>
<td>0.55</td>
<td>0.35</td>
<td>30</td>
<td>13</td>
<td>8/13</td>
<td>19</td>
<td>5/13</td>
<td>0</td>
<td>5/13</td>
</tr>
<tr>
<td>4 except Marine</td>
<td>0.35</td>
<td>0.60</td>
<td>NR</td>
<td>38</td>
<td>13</td>
<td>5/10</td>
<td>19</td>
<td>10/13</td>
<td>10, 2ft</td>
<td>10/13</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

a. R-values are minimums. U-factors and SHGC are maximums, R-19 batts compressed into nominal 2 x 6 framing cavity
   such that the R-Value is reduced by R-1 or more shall be marked with the compressed R-Value in addition to the full
   thickness R-value.

b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.

c. The first R-value applies to continuous insulation, the second to framing cavity insulation; either insulation meets the
   requirement.

d. R-5 shall be added to the required slab edge R-values for heated slabs. Insulation depth shall be the depth of the footing
   or 2 feet, whichever is less, in zones 1 through 3 for heated slabs.

e. There are no SHGC requirements in the Marine Zone.

f. Basement wall insulation is not required in warm-humid locations as defined by Figure N1101.7 and Table N1101.7.

g. [Deleted.]
h. ‘13+5’ means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, R-5 sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of the exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.

i. For impact-rated fenestration complying with Section R301.2.1.2, the maximum U-factor shall be 0.65 in zone 3.

j. For impact-resistant fenestration complying with Section R301.2.1.2, the maximum SHGC shall be 0.40.

k. The second R-value applies when more than half the insulation is on the interior.

l. If foundation/slab insulation is used and slab ledge exists ½ inch insulation in Vertical position is allowed as thermal break between slab edge and foundation wall so that slab can still bear on horizontal ledge.

m. In addition to the requirements in Table N1102.1.2, one of the following improvements are required:
   (i) Fenestration U-Factors to be 0.35.
   (ii) Wood Frame Wall R-Value to be R15.
   (iii) Slab R-Value and Depth to be 5.2 feet.
   (iv) Ceiling R-Value to be R38.
   (v) Exception: If duct testing is performed and passed in accordance with N1103.3.2 by either the post-construction test or rough-in test no further upgrade is required from the values in Table N1102.1.2.

N1102.1.3 R-value computation. – Amendatory. Insulation material used in layers, such as framing cavity insulation, and insulation sheathing, shall be summed to compute the component R-value. The manufacturer’s settled R-value shall be used for blown insulation. Computed R-values shall not include an R-value for other building materials or air films.

TABLE N1102.1.4
EQUIVALENT U-FACTORS

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>FENESTRATION U-FACTOR</th>
<th>SKYLIGHT U-FACTOR</th>
<th>CEILING U-FACTOR</th>
<th>FRAME WALL U-FACTOR</th>
<th>MASS WALL U-FACTOR</th>
<th>FLOOR U-FACTOR</th>
<th>BASEMENT WALL U-FACTOR</th>
<th>CRAWL SPACE WALL U-FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0.50</td>
<td>0.65</td>
<td>0.035</td>
<td>0.082</td>
<td>0.141</td>
<td>0.047</td>
<td>0.091c</td>
<td>0.136</td>
</tr>
<tr>
<td>4 except Marine</td>
<td>0.35</td>
<td>0.60</td>
<td>0.030</td>
<td>0.082</td>
<td>0.141</td>
<td>0.047</td>
<td>0.059</td>
<td>0.065</td>
</tr>
</tbody>
</table>

a. Nonfenestration U-factors shall be obtained from measurements, calculation or an approved source.

b. When more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.12 in Zone 3, 0.10 in Zone 4 except Marine.

c. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure N1101.7 and Table N1101.7.

N1102.1.4 U-factor alternative. – Amendatory. An assembly with a U-factor equal to or less than that specified in Table N1102.1.4 shall be permitted as an alternative to the R-value in Table N1102.1.2.

N1102.1.5 Total UA alternative. – Amendatory. If the total building thermal envelope UA (sum of U-factor times assembly area) is less than or equal to the total UA resulting from using the U-factors in Table 1102.1.4 (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table N1102.1.2. 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. The SHGC requirements shall be met in addition to UA compliance.

N1102.2 Specific insulation requirements. – Amendatory.

N1102.2.1 Ceilings with attic spaces. – Amendatory. Where Section N1102.1.2 would require R-38 in the ceiling, R-30 shall be deemed to satisfy the requirement for R-38
wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Similarly, R-38 shall be deemed to satisfy the requirement for R-49 insulation wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the U-factor alternative approach in Section R1102.1.4 and the total UA alternative in Section R1102.1.5.

N1102.2.2 Ceilings without attic spaces. – Amendatory. Where Section N1102.1.2 would require insulation levels above R-30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the minimum required insulation for such roof/ceiling assemblies shall be R-30. This reduction of insulation from the requirements of Section N1102.1.2 shall be limited to 500 square feet (46 square meters) or 20 percent of the total insulated ceiling area, whichever is less. Where Section N1102.1 would require insulation level R-30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the minimum required insulation for such roof/ceiling assemblies shall be R-19. This reduction of insulation from the requirements of Section N1102.1 shall be limited to 500 square feet (46 square meters) or 20 percent of the total insulated ceiling area, whichever is less.

N1102.2.3 (R402.2.3) Eave baffle. – Deleted.

N1102.2.4 Access hatches and doors. – Amendatory. Access doors from conditioned spaces to unconditioned spaces such as attics and crawl spaces shall be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces. Access shall be provided to all equipment that prevents damaging or compressing the insulation. A wood-framed or equivalent baffle or retainer is required to be provided when loose-fill insulation is installed, the purpose of which is to prevent the loose-fill insulation from spilling into the living space when the attic is opened, and to provide a permanent means of maintaining the installed R-value of the loose-fill insulation.

N1102.2.5 Mass walls. – Amendatory. Mass walls for the purposes of this chapter shall be considered above-grade walls of concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth) and solid timber/logs.

N1102.2.6 Steel-frame ceilings, walls, and floors. – Amendatory. Steel-frame ceilings, walls, and floors shall meet the insulation requirements of Table N1102.2.6 or shall meet the U-factor requirements of Table N1102.1.4. The calculation of the U-factor for a steel-frame envelope assembly shall use a series-parallel path calculation method. Exception: In climate zones 1 and 2, the continuous insulation requirements in the Table N1102.2.6 shall be permitted to be reduced to R-3 for steel frame wall assemblies with studs spaced at 24 inches (610 mm) on center.
Table N.1102.2.6
STEEL-FRAME CEILING, WALL AND FLOOR INSULATION (R-VALUE)

<table>
<thead>
<tr>
<th>WOOD FRAME R-VALUE REQUIREMENT</th>
<th>COLD-FORMED STEEL EQUIVALENT R-VALUE\textsuperscript{a}</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Steel Truss Ceiling\textsuperscript{b}</strong></td>
<td></td>
</tr>
<tr>
<td>R-30</td>
<td>R-38 or R-30 + 3 or R-26 + 5</td>
</tr>
<tr>
<td>R-38</td>
<td>R-49 or R-038 + 3</td>
</tr>
<tr>
<td>R-49</td>
<td>R-38 + 5</td>
</tr>
<tr>
<td><strong>Steel Joist Ceiling\textsuperscript{b}</strong></td>
<td></td>
</tr>
<tr>
<td>R-30</td>
<td>R-38 in 2 x 4 or 2 x 6 or 2 x 8 R-49 in any framing</td>
</tr>
<tr>
<td>R-38</td>
<td>R-49 in 2 x 4 or 2 x 6 or 2 x 8 or 2 x 10</td>
</tr>
<tr>
<td><strong>Steel-Framed Wall</strong></td>
<td></td>
</tr>
<tr>
<td>R-13</td>
<td>R-13 + 5 or R-15 + 4 or R-21 + 3 or R-0 + 10</td>
</tr>
<tr>
<td>R-19</td>
<td>R-13 + 9 or R-19 + 8 or R-25 + 7</td>
</tr>
<tr>
<td>R-21</td>
<td>R-13 + 10 or R-19 + 9 or R-25 + 8</td>
</tr>
<tr>
<td><strong>Steel Joist Floor</strong></td>
<td></td>
</tr>
<tr>
<td>R-13</td>
<td>R-19 in 2 x 6, R-19 + R-6 in 2 x 8 or 2 x 20</td>
</tr>
<tr>
<td>R-19</td>
<td>R-19 + R-6 in 2 x 6, or R-19 + R-12 in 2 x 8 or 2 x 10</td>
</tr>
</tbody>
</table>

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.

N1102.2.7 (R402.2.7) Walls with partial structural sheathing. – Deleted.

N1102.2.8 Floors. – Amendatory. Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of the subfloor decking.

N1102.2.9 Basement walls. – Amendatory. Exterior walls associated with conditioned basements shall be insulated from the top of the basement wall down to 10 feet (3048 mm) below grade or to the basement floor, whichever is less. Walls associated with unconditioned basements shall meet this requirement unless the floor overhead is insulated in accordance with Sections N1102.1.2 and N1102.2.8.

N1102.2.10 Slab-on-grade floors. – Amendatory. Slab-on-grade floors with a floor surface less than 12 inches (305 mm) below grade shall be insulated in accordance with Table N1102.1.2. The insulation shall extend downward from the top of the slab on the outside or inside of the foundation wall. Insulation located below grade shall be extended the distance provided in Table N1102.1.2 by any combination of vertical insulation, insulation extending under the slab or insulation extending out from the building. Insulation extending away from the building shall be protected by pavement or by not less than 10 inches (254 mm) of soil. The top edge of the insulation installed between the exterior wall and the edge of the interior slab shall be permitted to be cut at a 45 degree (0.79 rad) angle away from the exterior wall.
Slab-edge insulation is not required in jurisdictions designated by the building official as having a very heavy termite infestation.

N1102.2.11 Crawl space walls. – Amendatory. As an alternative to insulating floors over crawl spaces, crawl space walls shall be permitted to be insulated when the crawl space is not vented to the outside. Crawl space wall insulation shall be permanently fastened to the wall and extend downward from the floor to the finished grade level and then vertically and/or horizontally for at least an additional 24 inches (610 mm). Exposed earth in unvented crawl space foundations shall be covered with a continuous Class I vapor retarder in accordance with this code. All joints of the vapor retarder shall overlap by 6 inches (153 mm) and be sealed or taped. The edges of the vapor retarder shall extend not less than 6 inches (153 mm) up the stem wall and shall be attached to the stem wall.

N1102.2.12 Masonry veneer. – Amendatory. Insulation shall not be required on the horizontal portion of the foundation that supports a masonry veneer.

N1102.2.13 Thermally isolated sunroom insulation. – Amendatory. The minimum ceiling insulation R-values shall be R-19 in Zones 1 through 4 and R-24 in Zones 5 through 8. The minimum wall R-value shall be R-13 in all zones. New walls separating the sunroom from the conditioned space shall meet the building thermal envelope requirements.

N1102.3 Fenestration – Amendatory.

N1102.3.1 U-factor. – Amendatory. An area-weighted average of fenestration products shall be permitted to satisfy the U-factor requirements.

N1102.3.2 Glazed fenestration SHGC. – Amendatory. An area-weighted average of fenestration products more than 50-percent glazed shall be permitted to satisfy the solar heat gain coefficient (SHGC) requirements.

N1102.3.3 Glazed fenestration exemption. – Amendatory. Up to 15 square feet (1.4 square meters) of glazed fenestration per dwelling unit shall be permitted to be exempt from U-factor and SHGC requirements in Section N1102.1.2. This exemption shall not apply to the U-factor alternative approach in N1102.1.4 and the total UA alternative approach in N1102.1.5.

N1102.3.4 Opaque door exemption. – Amendatory. One side-hinged opaque door assembly up to 24 square feet (2.22 square meters) in area is exempted from the U-factor requirement in Section N1102.1.2. This exemption shall not apply to the U-factor alternative approach in Section N1102.1.4 and the total UA alternative in Section N1102.1.5.

N1102.3.5 Thermally isolated sunroom U-factor. – Amendatory. For zones 4 through 8, the maximum fenestration U-factor shall be 0.50 and the maximum skylight U-factor shall be 0.75. New windows and doors separating the sunroom from conditioned space shall meet the building thermal envelope requirements.
N1102.3.6 Replacement fenestration. – Added. Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for U-factor and solar heat gain coefficient (SHGC) in Table N1102.1.2.

N1102.4 Air leakage. – Amendatory.

N1102.4.1 Building thermal envelope. – Amendatory. The building thermal envelope shall be durably sealed to limit infiltration. The sealing methods between dissimilar materials shall allow for differential expansion and contraction. The following shall be caulked, gasketed, weather-stripped or otherwise sealed with an air barrier material, suitable film or solid material.
(A) All joints seams and penetrations.
(B) Site-built windows, doors and skylights.
(C) Openings between window and door assemblies and their respective jambs and framing.
(D) Utility penetrations.
(E) Dropped ceilings or chases adjacent to the thermal envelope.
(F) Knee walls.
(G) Walls and ceilings separating the garage from conditioned spaces.
(H) Behind tubs and showers on exterior walls.
(I) Common walls between dwelling units.
(J) Attic access openings.
(K) Rim joists junction.
(L) Other sources of infiltration.

N1102.4.1.1 Air sealing and insulation. – Amendatory. Building envelope air tightness and insulation installation shall be demonstrated to comply with one of the following options given by Sections N1102.4.1.2 or N1102.4.1.3.

N1102.4.1.2 Testing option. – Amendatory. Tested air leakage rate is less than 7 ACH when tested with a blower door at a pressure of 50 Pascals (0.007 psi). Testing shall occur after rough in and after installation of penetrations of the building envelope including penetrations for utilities, plumbing, electrical, ventilation and combustion appliances. During testing:
(A) Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed;
(B) Dampers shall be closed, but not sealed; including exhaust, intake, makeup air, back draft and flu dampers;
(C) Interior doors shall be open;
(D) Exterior openings for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
(E) Heating and cooling system(s) shall be turned off;
(F) HVAC ducts shall not be sealed; and
(G) Supply and return registers, shall not be sealed.
N1102.4.1.3 Visual Inspection. – Added. The items listed in Table N1102.4.1.1 applicable to the method of construction, are field verified. Where required by the code official, an approved party independent from the installer of the insulation or contractor, shall inspect the air barrier and insulation. Where no approved party inspects these items the air barrier components shall be viewed as a part of the frame inspection or insulation inspection by the Authority Having Jurisdiction.

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air barrier and thermal</td>
<td>Exterior thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with the building envelope air barrier. Breaks or joints in the air barrier are filled or repaired. Air-permeable insulation is not used as a sealing material. Air-permeable insulation is inside of an air barrier.</td>
</tr>
<tr>
<td>barrier</td>
<td></td>
</tr>
<tr>
<td>Ceiling/attic</td>
<td>Air barrier in any dropped ceiling/soffit substantially aligned with insulation and any gaps are sealed. Attic access (except unvented attic), knee wall door, or drop down door stair is sealed.</td>
</tr>
<tr>
<td>Walls</td>
<td>Corners and headers are insulated. Junction of foundation and sill plate is sealed.</td>
</tr>
<tr>
<td>Windows and doors</td>
<td>The space between window/door jambs and framing are sealed.</td>
</tr>
<tr>
<td>Rim joists</td>
<td>Rim joists are insulated and include an air barrier.</td>
</tr>
<tr>
<td>Floors (including above</td>
<td>Insulation is installed to maintain permanent contact with the underside of subfloor decking. Air barrier is installed at any exposed edge of floor.</td>
</tr>
<tr>
<td>garage and cantilevered</td>
<td></td>
</tr>
<tr>
<td>floors)</td>
<td></td>
</tr>
<tr>
<td>Crawl space walls</td>
<td>Insulation is permanently attached to walls. Exposed earth in unvented crawl spaces is covered with a Class I vapor retarder with overlapping joints taped.</td>
</tr>
<tr>
<td>Shafts, penetrations</td>
<td>Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or unconditioned space are sealed.</td>
</tr>
<tr>
<td>Narrow cavities</td>
<td>Batt insulation is cut to fit, or narrow cavities are filled by sprayed/blown insulation.</td>
</tr>
<tr>
<td>Garage separation</td>
<td>Air sealing is provided between the garage and conditioned space.</td>
</tr>
<tr>
<td>Recessed lighting</td>
<td>Recessed light fixtures are airtight, IC rated and sealed to the drywall. Exception: Fixtures in conditioned space.</td>
</tr>
<tr>
<td>Plumbing and wiring</td>
<td>Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing or sprayed/blown insulation extends behind piping and wiring.</td>
</tr>
<tr>
<td>Shower/tub on exterior wall</td>
<td>Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.</td>
</tr>
<tr>
<td>Electrical/phone box on</td>
<td>Air barrier extends behind boxes or air-sealed boxes are installed.</td>
</tr>
<tr>
<td>exterior walls</td>
<td></td>
</tr>
<tr>
<td>Common Wall</td>
<td>Air barrier is installed in common wall between dwelling units.</td>
</tr>
<tr>
<td>HVAC register boots</td>
<td>HVAC register boots that penetrate building envelope are sealed to subfloor and drywall.</td>
</tr>
<tr>
<td>Fireplaces</td>
<td>Fireplace walls include an air barrier.</td>
</tr>
</tbody>
</table>

N1102.4.2 Fireplaces – Amendatory. New wood-burning fireplaces shall have outdoor combustion air.

N1102.4.3 Fenestration air leakage. – Amendatory. Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cfm per square foot (1.5 L divided by s divided by square meters), and swinging doors no more than 0.5 cfm per square
foot (2.5 L divided by s divided by square meters), when tested according to NFRC 400 or AAMA/WDMA/CSA 101/1.S.2/A440 by an accredited, independent laboratory and listed and labeled by the manufacturer. Exception: Site-built windows, skylights, and doors.

N1102.4.4 (R402.4.4) Rooms containing fuel burning appliances. – Deleted.

N1102.4.5 Recessed lighting. – Amendatory. Recessed luminaries installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned space. All recessed luminaries shall be IC-rated and labeled as meeting ASTM E 283 when tested at 1.57 psi (75 Pa) pressure differential with no more than 2.0 cfm (0.944 L/s) of air movement from the conditioned space to the ceiling cavity. All recessed luminaries shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling cover.

N1102.5 (R402.5) Maximum fenestration U-factor and SHGC (Mandatory). – Deleted.

N1103.1 Controls. – Amendatory. At least one thermostat shall be installed for each separate heating and cooling system.

N1103.1.1 Programmable thermostat. – Amendatory. Where the primary heating system is a forced air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain zone temperature down to 55 degrees Fahrenheit (13 degrees Celsius) or up to 85 degrees Fahrenheit (29 degrees Celsius). The thermostat shall initially be programmed with a heating temperature set point no higher than 70 degrees Fahrenheit (21 degrees Celsius) and a cooling temperature set point no lower than 78 degrees Fahrenheit (26 degrees Celsius).

N1103.1.2 Heat pump supplementary heat. – Amendatory. 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.

N1103.2 (R403.2) Hot water boiler outdoor temperature setback. – Deleted.

Section N1103.3 Ducts – Amendatory.

N1103.3.1 Insulation. – Amendatory. Supply ducts in attics shall be insulated to a minimum of R-8. All other ducts shall be insulated to a minimum of R-6.

Exception: The minimums do not apply to ducts or portions thereof located completely inside the building thermal envelope.

N1103.3.2 Sealing. – Amendatory. Ducts, air handlers, filter boxes and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.4. For duct systems with sheet metal plenums, Y’s and supply boots, only liquid applied sealants
complying with UL 181 BM (Mastic or similar) or equivalent method, shall be used to seal inner liners and start collars to plenum and any other seams in the system. Duct tightness shall be verified by one of the following:

(A) Post-construction test: Leakage to outdoors shall be less than or equal to 8 cfm (3.78 L/s) per 100 square feet (9.29 square meters) of conditioned floor area or a total leakage less than or equal to 12 cfm (5.66 L/s) per 100 square feet (9.29 square meters) of conditioned floor area when tested at a pressure differential of 0.1 inch w.g. (25 Pa) across the entire system, including the manufacturer's air handler end closure. All register boots shall be taped or otherwise sealed during the test.

(B) Rough-in test: Total leakage shall be less than or equal to 6 cfm (2.83 L/s) per 100 square feet (9.29 square meters) of conditioned floor area when tested at a pressure differential of 0.1 inch w.g. (25 Pa) across the roughed in system, including the manufacturer's air handler enclosure. All registered boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 4 cfm (1.89 L/s) per 100 square feet (9.29 square meters) of conditioned floor space.

(C) Visual verification by the Authority Having Jurisdiction or an approved agency.

Exception: Duct tightness test is not required if the air handler and all ducts are located within conditioned space.

N1103.3.2.1 (R403.2.1) Sealed air handler. – Deleted.

N1103.3.3 (R403.3.3) Duct testing (Mandatory). – Deleted.

N1103.3.4 (R403.3.4) Duct leakage (Mandatory). – Deleted.

N1103.3.5 Building cavities. – Amendatory. Building framing cavities shall not be used as supply ducts.

N1103.4 Mechanical system piping insulation. – Amendatory. Mechanical system piping capable of carrying fluids above 105 degree Fahrenheit (41 degrees Celsius) or below 55 degrees Fahrenheit (13 degrees Celsius) shall be insulated to a minimum of R-2.

N1103.4.1 (R403.4.1) Protection of piping insulation. – Deleted.

N1103.5 Circulation service hot water systems. – Amendatory. Energy conservation measures for circulation service potable hot water systems shall be in accordance with Sections N1103.5.1 and N1103.5.2.

N1103.5.1 Heated water circulation and temperature systems (Mandatory). – Amendatory. Heated water circulation systems shall be in accordance with Section R1103.5.1.1. Heat trace temperature maintenance systems shall be in accordance with Section R1103.5.1.2. Automatic controls, temperature sensors and pumps shall be accessible. Manual controls shall be readily accessible.
N1103.5.1.1 Circulation systems. – Amendatory. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-siphon circulation systems shall be prohibited. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

N1103.5.1.2 Heat trace systems. – Amendatory. Electric heat trace systems shall comply with IEEE 515.1 or UL 515. Controls for such systems shall automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

N1103.5.2 Demand recirculation systems. – Amendatory. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a demand recirculation water system. Pumps shall have controls that comply with both of the following:
(A) The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture, fitting or appliance.
(B) The control shall limit the temperature of the water entering the cold water piping to 104 degrees Fahrenheit (40 degrees Celsius).

N1103.5.3 Hot water pipe insulation (Prescriptive). – Amendatory. Insulation for hot water pipe with a minimum thermal resistance (R-value) of R-3 shall be applied to the following:
(A) Piping 1 inch (25 mm) and larger in nominal diameter.
(B) Piping serving more than one dwelling unit.
(C) Piping located outside the conditioned space.
(D) Piping from the water heater to the distribution manifold.
(E) Piping located under a floor slab.
(F) Buried in piping.
(G) Supply and return piping in recirculation systems other than demand recirculation systems.

N1103.5.4 (R403.5.4) Drain water heat recovery units. – Deleted.

N1103.6 Mechanical ventilation. – Amendatory. Outdoor air intakes shall have automatic or gravity dampers that close when the ventilation system is not operating.

N1103.6.1 (R403.6.1) Whole-house mechanical ventilation system fan efficacy. – Deleted.

Table N1103.6.1 (R403.6.1) Mechanical ventilation system fan efficacy. – Deleted.
N1103.7 Equipment sizing and efficiency rating. – Amendatory. Heating and cooling equipment shall be sized as specified in M1401.3.

N1103.8 (R403.8) Systems serving multiple dwelling units (Mandatory). – Deleted.

N1103.9 Snow melt system controls. – Amendatory. Snow- and ice-melting systems, supplied through energy service to the building shall include automatic controls capable of shutting off the system when the pavement temperature is above 50 degrees Fahrenheit (10 degrees Celsius), and no precipitation is falling and an automatic or manual control that will allow the shutoff when the outdoor temperature is above 40 degrees Fahrenheit (5 degrees Celsius).

N1103.10 Pools. – Amendatory. Pools shall be provided with energy conservation measures in accordance with Sections N1103.10.2 through N1103.10.4.

N1103.10.1 (R403.10.1) Residential pools and permanent residential spas. – Deleted; Section number retained but unused.

N1103.10.2 Pool heaters. – Amendatory. All pool heaters shall be equipped with a readily accessible on-off switch to allow shutting off the heater without adjusting the thermostat setting. Pool heaters fired by natural gas or LPG shall not have continuously burning pilot lights.

N1103.10.3 Time switches. – Amendatory. Time switches that can automatically turn off and on heaters and pumps according to a preset schedule shall be installed on swimming pool heaters and pumps.

Exceptions: Time switches shall not be installed where:
(A) public health standards require 24-hour pump operation.
(B) pumps are required to operate solar- and waste-heat-recovery pool heating systems

N1103.10.4 Pool covers. – Amendatory. Pools heated to more than 90 degrees Fahrenheit (32 degrees Celsius) shall have a pool cover with a minimum insulation value of R-12.

N1103.11 (R403.11) Portable spas (Mandatory). – Deleted.

N1103.12 (R403.12) Residential pools and permanent residential spas. – Deleted.

N1104 Lighting Systems. – Amendatory.

N1104.1 Lighting equipment. – Amendatory. Not less than 75 percent of the lamps in permanently installed luminaries shall be high-efficacy lamps or not less than 75 percent of the permanently installed luminaries shall contain only high-efficacy lamps.

Exception: Low-voltage lighting is not subject to this requirement.

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N1104.1.1 (R401.1) Lighting equipment (Mandatory). – Deleted.


N1106 (R406) Energy rating index compliance alternative. – Deleted.

N1107 (R501) Existing Buildings- General. – Deleted.

N1108 (R502) Additions. – Deleted.

N1109 (R503) Alterations. – Deleted.

N1110 (R504) Repairs. – Deleted.

N1111 (R505) Change of occupancy or use. – Deleted.

PART V—MECHANICAL

M1308.2.4. Protection of refrigerant lines. - Added. Refrigerant lines shall not be installed less than one and one-half (1 ½) inches from the bottom side of roof decking unless protected from damage by an approved method.

M1502.3 Duct termination. - Amendatory. Exhaust ducts shall terminate on the outside of the building. Exhaust duct terminations shall be in accordance with the dryer manufacturer's installation instructions. If the manufacturer's instructions do not specify a termination location, the exhaust duct shall terminate not less than three (3) feet (914 mm) in any direction from the openings into buildings nor less than 12 inches from finished ground level or other obstruction. Exhaust duct terminations shall be equipped with a backdraft damper. Additionally, exhaust shall not terminate within three (3) feet (914 mm) of condensing units nor within 12 inches from ground level or any obstruction. Screens shall not be installed at the duct termination.

1502.4.2 Duct installation. - Amendatory. Exhaust ducts shall be supported at 4 feet (1219 mm) intervals and secured in place. The insert end of the duct shall extend into the adjoining duct or fitting in the direction of airflow. Ducts shall not be joined with screws or similar fasteners that protrude into the inside of the duct.
Table M1601.1.1 - Amendatory.

**TABLE M1601.1.1**

<table>
<thead>
<tr>
<th>DUCT SIZE</th>
<th>GALVANIZED</th>
<th>APPROXIMATE ALUMINUM B &amp; S GAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum thickness (inches)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Round ducts and enclosed</td>
<td>0.013</td>
<td>26</td>
</tr>
<tr>
<td>Rectangular ducts</td>
<td>0.016</td>
<td>24</td>
</tr>
<tr>
<td>14” or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 14”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposed rectangular ducts</td>
<td>0.016</td>
<td>24</td>
</tr>
<tr>
<td>14” or less</td>
<td>0.019</td>
<td>22</td>
</tr>
<tr>
<td>Over 14”</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm.

a. Ductwork that exceeds 20 inches by dimension or exceeds a pressure of 1 inch water gage (250Pa) shall be constructed in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible.

Section M1601.4.1 Joints, seams, and connections. – Amendatory.

Longitudinal and transverse joints, seams and connections in metallic and nonmetallic ducts shall be constructed as specified in SMACNA HVAC Duct Construction Standards-Metal and Flexible and NAIMA Fibrous Glass Duct Construction Standards. Joints, longitudinal and transverse seams and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesive), mastic-plus-embedded-fabric systems, liquid sealants or tapes. Tapes and mastics used to seal fibrous glass ductwork shall be listed and labeled in accordance with UL 181A and shall be marked “181A-P” for pressure-sensitive tape, “181A-M” for mastic or “181 A-H” for heat sensitive tape.

Tapes and mastics used to seal metallic and flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked “181 B-FX” for pressure-sensitive tape or “181 BM” for mastic. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked 181B-C. Crimps joints for round metallic ducts shall have a contact lap of not less than 1 inch (25 mm) and shall be mechanically fastened by means of not less than three sheet-metal screws or rivets equally spaced around the joint.

Closure systems used to seal all ductwork shall be installed in accordance with the manufacturers’ instructions.

Exceptions:

(i) Spray polyurethane foam shall be permitted to be applied without additional joint seals.
(ii) Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.

(iii) For ducts having a static pressure classification of less than 2 inches of water column (500 Pa), additional closure systems shall not be required for continuously welded joints and seams and locking-type joints and seams of other than the snap-lock and button-lock types.

(iv) For duct systems with sheet metal plenums, Y’s and supply boots, only liquid applied sealants complying with UL 181 BM (Mastic or similar) or equivalent method, shall be used to seal inner liners and start collars to plenum and any other seams in system.

M1903.1.1 Electrical requirements. - Added. In addition to the requirements of M1903.1, interconnection and all associated wiring shall be installed in accordance with NFPA 70, NEC®, 2014, Article 692 Fuel Cell Systems.

PART VI—FUEL GAS.

G2413.1 General Considerations. - Amendatory. Piping systems shall be of such size and so installed as to provide a supply of gas sufficient to meet the maximum demand and supply gas to each appliance inlet at not less than the minimum supply pressure required by the appliance, but not less than one (1) inch to the first connected appliance.

G2415.7.4 Protection of gas piping other than steel. - Added. Gas piping other than steel shall not be installed less than one and one-half (1 ½) inches from the bottom side of roof decking unless protected from damage by an approved method.

G2415.12 Minimum burial depth. - Amendatory. Underground piping systems shall be installed a minimum depth of 18 inches (457.5 mm) below grade, except as provided for in Section G2415.12.1.

G2415.13.1 Separation of gas piping from other piping systems. - Added. There shall be a minimum 12 inches of undisturbed or compacted earth separation between buried gas piping and any other electrical service lines, water piping or sewer piping systems.

G2417.4.1 Test pressure - Amendatory. The test pressure to be used shall be no less than 1 ½ times the proposed maximum working pressure, but not less than 3 psi on a five (5) psi gauge registered in one-tenth pound increments or ten (10) psi on a thirty (30) psi gauge registered in one (1) pound increments. Where the test pressure exceeds 125 psig (862 kpa gauge), the test pressure shall not exceed a value that produces a hoop stress in the piping greater than 50 percent of the specified minimum yield strength of the pipe.

G2417.6.2.1 General - Added. At least one appliance shall be connected prior to final release of the gas meter.
G2420.3.1 Location of Shut-off Valves - Added.
A. Outlets for the individual manufactured homes and gas piping to any building supplied by the system shall be provided with a readily accessible, approved valve which cannot be locked in the open position.
B. A readily accessible valve shall be provided near the point of gas delivery for shutting off the entire manufactured home park system. The valve provided by the serving gas supplier may be considered acceptable for this purpose, provided it is readily accessible.

G2420.5.4 Location, Protection and Sizing - Added. The gas riser and shut-off valve to each manufactured home site shall be placed in the rear one-third section of the site, within eighteen (18) inches of the roadside wall of the manufactured home (ie., the right side of the manufactured home when viewing the tongue of the manufactured home). It shall be located and protected or supported so as to minimize the likelihood of damage by moving vehicles. The minimum size of the gas piping outlet at such site shall be three-fourths (3/4) inch for other than undiluted liquefied petroleum gases.

PART VII—PLUMBING

P2503.4 Building sewer testing. - Amendatory.
A. The building sewer shall be tested by insertion of a test plug at the point of connection with the public sewer, filling the building sewer with water, and pressuring the sewer with not less than five (5) foot (3,048 mm) head of water. The test pressure shall not decrease during a period of not less than fifteen (15) minutes. The building sewer shall be water-tight at all points.
B. A forced sewer test shall consist of pressuring to a pressure of not less than 5 psi (34.5kPa) greater than the pump rating and maintaining such pressure for not less than 15 minutes. The forced sewer shall be water-tight at all times.

P2503.7 Water-supply system testing. - Amendatory. Upon completion of the water-supply system or a section of it, the system or portion completed shall be tested and proved tight under a water pressure of not less than the working pressure of the system or, for piping systems other than PVC or CPVC, by an air test of not less than fifty (50) psi (345 kPa). This pressure shall be held for not less than fifteen (15) minutes. The water used for tests shall be obtained from a potable water source.

P2603.4 Pipes through foundation walls. – Amendatory. A pipe that passes through a foundation wall shall be provided with a relieving arch, or a pipe sleeve shall be built into the foundation wall. The relieving arch or pipe sleeve shall conform to one of the materials listed in Table P3002.1(2). The sleeve shall be two pipe sizes greater than the pipe passing through the wall.

P2603.5.1 Sewer Depth - Amendatory. Building sewers that connect to private sewage disposal systems shall be a minimum of twelve (12) inches below finished grade at the point of septic tank connection. Building sewers shall be a minimum of twelve (12) inches below grade.
P2704.1 General. - Amendatory. Slip joints shall be made with an approved elastomeric gasket and shall be installed from the fixture to within eighteen (18) inches downstream of the trap outlet seal. Fixtures with concealed slip-joint connections shall be provided with an access panel or utility space at least twelve (12) inches (305 mm) in its smallest dimension or other approved arrangement so as to provide access to the slip-joint connections for inspection and repair.

P2709.2 Lining required. - Amendatory.
Where required, the adjoining walls and floor framing which enclose on-site built-up shower receptors shall be lined with one (1) of the following materials:
1. Sheet lead,
2. Sheet copper,
3. Plastic liner material that complies with ASTM D 4068 or ASTM D 4551,
4. Hot mopping in accordance with Section P2709.2.3 or
5. Sheet-applied load-bearing, bonded waterproof membranes that comply with ANSI A118.10.

The lining material shall extend not less than three (3) inches (76 mm) beyond or around the rough jamb and not less than three (3) inches (76 mm) above finished thresholds. Sheet-applied load bearing, bonded waterproof membranes shall be applied in accordance with the manufacturer's installation instructions.

P2715.1 Laundry tray waste outlet. - Amendatory. Each compartment of a laundry tray shall be provided with a waste outlet not less than one and one-half (1½) inches (38 mm) in diameter and a strainer or crossbar to restrict the clear opening of the waste outlet.

P2902.5.3 Lawn irrigation systems. - Amendatory. The potable water supply to lawn irrigation systems shall be protected against backflow by an atmospheric vacuum breaker, a pressure vacuum breaker assembly, a spill-resistant vacuum breaker, or a reduced pressure principle backflow prevention assembly. Valves shall not be installed downstream from an atmospheric vacuum breaker. Where chemicals are introduced into the system, the potable water supply shall be protected against backflow by a reduced pressure principle backflow prevention assembly.

P2903.9.1 Service valve. – Amendatory. Each dwelling unit shall be provided with an accessible main shutoff valve near the entrance of the water service. The valve shall be of a full-open type having nominal restriction to flow. Additionally, the water service shall be valved at the curb or property line in accordance with local requirements.

P2903.10 Hose bibb. - Amendatory. Hose bibbs subject to freezing, including the "frost-proof" type, shall be equipped with an accessible valve inside the building so that they can be controlled and/or drained during cold periods.

Section P2904.1.1 Required sprinkler locations. - Amendatory. Sprinklers shall be installed to protect all areas of a townhouse dwelling unit.
P2906.4 Water service pipe. - Amendatory. Water service pipe shall conform to NSF 61 and shall conform to one (1) of the standards listed in Table P2906.4. Water service pipe or tubing, installed underground and outside of the structure, shall have a minimum working pressure rating of not less than one hundred sixty (160) pounds per square inch at 73°F (1103 kPa at 23°C). Where the water pressure exceeds one hundred sixty (160) pounds per square inch (1103 kPa), piping material shall have a rated working pressure equal to or greater than the highest available pressure. Water service piping materials not third-party certified for water distribution shall terminate at least thirty (30) inches outside the exterior wall. Ductile iron water service piping shall be cement mortar lined in accordance with AWWA C104/A21.4.

Table P2906.4 Water Service Pipe – Amendatory.

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STANDARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrylonitrile butadiene styrene (ABS) plastic pipe</td>
<td>ASTM D 1527; ASTM D 2282</td>
</tr>
<tr>
<td>Brass pipe</td>
<td>ASTM B 43</td>
</tr>
<tr>
<td>Chlorinated polyvinyl chloride (CPVC) plastic pipe</td>
<td>ASTM D 2846; ASTM F 441; ASTM F 442; CSA B 137.6</td>
</tr>
<tr>
<td>Copper or copper-alloy pipe</td>
<td>ASTM B 42; ASTM B 302</td>
</tr>
<tr>
<td>Copper or copper-alloy tubing (Type K, WK, L, WL, M or WM)</td>
<td>ASTM B 75; ASTM B 88; ASTM B 251; ASTM B 447</td>
</tr>
<tr>
<td>Cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pipe</td>
<td>ASTM F 1281; ASTM F 2262; CSA B 137.10M</td>
</tr>
<tr>
<td>Cross-linked polyethylene/aluminum/high-density polyethylene (PEX-AL-HDPE)</td>
<td>ASTM F 1986</td>
</tr>
<tr>
<td>Cross-linked polyethylene (PEX) plastic tubing</td>
<td>ASTM F 876; ASTM F 877; CSA B 137.5</td>
</tr>
<tr>
<td>Ductile iron water pipe</td>
<td>AWWA C151; AWWA C115</td>
</tr>
<tr>
<td>Galvanized steel pipe</td>
<td>ASTM A 53</td>
</tr>
<tr>
<td>Polyethylene/aluminum/polyethylene (PE-AL-PE) pipe</td>
<td>ASTM F 1282; CSA CAN/CSA-B137.9M</td>
</tr>
<tr>
<td>Polyethylene (PE) plastic pipe</td>
<td>ASTM D 2104; ASTM D 2239; CSA-B137.1</td>
</tr>
<tr>
<td>Polyethylene (PE) plastic tubing</td>
<td>ASTM D 2737; CSA B137.1</td>
</tr>
<tr>
<td>Polypropylene (PP) plastic pipe or tubing</td>
<td>ASTM F 2389; CSA B137.11</td>
</tr>
</tbody>
</table>
P3003.2 Prohibited joints. - Amendatory. Running threads and bands shall not be used in the drainage system. Drainage and vent piping shall not be drilled, tapped, burned or welded. The following types of joints and connections shall be prohibited:
1. Cement or concrete.
2. Mastic or hot-pour bituminous joints.
3. Joints made with fittings not approved for the specific installation.
4. Joints between different diameter pipes made with elastomeric rolling O-rings.
5. Solvent-cement joints between different types of plastic pipe.

Exception: Saddle-type fittings may be used to connect the building sewer to a public sewer.

P3003.9.2 Solvent cementing. – Amendatory. Joint surfaces shall be clean and free from moisture. A purple primer that conforms to ASTM F656 shall be applied. Solvent cement not purple in color and conforming to ASTM D2564, CSA B137.3 or CSA B181.2 shall be applied to all joint surfaces. The joint shall be made while the cement is wet, and shall be in accordance with ASTM D2855. Solvent-cement joints shall be installed above or below ground.

P3005.2.12 Cleanout Requirements for Residential Construction - Added. All bathtub, lavatory, kitchen sink, mop or utility sink, and washing machine drains shall have an accessible cleanout which will allow for the cleaning or rodding of the drain line.
A. Cleanouts shall be the removable trap or threaded plug type, and shall be the same diameter or greater than the pipe served.
B. When two (2) drains are combined with a sanitary cross fitting, a threaded plug-type cleanout shall be installed immediately upstream of the sanitary cross fitting.
C. Shower drains with two (2) inch traps are not required to have a cleanout if the developed length of the shower drain is no more than ten (10) feet in length.
D. Besides the main cleanout for the building sewer located just outside and downstream of the residence, a second cleanout shall be located upstream of the first floor water closet plumbed the greatest distance from the point the building sewer leaves the residence. This cleanout shall be the same diameter as the pipe it serves and be located at ground level and within five (5) feet of the building, or in the outside wall no higher than two (2) feet above ground level.

P3008.1 Sewage backflow. - Amendatory. Where the flood level rims of plumbing fixtures are below the elevation of the manhole cover of the next upstream manhole in the public
sewer, the fixtures shall be protected by a backwater valve installed in the building drain, branch of the building drain or horizontal branch serving such fixtures.

PART VIII—ELECTRICAL

E3402.2 Penetrations of fire-resistance-rated assemblies. - Amendatory. Electrical installations in hollow spaces, vertical shafts and ventilation or air-handling ducts shall be made so that the possible spread of fire or products of combustion will not be substantially increased. Electrical penetrations through fire-resistance-rated walls, partitions, floors or ceilings shall be protected by approved methods to maintain the fire-resistance rating of the element penetrated. Penetrations of fire-resistance-rated walls shall be limited as specified in Section R302.4 (300.21)

E3403.3 Listing and labeling. - Amendatory. Electrical materials, components, devices, fixtures and equipment shall be listed for the application, in accordance with NFPA 70, shall bear the label of an approved agency and shall be installed, and used, or both, in accordance with the manufacturer's installation instructions.[110.3(B)]

E3404.7 Integrity of electrical equipment. - Amendatory. Internal parts of electrical equipment, including busbars, wiring terminals, insulators and other surfaces, shall not be damaged or contaminated by foreign materials such as paint, plaster, cleaners or abrasives, and corrosive residues. There shall not be any damaged parts that might adversely affect safe operation or mechanical strength of the equipment such as parts that are broken; bent; cut; deteriorated by corrosion, chemical action, or overheating. Foreign debris shall be removed from equipment. Damaged materials, equipment, appliances, and devices shall not be reused unless such elements have been reconditioned, tested, and placed in good and proper working condition and approved by a Nationally Recognized Testing Laboratory (NRTL), or by the manufacturer of the equipment. Electrical equipment damaged by natural or man-made events shall be reused only as recommended by the manufacturer of such equipment. [110.12(B)]

E3501.1 Scope. – Amendatory. Definition added.

UNFINISHED ROOM. A room with either the floor decking and/or heating/air conditioning not installed.

E3604.3 Point of Attachment. - Amendatory. The point of the overhead service entrance and attachment to the electric utility company’s service wires on a building shall be a minimum of ten (10) feet above finished grade.

Exception: For existing structures with new overhead services, the point of attachment shall be nine (9) feet above the ground; and clearances shall be provided as required by the National Electrical Code.
E3604.5 Service masts as supports. - Amendatory. Where a service mast is used for the support of service-drop conductors, it shall be of adequate strength or be supported by braces or guys to withstand the strain imposed by the service drop. Where raceway-type service masts are used, all equipment shall be approved. Only power service drop conductors shall be permitted to be attached to a service mast. The minimum size of rigid metal conduit (RMC) shall be two (2) inches for services up to and including two hundred (200) amperes, and two and one-half (2½) inches for services over two hundred (200) amperes.

E3604.7 Compliance with Utility Company Regulations - Added. All electric metering equipment, the ownership and responsibility for which rests with the electric utility company furnishing electricity to such meter, shall be placed, wired, installed and equipped in accordance with the rules and regulations of such electric utility company.

E3702.3 Fifteen- and 20-ampere branch circuits. - Amendatory. A 15- or 20-ampere branch circuit shall be permitted to supply lighting units, or other utilization equipment, or a combination of both. The rating of any one cord-and-plug connected utilization equipment not fastened in place shall not exceed 80 percent of the branch-circuit ampere rating. The total rating of utilization equipment fastened in place, other than luminaries, shall not exceed 50 percent of the branch-circuit ampere rating where lighting units, cord-and-plug connected utilization equipment is not fastened in place, or both, are also supplied. 20-Ampere general-purpose branch circuits shall supply a maximum of 10 outlets. 15-Ampere general-purpose branch circuits shall supply a maximum of 8 outlets. [210.23(A)(1) and (2)]

E3901.1.1 Unfinished Rooms - Added. Unfinished rooms located within new dwellings are not required to comply with this code as to the number and placement of receptacles and luminaries.

E4003.12.1 Luminaires in Dwelling Unit Dressing Rooms - Added. The dressing room is a room designed for the purpose of storage of clothing, which permits incandescent luminaires with open or partially enclosed lamps and pendant luminaires or lampholders when the dressing room shall have a distance of fifty-four (54) inches or greater from the sides and back of the closet walls, respectively, and continuing vertically to the closet ceiling parallel to the walls at a horizontal distance of the same. The dressing room may have incandescent luminaires with open or partially enclosed lamps and pendant light fixtures where the distance to the combustibles in any configuration is thirty (30) inches or greater to the nearest edge of the luminaire.

E4206.4.1 Luminaires. - Amendatory. Luminaires shall not operate above the low-voltage contact limit as defined in E4202.1. [680.23(A)(4)].

Section 202. - Protection of existing rights and remedies.

Nothing in this chapter shall be construed to affect any suit or proceeding pending in any court, or any rights acquitted, or liability incurred, or any cause or causes of action acquired or existing under any act or provision hereby repealed; nor shall this chapter require any changes in work
which has been lawfully authorized prior to the adoption of this chapter, so long as such work is actually commenced within sixty (60) days after its adoption.

Section 203. Violation Penalties—Amendatory.

It shall be unlawful and a misdemeanor offense for any person, firm, corporation, limited liability company or other entity to violate any of the provisions of this code, fail to comply with any of the requirements thereof, or to erect, construct, alter, repair or change the occupancy of any building or structure in violation of an approved plan or directive of the building official or of a permit or certificate issued under the provisions of this code. Any person, firm, corporation, limited liability company or other entity convicted of a violation of this code shall be guilty of a misdemeanor offense and shall be punished by a fine of not more than One Thousand Two Hundred Dollars ($1,200.00), excluding costs, fees, and assessments, or by imprisonment for a period not exceeding six (6) months, or by both such fine and imprisonment. Each day, or portion thereof, during which a violation is committed, or continued, shall be deemed a separate offense.”

Section 2. SEVERABILITY CLAUSE. If any section, sentence, clause or phrase of this ordinance or any part thereof is for any reason found to be invalid by a court of competent jurisdiction, such decision shall not affect the validity of the remainder of this ordinance or any part thereof.

Section 3. REPEAL OF CONFLICTING ORDINANCES. That all ordinances or parts of ordinances in conflict herewith be and the same are now expressly repealed.

Section 4. EMERGENCY CLAUSE. That an emergency is now declared to exist for the preservation of the public peace, health and safety, by reason whereof this ordinance shall take effect immediately from and after its passage, approval and publication.

ADOPTED by the Council: 11-30-16
Date

Chair of the Council

ADOPTED as an emergency measure: 11-30-16

Chair of the Council

RRE/fm
10/5/16