

Differences between the 2013 RCO and the 2018 RCO

1/29/2019

Montgomery County Building Regulations

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Note: The text that is *italicized* is addition information on the type of change. Not Code Text.
The text that is underlined is new language within existing language.

Noted Changes in the 2018 RCO

CHAPTER 1

101.2 Scope ... any accessory structure incidental to that dwelling house including electrical equipment associated with bodies of water as defined in article 680 of NFPA 70 as referenced in part IX, chapter 44. *Includes electrical equipment coming from building services associated with bodies of water (pools, spas and ponds)*

101.2 Scope- Exception 1 –Manufactured homes constructed under “24CFR Part 3280,” “Manufactured Home Construction and Safety Standards” and used as a dwelling or by a park operator to promote the sale/rental of manufactured homes. *Exempt all work related to manufactured home as dwelling*

101.2 Scope- Exception 12 -Wind turbines, pumps, site lighting, and flagpoles not connected to building services equipment. *Exempt poles and equipment not connected to building services.*

101.2 Scope- Exception 13 - Fixed or floating docks (including the electrical wiring and lighting systems serving the docks not connected to building services equipment. *Exempt all work related to fixed or floating docks*

101.2 Scope- Exception 14- Retaining walls, bridges, walkways or site stairs unless associated with or necessary for the building or the building egress to comply with the rules of the board. *Exempt retaining walls, bridges, site stairs – not required*

101.2 Scope- Exception 15- The applicable provisions of the OBC shall apply when installing components, equipment, and systems for which there are no provisions in this code. *Change #13 to #15 to address the application of OBC provisions to construction in a dwelling*

101.2 Scope- Exception 16- When buildings regulated by the OBC are permitted to use the construction requirements of this code, such buildings remain within the scope of the OBC. *Change #14 to #16 to clarify a commercial building using the RCO for construction criteria remains a commercial building*

101.5 Jurisdiction without a certified residential building department. If no municipal, township, or county building department is certified by the Board of Building Standards for residential buildings in accordance with section 3781.10(E) of the Revised Code has jurisdiction, the owner is not required to make submission of construction documents, seek approvals, request inspections, or obtain certificates of occupancy required in this Chapter. *Clarify – jurisdictions without a residential building dept.*

102.8.2 Elevators and lifts. Non-required elevators and platform lifts shall be installed in accordance with Section 321. *Clarify – non-required elevator and lift requirements*

102.10 Work Exempt from Approval:

Building-11; Battery operated smoke or carbon monoxide alarms installed in existing buildings where no construction is taking place. *Add – battery operated alarms without other construction*

Gas-10: Process equipment including the associated tanks, foundations, and process piping. For combination building services/process or power piping systems, the power or process piping located downstream of the control valve which separates the process from the building services piping is exempt from approval. *Add – process equipment – exempt from approval.*

105.01.4 Phased approval. The residential building official shall issue an approval for the residential construction of foundations, floors, walls, roofs or any other part of a building, structure, or building service equipment before the residential construction documents for the whole building, structure or building service equipment have been submitted, provided that adequate information and detailed statements have been filed complying with applicable requirements of this code. The holder of such approval for the foundations, floors, walls, roofs or other parts of a building or structure shall proceed at the holder's own risk with the building operation and without assurance that an approval for the entire structure will be granted. Such approvals shall be issued for various stages in the sequence of construction provided that all information and data required by the code for that portion of the building or structure has been submitted. The holder of a phased plan approval may proceed only to the point for which approval has been given. *Clarify - phased approval*

111.1.1.2 Residential building alterations or additions. A residential building or structure enlarged, extended or altered, in whole or in part, shall not be occupied or used until a certificate of occupancy has been issued. Occupancy of spaces within a building which are unaffected by the work of alteration shall be allowed to continue if the residential building official determines the existing spaces can be occupied safely until the completion of the alteration. *Add a certificate of completion for alterations/repairs performed while building remains occupied.*

113.5 Replacement of systems, components and materials. Replacements of an existing system (egress, fire protection, mechanical, plumbing, etc.) and materials or building components not otherwise provided for in this section, shall conform to that required for new construction to the extent of the alteration. The existing systems, materials, or components shall not be required to comply with all of the requirements of this code for new construction except to the extent that they are affected by the alteration. Replacement of existing systems, materials, or components shall not cause them to become unsafe, hazardous, overloaded, or become less effective than when originally installed, constructed, and/or approved. *Clarify alteration - replacement (not repair)*

113.6 Repairs to systems, components and materials. Repair of residential building components, systems and materials or building components not otherwise provided for in this section, shall not be required to meet the provisions for new construction, provided such work is done in accordance with the conditions of the existing approval in the same manner and arrangement as was in the existing system, is not less safe than when originally installed and is approved. *Clarify alteration - repair (not minor)*

113.7.3 Type B family day care homes. When a residential building that is intended to be used in whole or in part as a type B family day-care home and is required to be licensed, the residential building shall be inspected in accordance with the type B family day-care home checklist (available from the board of building standards). The residential building official shall issue a report of the findings to the Ohio department of jobs and family services. *Include Type B family day care homes*

113.8 Moved structures. Residential structures moved shall be safe and sanitary and any repair, alteration, or change in occupancy shall comply with the provisions of this code for new structures. Field work, building location, foundations and foundation connections, wind loads, seismic loads, snow loads, and flood loads, shall comply with the requirements of this code.

The residential building official shall be authorized to inspect, or require inspection at the expense of the owner, the various components of a relocated building to verify that they have not sustained damage. Building service equipment, mechanical, plumbing, and fire protection systems shall be tested to assure that they are in operating condition. Any repairs or alterations required as a result of such inspections shall be approved and completed prior to issuance of the certificate of occupancy.

Buildings previously approved as industrialized units, when moved after first occupancy are to be evaluated for conformance in accordance with this section by the residential building official in the jurisdiction where the building is intended to be relocated. *Clarify an IU becomes an existing building after initial installation.*

114.3.2.1 Evaluation Service Reports. Building officials are authorized to accept evaluation service reports for materials, products, assemblies, and methods of construction from recognized evaluation service agencies after reviewing and verifying all of the following minimum information in the evaluation service report: *Add provision for use of Evaluation Service Reports (ES reports)*

1. Identification and description of the product specifically addressed in the report and a description of how the product can be identified;
2. Identification of the specific code provisions to which the product was evaluated as a suitable alternative to the requirements of the code;
3. The product installation requirements;
4. The statement of the conditions and limitations of use of the product; and
5. List the test reports used in the evaluation.

CHAPTER 2 DEFINITIONS

ACCESS (TO). That which enables a device, an appliance or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel, door or similar obstruction. *Clarification of difference between accessible and access to.*

ACCESSORY STRUCTURE. A building, the use of which is incidental to that of the dwelling(s) and that is located on the same lot. *Modify definition to remove size limitation. Previously adopted*

AIR BARRIER. One or more materials joined together in a continuous manner to restrict or prevent the passage of air through the building thermal envelope and its assemblies. *From Chapter 11 – Energy Efficiency Relocate all definitions to Chapter 2*

ALTERNATING TREAD DEVICE. A device that has a series of steps between 50 and 70 degrees (0.87 and 1.22 rad) from horizontal, usually attached. *Modify definition to remove size limitation. Added definition.*

ATTIC, HABITABLE. A finished or unfinished habitable space within an attic. *Simplified definition.*

BUILDING THERMAL ENVELOPE. The basement walls, exterior walls, floors, ceilings, roofs and any other building element assemblies that enclose conditioned space or provide a boundary between

conditioned space and exempt or unconditioned space. *From Chapter 11 – Energy Efficiency Relocate all definitions to Chapter 2*

CHANGE OF OCCUPANCY. A change in the purpose or level of activity within a building that involves a change in application of the requirements of the code. Such a change could be to an entire building or a portion of a building. A change of occupancy shall include any change that causes an increase in risk. *Added definition. Previously defined in Ohio. Keep Ohio definition.*

CARBON MONOXIDE ALARM. A single- or multiple-station alarm intended to detect carbon monoxide gas and alert occupants by a distinct audible signal. It incorporates a sensor, control components and an alarm notification appliance in a single unit. *Added definition.*

CARBON MONOXIDE DETECTOR. A device with an integral sensor to detect carbon monoxide gas and transmit an alarm signal to a connected alarm control unit. *Added definition.*

CONTINUOUS INSULATION (ci). Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior, or is integral to any opaque surface, of the building envelope. *From Chapter 11 – Energy Efficiency Relocate all definitions to Chapter 2*

CRAWL SPACE. An underfloor space that is not a basement. *Added definition.*

FENESTRATION. Products classified as either vertical fenestration or skylights and sloped glazing, installed in such a manner as to preserve the weather-resistant barrier of the wall or roof in which they are installed. Fenestration includes products with glass or other transparent or translucent materials.

Site-built fenestration product. A fenestration designed to be made up of field-glazed or field-assembled units using specific factory cut or otherwise factory-formed framing and glazing units. Examples of site-built fenestration include storefront systems, curtain walls, and atrium roof systems.

Skylights and sloped glazing. Glass or other transparent or translucent glazing material installed at a slope of 15 degrees (0.26 rad) or more from vertical. Unit skylights, tubular daylighting devices and glazing materials in solariums, sunrooms, roofs and sloped walls are included in this definition.

Skylights (Chapter 11 Energy Conservation). Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal.

Unit Skylight.. A factory assembled, glazed fenestration unit, containing one panel of glazing material, that allows for natural daylighting through an opening in the roof assembly while preserving the weather-resistant barrier of the roof.

Vertical fenestration. Windows that are fixed or movable, opaque doors, glazed doors, glazed block and combination opaque and glazed doors installed in a wall at less than 15 degrees from vertical.

Vertical fenestration (Chapter 11 Energy Conservation). Windows that are fixed or operable, opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of not less than 60 degrees (1.05 rad) from horizontal.

FUEL GAS. A natural gas, manufactured gas, liquefied petroleum gas or mixtures of these gases. *Move all definitions from Chapter 24 Fuel Gas to Chapter 2*

INSULATED SIDING. A type of continuous insulation, with manufacturer- installed insulating material as an integral part of the cladding product, having a minimum R-value of R-2. *From Chapter 11 – Energy Efficiency Relocate all definitions to Chapter 2*

INSULATED VINYL SIDING. A vinyl cladding product, with manufacturer- installed foam plastic insulating material as an integral part of the cladding product, having a thermal resistance of not less than R-2. *From Chapter 11 – Energy Efficiency Relocate all definitions to Chapter 2*

MANUFACTURER’S INSTALLATION INSTRUCTIONS. Instructions published for appliances, materials, components, products, equipment, assemblies or systems as part of the conditions of their listing and labeling. *Clarification – expand the scope beyond “equipment” when instructions shall be followed.*

OPAQUE DOOR. A door that is not less than 50-percent opaque in surface area. . *From Chapter 11 – Energy Efficiency Relocate all definitions to Chapter 2*

READY ACCESS (TO). That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel, door or similar obstruction. *Clarification of difference between accessible and access to.*

SKYLIGHT. See FENESTRATION, Skylights. *From Chapter 11 – Energy Efficiency Relocate all definitions to Chapter 2*

SKYLIGHT, UNIT. See FENESTRATION, Unit Skylight. *From Chapter 11 – Energy Efficiency Relocate all definitions to Chapter 2*

SKYLIGHTS AND SLOPED GLAZING. See FENESTRATION, Skylights and Sloped Glazing. *From Chapter 11 – Energy Efficiency Relocate all definitions to Chapter 2*

SOLAR ENERGY SYSTEM. A system that converts solar radiation to usable energy, including photovoltaic panel systems and solar thermal systems.

SOLAR HEAT GAIN COEFFICIENT (SHGC). The ratio of the solar heat gain entering the space through the fenestration assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation that is then reradiated, conducted or convected into the space.

SOLAR THERMAL COLLECTOR. Components in a solar thermal system that collect and convert solar radiation to thermal energy.

SOLAR THERMAL SYSTEM. A system that converts solar radiation to thermal energy for use in heating or cooling. *Added definition related to solar energy systems to clarify the related provisions in Chapters 3 and 9.*

STRUCTURAL COMPOSITE LUMBER. Structural members manufactured using wood elements bonded together with exterior adhesives.

Examples of structural composite lumber are:

Laminated strand lumber (LSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member, where the least dimension of the wood strand elements is 0.10 inch (2.54 mm) or less and their average lengths are not less than 150 times the least dimension of the wood strand elements.

Laminated veneer lumber (LVL). A composite of wood veneer elements with wood fibers primarily oriented along the length of the member, where the veneer element thicknesses are 0.25 inch (6.4 mm) or less.

Oriented strand lumber (OSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member, where the least dimension of the wood strand elements is 0.10 inch (2.54 mm) or less and their average lengths are not less than 75 times and less than 150 times the least dimension of the wood strand elements.

Parallel strand lumber (PSL). A composite of wood strand elements with wood fibers primarily oriented along the length of the member, where the least dimension of the wood strand elements is 0.25 inch (6.4 mm) or less and their average lengths are not less than 300 times the least dimension of the wood strand elements.

TOWNHOUSE: Deleted term

VERTICAL FENESTRATION. See FENESTRATION, vertical. *From Chapter 11 – Energy Efficiency Relocate all definitions to Chapter 2*

WINDBORNE DEBRIS REGION. *Deleted.*

CHAPTER 3 BUILDING PLANNING

Table 301.2(1) – Fixed constants for Ohio / Removed Man. J

Wind Design Maps updated for Vult

Figures 301.2(2) & (3) – Added an area of SDC C

Figure 301.2(8) – Component and cladding pressure zones

Table 301.2(2) – Component and cladding loads

301.2.1 Wind design criteria. Buildings and portions thereof shall be constructed in accordance with the wind provisions of this code using the ultimate design wind speed in Table 301.2(1) as determined from Figure 301.2(5)A. The structural provisions of this code for wind loads are not permitted where wind design is required as specified in Section 301.2.1.1. Where different construction methods and structural materials are used for various portions of a building, the applicable requirements of this section for each portion shall apply. Where not otherwise specified, the wind loads listed in Table 301.2(2) adjusted for height and exposure using Table 301.2(3) shall be used to determine design load performance

requirements for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors and exterior doors. Asphalt shingles shall be designed for wind speeds in accordance with Section 905.2.4. A continuous load path shall be provided to transmit the applicable uplift forces in Section from the roof assembly to the foundation. *Wind design criteria – Clarify intent.*

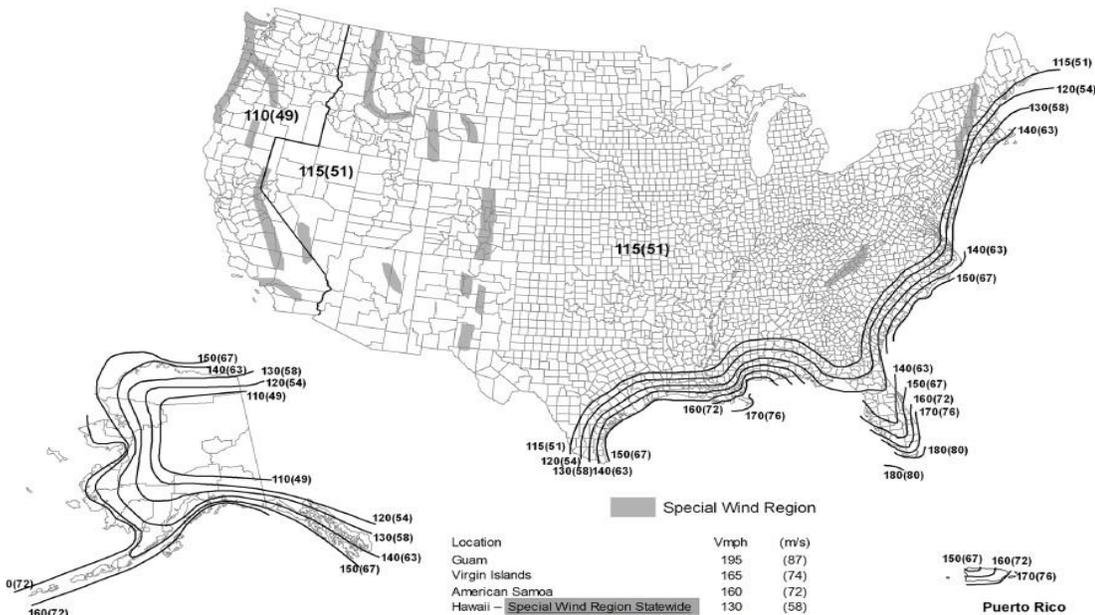
GROUND SNOW LOAD ^o	WIND DESIGN	SEISMIC DESIGN CATEGORY	SUBJECT TO DAMAGE FROM			WINTER DESIGN TEMP. ^e	ICE BARRIER UNDERLAYMENT REQUIRED ^h	FLOOD HAZARDS ^g	AIR FREEZING INDEX ⁱ	MEAN ANNUAL TEMP ^j
	Speed ^d (mph)		Weathering ^a	Frost line depth ^b	Termite ^c					
	115		severe		Moderate to heavy		Yes			
MANUAL J DESIGN CRITERIA ^u										
<i>Deleted portion of table – owners shall use manual J when required by this code</i>										

For SI: 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s.

- a. Where weathering requires a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code, the frost line depth strength required for weathering shall govern. The grade of masonry units shall be determined from ASTM C34, C55, C62, C73, C90, C129, C145, C216 or C652.
- b. Where the frost line depth requires deeper footings than indicated in Figure R403.1(1), the frost line depth strength required for weathering shall govern. The jurisdiction shall fill in the frost line depth column with the minimum depth of footing below finish grade.
- c. *Indicates* the need for protection depending on whether there has been a history of local subterranean termite damage.
- d. Wind exposure category shall be determined on a site-specific basis in accordance with Section 301.2.1.4.

The outdoor design dry-bulb temperature shall be *determined from the following table*

301.2 Wind speed table changed from 90 MPH 3 second gusts to 115 Ultimate wind speed.



- Notes:
1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.
 2. Linear interpolation between contours is permitted.
 3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
 4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
 5. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

301.2.1.3 Wind speed conversion. Where referenced documents are based on nominal design wind speeds and do not provide the means for conversion between ultimate design wind speeds and nominal design wind speeds, the ultimate design wind speeds, V_{ult} , of Figure 301.2(5)A shall be converted to nominal design wind speeds, V_{asd} , using Table 301.2.1.3.

**TABLE 301.2.1.3
WIND SPEED CONVERSIONS^a**

V_{ult}	110	115	120	130	140	150	160	170	180	190	200
V_{asd}	85	89	93	101	108	116	124	132	139	147	155

For SI: 1 mile per hour = 0.447 m/s.

a. Linear interpolation is permitted.

301.2.1.1 Wind limitations and wind design required. *Deleted. Wind design limitations – not applicable in Ohio*

301.2.1.1.1 Sunrooms. Sunrooms shall comply with AAMA/NPEA/NSA 2100. For the purpose of applying the criteria of AAMA/NPEA/NSA 2100 based on the intended use, sunrooms shall be identified as one of the following categories by the permit applicant, design professional or the property owner or owner’s agent in the construction documents. Component and cladding pressures shall be used for the design of elements that do not qualify as main windforce-resisting systems. Main windforce-resisting system pressures shall be used for the design of elements assigned to provide support and stability for the overall sunroom. *Sunrooms – Category descriptions*

TABLE 301.2.1.2. DELETED. Windborne debris protection fastening schedule for wood structural panels: *Opening protection -Windborne debris – not applicable in Ohio*

301.2.1.4 Exposure category. Deleted Exposure A, large Cities.

301 2.1.5 Topographic wind effects. *Deleted*

TABLE 301.2.1.5.1 ULTIMATE DESIGN WIND SPEED MODIFICATION FOR TOPOGRAPHIC WIND EFFECT a,b *Deleted*

FIGURE 301.2.1.5.1(1) TOPOGRAPHIC FEATURES FOR WIND SPEED-UP EFFECT Deleted

FIGURE 301.2.1.5.1(2) ILLUSTRATION OF WHERE ON A TOPOGRAPHIC FEATURE, WIND SPEED INCREASE IS APPLIED. Deleted

301.2.1.5.1 Simplified topographic wind speed-up method. Deleted

301.2.2 Seismic provisions. Buildings in Seismic Design Categories C shall be constructed in accordance with the requirements of this section and other seismic requirements of this code. The seismic provisions of this code shall apply as follows:

1. Buildings with four or more dwelling units in Seismic Design Categories C.
2. Deleted

Components of buildings not required to be designed to resist seismic loads shall be constructed in accordance with the provisions of this code. *Seismic provisions*

301.2.2.1 Determination of seismic design category. Buildings shall be assigned a seismic design category in accordance with Figure 301.2(2) and Table 301.2.2.1.1 *Seismic Design Category – Identified zone meeting Category “C” existing in Ohio. See Figures 301.2(2) and 301.2(3)*

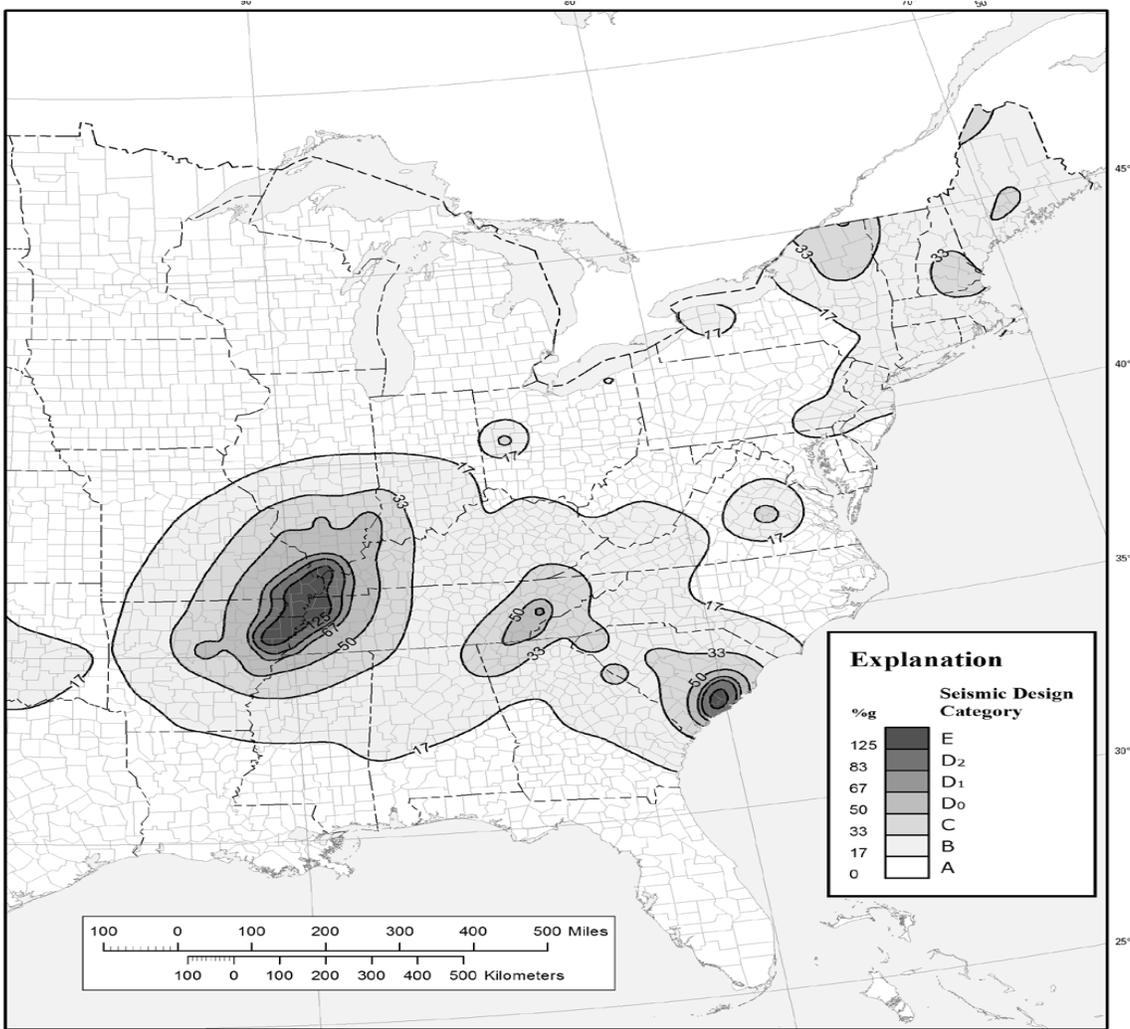


Figure 301.2(2)

TABLE 301.2.2.1.1
SEISMIC DESIGN CATEGORY DETERMINATION

CALCULATED	SEISMIC
$SDS \leq 0.17g$	A
$0.17g < SDS \leq 0.33g$	B
$0.33g < SDS \leq 0.50g$	C

301.2.2.1.2 Alternative determination of Seismic Design Category E. Deleted

301.2.2.6 Irregular Building Seismic provisions. See text: *rearrange for ease of use*

301.2.4 Floodplain construction. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table 301.2(1), and substantial improvement and repair of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with Section 322. Buildings and structures that are located in more than one flood hazard area shall comply with the provisions associated with the most restrictive flood hazard area.

Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24. *Floodplain construction – Must comply with most restrictive*

301.3 Story height. The wind and seismic provisions of this code shall apply to buildings with story heights not exceeding the following:

1. For wood wall framing, the story height shall not exceed 11 feet 7 inches (3531 mm) and the laterally unsupported bearing wall stud height permitted by Table 602.3(5).

2. For cold-formed steel wall framing, the story height shall be not more than 11 feet 7 inches (3531 mm) and the unsupported bearing wall stud height shall be not more than 10 feet (3048 mm).

3. For masonry walls, the story height shall be not more than 13 feet 7 inches (4140 mm) and the bearing wall clear height shall be not more than 12 feet (3658 mm).

Exception: An additional 8 feet (2438 mm) of bearing wall clear height is permitted for gable end walls.

4. For insulating concrete form walls, the maximum story height shall not exceed 11 feet 7 inches (3531 mm) and the maximum unsupported wall height per story as permitted by Section 608 tables shall not exceed 10 feet (3048 mm).

5. For structural insulated panel (SIP) walls, the story height shall be not more than 11 feet 7 inches (3531 mm) and the bearing wall height per story as permitted by Section 610 tables shall not exceed 10 feet (3048 mm).

Individual walls or wall studs shall be permitted to exceed these limits as permitted by Chapter 6 provisions, provided that story heights are not exceeded. An engineered design shall be provided for the wall or wall framing members where the limits of Chapter 6 are exceeded. Where the story height limits of this section are exceeded, the design of the building, or the noncompliant portions thereof, to resist wind and seismic loads shall be in accordance with the Ohio building code. *Story Height – max.ht. 11’-7” for frame; 13’-7” for masonry. Old code was 12’ frame, 10’ steel, and 12’ masonry*

**TABLE 301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS
(in pounds per square foot)**

USE	LIVE LOAD
<i>Uninhabitable</i> attics without storage ^b	10
<i>Uninhabitable</i> attics with limited storage ^{b,g}	20
Habitable attics and attics served with fixed stairs	30
Balconies (exterior) and decks ^e	40
Fire escapes	40
Guards and handrails ^d	200 ^h
Guard in-fill components ^f	50 ^h
Passenger vehicle garages ^a	50 ^a
Rooms other than sleeping rooms	40
Sleeping rooms	30
Stairs	40 ^c

For SI: 1 pound per square foot = 0.0479 kPa, 1 square inch = 645 mm², 1 pound = 4.45 N.

Clarify attic live loads added word uninhabitable to attic without and limited storage.

SECTION 302

FIRE-RESISTANT CONSTRUCTION

302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table 302.1(1); or dwellings equipped throughout with an

automatic sprinkler system installed in accordance with Section 2904 shall comply with Table 302.1(2). *Different separation tables for homes with and without suppression systems. See Text:*

302.2.2 Deleting references to Townhouses, in separation assemblies

302.2.3 Deleting references to Townhouse, in separation assemblies, parapet extensions.

302.3 Two-family dwellings. Dwelling units in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a 1- hour fire-resistance rating where tested in accordance with ASTM E119, UL 263 or Section 703.3 of the Ohio building code... *Dwelling unit separation – Added use of OBC section 703.3*

302.4.2 (4). Ceiling membrane penetrations by listed and labeled luminaires or by luminaires protected with listed materials that have been tested for use in fire resistance-rated assemblies and are installed in accordance with the instructions included in the listing. *Membrane penetration – Listed luminaires permitted*

302.10.1 Insulation: Insulating materials, where tested in accordance with the requirements of this section, shall include facings, where used, such as vapor retarders, vapor permeable membranes and similar coverings. *Flame Spread - Insulation Re-written*

302.13 Fire protection of floors:

Exception 2. Floor assemblies located directly over an underfloor space as referenced in section 408 and not intended for storage or for the installation of fuel- fired or electric-powered heating appliances. *Moved section from 502.14 and includes electrical powered heating appliance in crawlspace; not exempt.*

303.4 Mechanical ventilation. Where the air infiltration rate of a dwelling unit is 5 air changes per hour or less where tested with a blower door at a pressure of 0.2 inch w.c. (50 Pa) in accordance with Section 1102.4.1.2 or Section 1112.2.4.2.1, the dwelling unit shall be provided with whole-house mechanical ventilation in accordance with Section 1505.4. *Ventilation-mechanical required under 5ACH, which is required by the energy code.*

303.5.1 Air Intake Openings:

Exceptions:

1. The 10-foot (3048 mm) separation is not required where the intake opening is located 3 feet (914 mm) or greater below the contaminant source.
2. Vents and chimneys serving fuel-burning appliances shall be terminated in accordance with the applicable provisions of Chapters 18 and 24.
3. Clothes dryer exhaust ducts shall be terminated in accordance with Section 1502.3. *Ventilation-intake - 3' below if contaminant is <10'*

303.7 Interior stairway illumination. Interior stairways shall be provided with an artificial light source to illuminate the landings and treads. The light source shall be capable of illuminating treads and landings to levels of not less than 1 foot- candle (11 lux) as measured at the center of treads and landings. There shall be a wall switch at each floor level to control the light source where the stairway has six or more risers. *Re-written*

Exception: A switch is not required where remote, central or automatic control of lighting is provided.
Stairway illumination – Clarify – separate interior

303.8 Exterior stairway illumination. Exterior stairways shall be provided with an artificial light source located at the top landing of the stairway. Exterior stairways providing access to a basement from the outdoor grade level shall be provided with an artificial light source located at the bottom landing of the stairway. *Stairway illumination -Clarify – separate exterior.*

304.1 Minimum area. Habitable rooms shall have a floor area of not less than 70 square feet (6.5 m²).
Exception: Kitchens. *Habitable room area – minimum reduced to 70 sf from 150 sf.*

305.1 Minimum ceiling height: Exception (3.) Beams, girders, ducts or other obstructions in basements containing habitable space shall be permitted to project to within 6 feet 4 inches (1931 mm) of the finished floor. *Ceiling Height – minimum height reduced for obstructions in finished basements to 6'-4" from 7'.*

NOTE: Section 308.4 has had an extensive re-write but appears to be similar to the 2013 text.

308.4 Hazardous locations. The locations specified in Sections 308.4.1 through 308.4.7 shall be considered to be specific hazardous locations for the purposes of glazing. *Re-written*

308.4.1 Glazing in doors. Glazing in fixed and operable panels of swinging, sliding and bifold doors shall be considered to be a hazardous location.

Exceptions:

1. Glazed openings of a size through which a 3 -inch-diameter (76 mm) sphere is unable to pass.
2. Decorative glazing. *Re-written*

308.4.2 Glazing adjacent to doors. Glazing in an individual fixed or operable panel adjacent to a door shall be considered to be a hazardous location where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) above the floor or walking surface and it meets either of the following conditions:

1. Where the glazing is within 24 inches (610 mm) of either side of the door in the plane of the door in a closed position.
2. Where the glazing is on a wall less than 180 degrees (3.14 rad) from the plane of the door in a closed position and within 24 inches (610 mm) of the hinge side of an in-swinging door.

Exceptions:

1. Decorative glazing.
2. Where there is an intervening wall or other permanent barrier between the door and the glazing.
3. Where access through the door is to a closet or storage area 3 feet (914 mm) or less in depth. Glazing in this application shall comply with Section 308.4.3.
4. Glazing that is adjacent to the fixed panel of patio doors.

Deleted the exception, that exempted glazing close to the latch side of the door.

308.4.3 Glazing in windows. Glazing in an individual fixed or operable panel that meets all of the following conditions shall be considered to be a hazardous location:

1. The exposed area of an individual pane is larger than 9 square feet (0.836 m²).

2. The bottom edge of the glazing is less than 18 inches (457 mm) above the floor.
3. The top edge of the glazing is more than 36 inches (914 mm) above the floor.
4. One or more walking surfaces are within 36 inches (914 mm), measured horizontally and in a straight line, of the glazing.

Exceptions:

1. Decorative glazing.
2. Where glazing is adjacent to a walking surface and a horizontal rail is installed 34 to 38 inches (864 to 965 mm) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and have a cross-sectional height of not less than 1 1/2 inches (38 mm).
3. Outboard panes in insulating glass units and other multiple glazed panels where the bottom edge of the glass is 25 feet (7620 mm) or more above grade, a roof, walking surfaces or other horizontal [within 45degrees (0.79 rad) of horizontal] surface adjacent to the glass exterior. *Re-written*

308.4.4 Glazing in guards and railings. Glazing in guards and railings, including structural baluster panels and nonstructural in-fill panels, regardless of area or height above a walking surface shall be considered to be a hazardous location. *Re-written*

308.4.4.1 Structural glass baluster panels. Guards with structural glass baluster panels shall be installed with an attached top rail or handrail. The top rail or handrail shall be supported by not less than three glass baluster panels, or shall be otherwise supported to remain in place should one glass baluster panel fail.

Exception: An attached top rail or handrail is not required where the glass baluster panels are laminated glass with two or more glass plies of equal thickness and of the same glass type. *Re-written*

308.4.5 Glazing and wet surfaces. Glazing in walls, enclosures or fences containing or facing hot tubs, spas, whirlpools, saunas, steam rooms, bathtubs, showers and indoor or outdoor swimming pools where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) measured vertically above any standing or walking surface shall be considered to be a hazardous location. This shall apply to single glazing and each pane in multiple glazing.

Exception: Glazing that is more than 60 inches (1524 mm), measured horizontally and in a straight line, from the water's edge of a bathtub, hot tub, spa, whirlpool or swimming pool or from the edge of a shower, sauna or steam room. *Re-written*

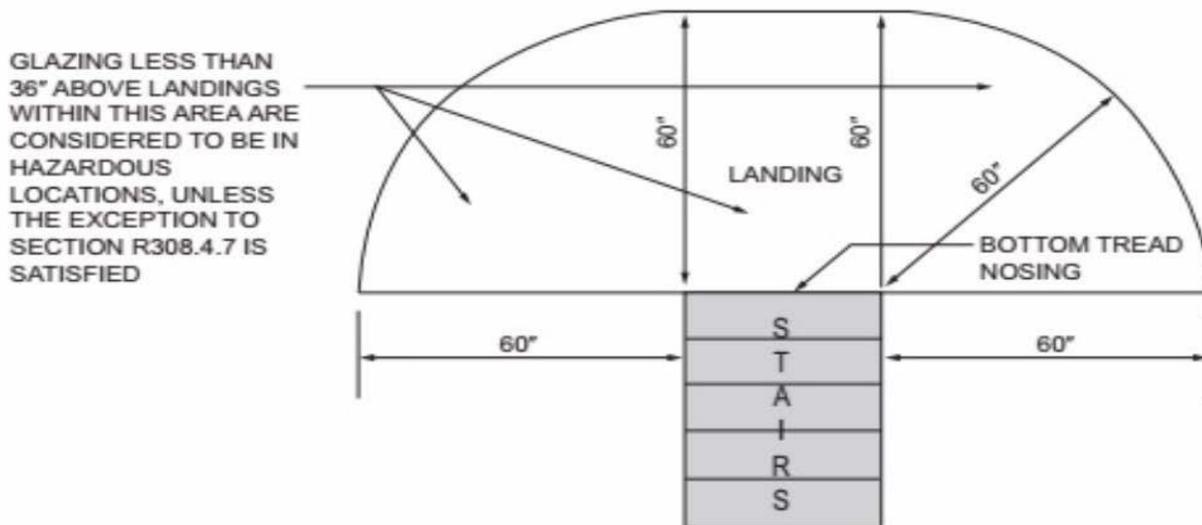
308.4.6 Glazing adjacent to stairs and ramps. Glazing where the bottom exposed edge of the glazing is less than 36 inches (914 mm) above the plane of the adjacent walking surface of stairways, landings between flights of stairs and ramps shall be considered to be a hazardous location.

Exceptions:

1. Where glazing is adjacent to a walking surface and a horizontal rail is installed at 34 to 38 inches (864 to 965 mm) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and have a cross-sectional height of not less than 1 1/2 inches (38 mm).
2. Glazing 36 inches (914 mm) or more measured horizontally from the walking surface. *Re-written*

308.4.7 Glazing adjacent to the bottom stair landing. Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than 36 inches (914 mm) above the landing and within a 60-inch (1524 mm) horizontal arc less than 180 degrees (3.14 rad) from the bottom tread nosing shall be considered to be a hazardous location.

Exception: Where the glazing is protected by a guard complying with Section 312 and the plane of the glass is more than 18 inches (457 mm) from the guard. *Re-written*



For SI: 1 inch = 25.4 mm.

FIGURE 308.4.7 *New Figure*
HAZARDOUS GLAZING LOCATIONS AT BOTTOM STAIR LANDINGS

309.5 Fire sprinklers. Private garages shall be protected by fire sprinklers where the garage wall has been designed based on Table 302.1(2), Note a. Sprinklers in garages shall be connected to an automatic sprinkler system that complies with Section 2904. Garage sprinklers shall be residential sprinklers or quick-response sprinklers, designed to provide a density of 0.05 gpm/ft². Garage doors shall not be considered obstructions with respect to sprinkler placement. *Required where houses and flats contain sprinkler systems and reduced distances to property lines have been applied.*

310.1 Emergency escape and rescue opening required. Every sleeping room shall have not less than one operable emergency escape and rescue opening. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

Exceptions: Where the dwelling or dwelling unit is equipped with an automatic sprinkler system installed in accordance with Section 2904, sleeping rooms in basements shall not be required to have emergency escape and rescue openings provided that the basement has one of the following:

1. One means of egress complying with Section 311 and one emergency escape and rescue opening.
2. Two means of egress complying with Section 311. *Exception for suppressed buildings*

310.2.3.2 Drainage. Window wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section 405.1 or by an approved alternative method.

Exception: A drainage system for window wells is not required where the foundation is on well-drained soil or sand-gravel mixture soils in accordance with the United Soil Classification System, Group I Soils, as detailed in Table 405.1. *Requirements for window well drainage.*

310.3 Emergency escape and rescue doors. Where a door is provided as the required emergency escape and rescue opening, it shall be a side-hinged door or a slider. Where the opening is below the adjacent grade, it shall be provided with an area well. *New Section*

310.3.1 Minimum door opening size. The minimum net clear height opening for any door that serves as an emergency and escape rescue opening shall be in accordance with Section 310.2.1. *New Section*

310.3.2 Area wells. Area wells shall have a width of not less than 36 inches (914 mm). The area well shall be sized to allow the emergency escape and rescue door to be fully opened. *New Section*

310.3.2.1 Ladder and steps. Area wells with a vertical depth greater than 44 inches (1118 mm) shall be equipped with a permanently affixed ladder or steps usable with the door in the fully open position. Ladders or steps required by this section shall not be required to comply with Section *New Section*

310.3.2.2 Drainage. Area wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section 405.1 or by an approved alternative method.

Exception: A drainage system for area wells is not required where the foundation is on well-drained soil or sand-gravel mixture soils in accordance with the United Soil Classification System, Group I Soils, as detailed in Table 405.1. *Area wells for Emergency/rescue doors*

310.5 Dwelling additions. Where dwelling additions contain sleeping rooms, an emergency escape and rescue opening shall be provided in each new sleeping room. *Clairification*

310.6 Alterations or repairs of existing basements. An emergency escape and rescue opening is not required where existing basements undergo alterations or repairs. *Clairification*

Exception: New sleeping rooms created in an existing basement shall be provided with emergency escape and rescue openings in accordance with Section 310.1. *Clairification*

311.1 Means of egress. Dwellings 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 requiring travel through a garage. The required egress door shall open directly into a public way or to a yard or court that opens to a public way. *Means of egress – egress door opens to public way*

311.3.2 Floor elevations at other exterior doors. Doors other than the required egress door shall be provided with landings or floors not more than 8 1/4 -inches (209 mm) below the top of the threshold.

Exception: A top landing is not required for the stairway located on the exterior side of the door, provided that the threshold of the door is not more than 30" above the adjacent grade and the door does not swing over the stairway. *New landing exception instead of 2 risers.*

311.7.6 Landings for stairways. There shall be a floor or landing at the top and bottom of each stairway. The width perpendicular to the direction of travel shall be not less than the width of the flight served. For landings of shapes other than square or rectangular, the depth at the walk line and the total area shall be not less than that of a quarter circle with a radius equal to the required landing width. Where the stairway has a straight run, the depth in the direction of travel shall be not less than 36 inches (914 mm).

311.7.11 Alternating tread devices. Alternating tread devices shall not be used as an element of a means of egress. Alternating tread devices shall be permitted provided that a required means of egress stairway or ramp serves the same space at each adjoining level or where a means of egress is not required. The clear width at and below the handrails shall be not less than 20 inches (508 mm).

Exception: Alternating tread devices are allowed to be used as an element of a means of egress for lofts, mezzanines and similar areas of 200 gross square feet (18.6m²) or less where such devices do not provide exclusive access to a kitchen or bathroom. *Stair-alternating tread devices – New*

311.7.11.1 Treads of alternating tread devices. Alternating tread devices shall have a tread depth of not less than 5 inches (127 mm), a projected tread depth of not less than 8 1/2 inches (216 mm), a tread width of not less than 7 inches (178 mm) and a riser height of not more than 9 1/2 inches (241 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projections of adjacent treads. The riser height shall be measured vertically between the leading edges of adjacent treads. The riser height and tread depth provided shall result in an angle of ascent from the horizontal of between 50 and 70 degrees (0.87 and 1.22 rad). The initial tread of the device shall begin at the same elevation as the platform, landing or floor surface. *Stair-alternating tread devices – New*

311.7.11.2 Handrails of alternating tread devices. Handrails shall be provided on both sides of alternating tread devices and shall comply with Sections 311.7.8.2 to 311.7.8.6. Handrail height shall be uniform, not less than 30 inches (762 mm) and not more than 34 inches (864 mm). *Stair-alternating tread devices – New*

311.7.12 Ships ladders. Ships ladders shall not be used as an element of a means of egress. Ships ladders shall be permitted provided that a required means of egress stairway or ramp serves the same space at each adjoining level or where a means of egress is not required. The clear width at and below the handrails shall be not less than 20 inches (508 mm).

Exception: Ships ladders are allowed to be used as an element of a means of egress for lofts, mezzanines and similar areas of 200 gross square feet (18.6 m²) or less that do not provide exclusive access to a kitchen or bathroom. *Stair-Ships ladder - New*

311.7.12.1 Treads of ships ladders. Treads shall have a depth of not less than 5 inches (127 mm). The tread shall be projected such that the total of the tread depth plus the nosing projection is not less than 8-1/2 inches (216 mm). The riser height shall be not more than 9 1/2 inches (241 mm). *Stair-Ships ladder - New*

311.7.12.2 Handrails of ships ladders. Handrails shall be provided on both sides of ships ladders and shall comply with Sections 311.7.8.2 to 311.7.8.6. Handrail height shall be uniform, not less than 30 inches (762 mm) and not more than 34 inches (864 mm). *Stair-Ships ladder - New*

312.2 Window fall protection. When provided, window fall protection shall be in accordance with Sections 312.2.1 and 312.2.2. *Guards - window fall protection moved from Chapter 6*

312.2.1 Window fall prevention devices. Window fall prevention devices and window guards, where provided, shall comply with the requirements of ASTM F 2090. *Guards - window fall protection moved from Chapter 6*

312.2.2 Window opening limiting devices. Where provided, window opening limiting devices shall comply with the provisions of this section. *Guards - window fall protection moved from Chapter 6*

312.2.2.1 General requirements. Window opening limiting devices shall be self-acting and shall be positioned to prohibit the free passage of a 4- in. (102-mm) diameter rigid sphere through the window opening when the window opening limiting device is installed in accordance with the manufacturer's instructions. *Guards - window fall protection moved from Chapter 6*

312.2.2.2 Operation for emergency escape. Window opening limiting devices shall be designed with release mechanisms to allow for emergency escape through the window opening without the need for keys, tools or special knowledge. Window opening limiting devices shall comply with all of the following:

1. Release of the window opening-limiting device shall require no more than 15 pounds (66 N) of force.
2. The window opening limiting device release mechanism shall operate properly in all types of weather.
3. Window opening limiting devices shall have their release mechanisms clearly identified for proper use in an emergency.
4. The window opening limiting device shall not reduce the minimum net clear opening area of the window unit below what is required by Section 310.1.1 of the code. *Guards - window fall protection moved from Chapter 6*

314.3 Location. Smoke alarms shall be installed in the following locations:

1. In each sleeping room.
2. Outside each separate sleeping area in the immediate vicinity of the sleeping rooms.
3. On each additional story of the dwelling, including basements and habitable attics and not including crawl spaces and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.
4. Smoke alarms shall be installed not less than 3 feet (914 mm) horizontally from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by this section. *New requirement*

314.3.1 Installation near cooking appliances. Smoke alarms shall not be installed in the following locations unless this would prevent placement of a smoke alarm in a location required by Section 314.3.

1. Ionization smoke alarms shall not be installed less than 20 feet (6096 mm) horizontally from a permanently installed cooking appliance.
2. Ionization smoke alarms with an alarm-silencing switch shall not be installed less than 10 feet (3048 mm) horizontally from a permanently installed cooking appliance.

3. Photoelectric smoke alarms shall not be installed less than 6 feet (1828 mm) horizontally from a permanently installed cooking appliance. *New requirement*

314.7 Fire alarm systems. Fire alarm systems shall be permitted to be used in lieu of smoke alarms and shall comply with Sections 314.7.1 through 314.7.4.

314.7.1 General. Fire alarm systems shall comply with the provisions of this code and the household fire warning equipment provisions of NFPA 72. Smoke detectors shall be listed in accordance with UL 268.

314.7.2 Location. Smoke detectors shall be installed in the locations specified in Section 314.3.

314.7.3 Permanent fixture. Where a household fire alarm system is installed, it shall become a permanent fixture of the occupancy, owned by the homeowner.

Exception. Where separate smoke alarms are provided meeting all other requirements of this section, the fire alarm system is not required to be a permanent fixture of the occupancy or owned by the homeowner.

314.7.4 Combination detectors. Combination smoke and carbon monoxide detectors shall be permitted to be installed in fire alarm systems in lieu of smoke detectors, provided that they are listed in accordance with UL 268 and UL 2075.

315.7 Carbon monoxide detection systems. Carbon monoxide detection systems shall be permitted to be used in lieu of carbon monoxide alarms and shall comply with Sections 315.7.1 through 315.7.4.

315.7.1 General. Household carbon monoxide detection systems shall comply with NFPA 720. Carbon monoxide detectors shall be listed and labeled in accordance with UL 2075.

315.7.2 Location. Carbon monoxide detectors shall be installed in the locations specified in Section 315.3. These locations supersede the locations specified in NFPA 720.

315.7.3 Permanent fixture. Where a household carbon monoxide detection system is installed, it shall become a permanent fixture of the occupancy and owned by the homeowner.

Exception. Where separate carbon monoxide alarms are provided meeting all other requirements of this section, the carbon monoxide detection system is not required to be a permanent fixture of the occupancy or owned by the homeowner.

315.7.4 Combination detectors. Combination carbon monoxide and smoke detectors installed in carbon monoxide detection systems in lieu of carbon monoxide detectors shall be listed and labeled in accordance with UL 2075 and UL 268.

317.1.4 Wood columns. Wood columns shall be approved wood of natural decay resistance or approved pressure-preservative-treated wood.

Exceptions:

1. Columns exposed to the weather or in basements where supported by concrete piers or metal pedestals projecting 1 inch (25 mm) above a concrete floor or 6 inches (152 mm) above exposed earth and the earth is covered by an approved impervious moisture barrier.

2. Columns in enclosed crawl spaces or unexcavated areas located within the periphery of the building where supported by a concrete pier or metal pedestal at a height more than 8 inches (203 mm) from exposed earth and the earth is covered by an impervious moisture barrier.

3. Deck posts supported by concrete piers or metal pedestals projecting not less than 1 inch (25 mm) above a concrete floor or 6 inches (152 mm) above exposed earth. *New Provision*

320.1.1 Guestrooms. A dwelling with guestrooms for primarily transient occupants shall comply with the provisions of Chapter 11 of the *Ohio building code* for Group R-3. For the purpose of applying the requirements of Chapter 11 of the *Ohio building code*, guestrooms shall be considered to be sleeping units.

Exception: Owner-occupied lodging houses with five or fewer guestrooms constructed in accordance with the Residential Code of *Ohio* are not required to be accessible. *Transient occupancy guestrooms use OBC Chapter 11*

SECTION 324 SOLAR ENERGY SYSTEMS: *New section see text*

SECTION 327 STATIONARY STORAGE BATTERY SYSTEMS . *New section see text*

CHAPTER 4 FOUNDATIONS

New footing Tables

TABLE 403.1(1)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS FOR LIGHT-FRAME CONSTRUCTION (inches) ^{a, b}

SNOW LOAD OR ROOF LIVE LOAD	STORY AND TYPE OF STRUCTURE WITH LIGHT FRAME	LOAD-BEARING VALUE OF SOIL (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—plus basement	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story—slab-on-grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story—with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story—plus basement	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
30 psf	1 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—plus basement	23 x 6	17 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	3 story—slab-on-grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story—with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story—plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
50 psf	1 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6

	2 story—plus basement	25 x 7	19 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	3 story—slab-on-grade	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story—with crawl space	22 x 6	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story—plus basement	28 x 9	21 x 6	17 x 6	14 x 6	12 x 6	12 x 6
70 psf	1 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	18 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story—plus basement	27 x 9	20 x 6	16 x 6	14 x 6	12 x 6	12 x 6
	3 story—slab-on-grade	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story—with crawl space	25 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	3 story—plus basement	30 x 10	23 x 6	18 x 6	15 x 6	12 x 6	12 x 6

For SI: 1 inch = 25.4 mm, 1 plf = 14.6 N/m, 1 pound per square foot = 47.9N/m².

a. Interpolation allowed. Extrapolation is not allowed.

b. Based on 32-foot-wide house with load-bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house, add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).

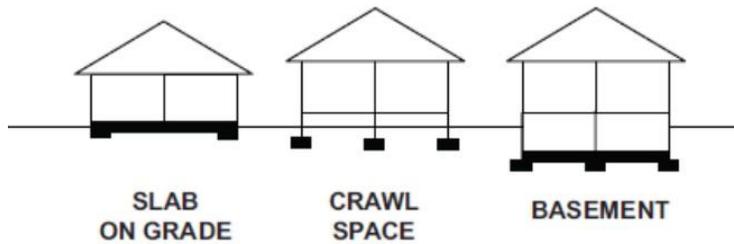


TABLE 403.1(2)

MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS FOR LIGHT-FRAME CONSTRUCTION WITH BRICK VENEER (inches) ^{a, b}

SNOW LOAD OR ROOF LIVE	STORY AND TYPE OF STRUCTURE WITH BRICK VENEER	LOAD-BEARING VALUE OF SOIL (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	21 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	3 story—slab-on-grade	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story—with crawl space	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	3 story—plus basement	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
30 psf	1 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story—plus basement	27 x 9	21 x 6	16 x 6	14 x 6	12 x 6	12 x 6
	3 story—slab-on-grade	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story—with crawl space	27 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	3 story—plus basement	33 x 11	24 x 7	20 x 6	16 x 6	14 x 6	12 x 6

50 psf	1 story—slab-on-grade	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story—plus basement	29 x 10	22 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	3 story—slab-on-grade	27 x 7	18 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story—with crawl space	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	3 story—plus basement	35 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
70 psf	1 story—slab-on-grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	2 story—slab-on grade	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story—plus basement	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story—slab-on-grade	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	3 story—with crawl space	31 x 11	23 x 7	19 x 6	16 x 6	13 x 6	12 x 6
	3 story—plus basement	37 x 13	28 x 9	22 x 6	18 x 6	16 x 6	14 x 6

For SI: 1 inch = 25.4 mm, 1 plf= 14.6 N/m, 1 pound per square foot = 47.9 N/m².

- a. Interpolation allowed. Extrapolation is not allowed.
- b. Based on 32-foot-wide house with load-bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house, add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).

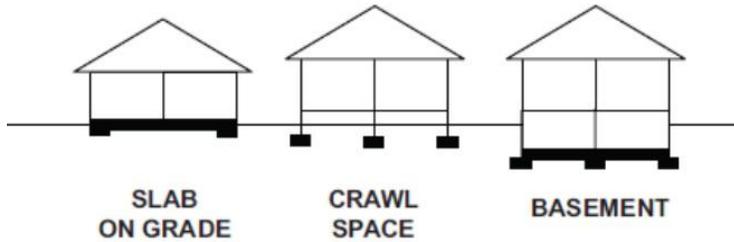


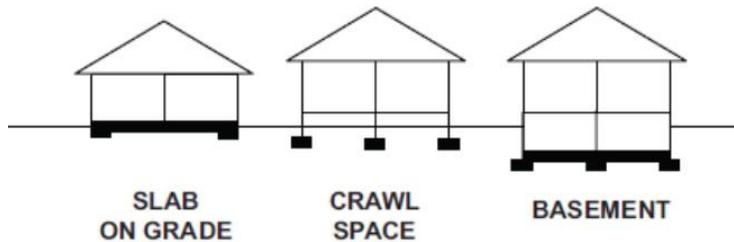
TABLE 403.1(3)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS
WITH CAST-IN-PLACE CONCRETE OR FULLY GROUTED MASONRY WALL CONSTRUCTION (inches)^{a, b}

SNOW LOAD OR ROOF LIVE LOAD	STORY AND TYPE OF STRUCTURE WITH CMU	LOAD-BEARING VALUE OF SOIL (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story—slab-on-grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	23 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story—plus basement	35 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
	3 story—slab-on-grade	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story—with crawl space	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story—plus basement	43 x 17	33 x 11	26 x 8	22 x 6	19 x 6	16 x 6
30 psf	1 story—slab-on-grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	24 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	30 x 10	22 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	2 story—plus basement	36 x 13	27 x 8	21 x 6	18 x 6	15 x 6	13 x 6
	3 story—slab-on-grade	33 x 12	25 x 7	20 x 6	17 x 6	14 x 6	12 x 6

	3 story—with crawl space	39 x 14	29 x 9	23 x 7	19 x 6	17 x 6	14 x 6
	3 story—plus basement	44 x 17	33 x 12	27x 8	22 x 6	19 x 6	17 x 6
50 psf	1 story—slab-on-grade	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	22 x 6	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	28x 9	21 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	27 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	2 story—with crawl space	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	2 story—plus basement	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story—slab-on-grade	35 x 13	27 x 8	21 x 6	18 x 6	15 x 6	13 x 6
	3 story—with crawl space	41 x 15	31 x 10	24 x 7	20 x 6	17 x 6	15 x 6
	3 story—plus basement	47 x 18	35 x 12	28 x 9	23 x 7	20 x 6	17 x 6
	70 psf	1 story—slab-on-grade	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6
1 story—with crawl space		25 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
1 story—plus basement		30 x 10	23 x 6	18 x 6	15 x 6	13 x 6	12 x 6
2 story—slab-on-grade		29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
2 story—with crawl space		34 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
2 story—plus basement		40 x 15	30 x 10	24 x 7	20 x 6	17 x 6	15 x 6
3 story—slab-on-grade		38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
3 story—with crawl space		43 x 16	32 x 11	26 x 8	21 x 6	18 x 6	16 x 6
3 story—plus basement		49 x 19	37 x 13	29 x 10	24 x 7	21 x 6	18 x 6

For SI: 1 inch = 25.4 mm, 1 plf = 14.6 N/m, 1 pound per square foot = 47.9 N/m².

- a. Interpolation allowed. Extrapolation is not allowed.
- b. Based on 32-foot-wide house with load-bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).



403.1.4.1 Frost protection. Except where otherwise protected from frost, foundation walls, piers and other permanent supports of buildings and structures shall be protected from frost by one or more of the following methods:

1. Extended below the frost line specified in Table 301.2(1).
2. Constructed in accordance with Section 403.3.
3. Constructed in accordance with ASCE 32.
4. Erected on solid rock.

Footings shall not bear on frozen soil unless the frozen condition is permanent that extend below the frost line.

Exceptions:

1. Deleted: 600 sq. ft. light frame construction exception to frost footings
2. Deleted: 400 sq. ft. other than light frame construction exception to frost footings
3. Decks not supported by a dwelling need not be provided with footings that extend below the frost line.
Deleted exception to frost footings

404.1.9 Isolated masonry piers. Isolated masonry piers shall be constructed in accordance with this section and the general masonry construction requirements of Section 606. Hollow masonry piers shall have a minimum nominal thickness of 8 inches (203 mm), with a nominal height not exceeding four times the nominal thickness and a nominal length not exceeding three times the nominal thickness. Where hollow masonry units are solidly filled with concrete or grout, piers shall be permitted to have a nominal height not exceeding ten times the nominal thickness. Footings for isolated masonry piers shall be sized in accordance with Section 403.1.1.

404.1.9.1 Pier cap. Hollow masonry piers shall be capped with 4 inches (102 mm) of solid masonry or concrete, a masonry cap block, or shall have cavities of the top course filled with concrete or grout. Where required, termite protection for the pier cap shall be provided in accordance with Section 318.

404.1.9.2 Masonry piers supporting floor girders. Masonry piers supporting wood girders sized in accordance with Tables 602.7(1) and 602.7(2) shall be permitted in accordance with this section. Piers supporting girders for interior bearing walls shall have a minimum nominal dimension of 12 inches (305 mm) and a maximum height of 10 feet (3048 mm) from top of footing to bottom of sill plate or girder. Piers supporting girders for exterior bearing walls shall have a minimum nominal dimension of 12 inches (305 mm) and a maximum height of 4 feet (1220 mm) from top of footing to bottom of sill plate or girder. Girders and sill plates shall be anchored to the pier or footing in accordance with Section 403.1.6 or Figure 404.1.5(1). Floor girder bearing shall be in accordance with Section 502.6.

404.1.9.3 Masonry piers supporting braced wall panels. Masonry piers supporting braced wall panels shall be designed in accordance with accepted engineering practice.

404.1.9.4 Seismic design of masonry piers. Masonry piers in dwellings with four or more dwelling units located in Seismic Design Category C, shall be designed in accordance with accepted engineering practice.

404.1.9.5 Masonry piers in flood hazard areas. Masonry piers for dwellings in flood hazard areas shall be designed in accordance with Section 322.

404.4 Retaining walls. Retaining walls that are not laterally supported at the top and that retain in excess of 48 inches (1219 mm) of unbalanced fill, or retaining walls exceeding 24 inches (610 mm) in height that resist lateral loads in addition to soil, shall be designed in accordance with accepted engineering practice to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Retaining walls shall be designed for a safety factor of 1.5 against lateral sliding and overturning. This section shall not apply to foundation walls supporting buildings.

408.3 Unvented crawl space. Ventilation openings in under-floor spaces specified in Sections 408.1 and 408.2 shall not be required where the following items are provided:

1. Exposed earth is covered with a continuous Class I vapor retarder. Joints of the vapor retarder shall overlap by 6 inches (152 mm) and shall be sealed or taped. The edges of the vapor retarder shall extend not

less than 6 inches (152 mm) up the stem wall and shall be attached and sealed to the stem wall or insulation.

2. One of the following is provided for the under-floor space:

2.1. Continuously operated mechanical exhaust ventilation at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m²) of crawl space floor area, including an air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section 1102.2.11 of this code.

2.2. Conditioned air supply sized to deliver at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m²) of under-floor area, including a return air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section 1102.2.11 of this code.

2.3. Plenum in existing structures complying with Section 1601.5, if under-floor space is used as a plenum.

2.4. Dehumidification sized to provide 70 pints (33 liters) of moisture removal per day for every 1,000 square feet (93 m²) of crawl space floor area. *Added dehumidification in unvented crawl space*

CHAPTER 5 FLOORS

502.6.3 Beams ending on an open pocket. When not prescribed in the manufacturer's installation instructions, or as otherwise may be prescribed by a registered design professional, at a minimum, beams ending on an open pocket shall use clip angles to attach the beam to the foundation at beam pockets. The clip angle to beam connection shall be either a welded or a bolted connection. When the clip angle to beam connection is a welded connection, the clip angle shall be welded to the beam along the clip angle's entire length. When the clip angle to beam connection is a bolted connection, the clip angle shall be bolted to the beam using no less than ½" diameter bolts. The clip angle shall be attached to the foundation wall using no less than a ½" diameter anchor placed in the middle of the clip angle. *Stabilizing provision for steel beams in open pockets was actually previously approved but not printed.*

502.9.1 Column to beam fastening. When not prescribed in the manufacturer's installation instructions, or as otherwise may be prescribed by a registered design professional, at a minimum, the top plate of supporting steel column(s) shall be connected to the beam using either welded or bolted connections.

1. When a beam ends in a concrete pocket and the column to beam connection is a welded connection, the top plate of the column shall be welded along the length of the two sides of the top plate perpendicular to the steel beam's length. When the column to beam connection is a bolted connection, no less than two ½" diameter bolts placed diagonally shall be used through the top plate of the steel column(s) and the bottom of the beam. The base plate(s) of steel column(s) shall be anchored to concrete footing pad(s) with no less than two ½" diameter anchors or bolts placed diagonally through the base plate(s) of the steel column(s) into the concrete footing pad(s).

2. When a beam ends on a steel column rather than in a beam pocket, and that connection is a bolted connection, no less than four ½" diameter bolts shall be used connecting the top plate of the steel column to the beam. The base plate of the steel column shall be anchored to the concrete footing pad with no less than four ½" diameter anchors through the base plate of the steel column to the concrete footing pad.

All powder actuated fasteners are prohibited when connecting steel column top plates to beams and steel column base plates to concrete footing pads. *Stabilizing provision for steel columns was previously approved but not printed.*

NEW SECTION 507 EXTERIOR DECKS EXPANDED

507.1 Decks. Wood-framed decks shall be in accordance with this section. For decks using materials and conditions not prescribed in this section, refer to Section 301.

507.2 Materials. Materials used for the construction of decks shall comply with this section.

507.2.1 Wood materials. Wood materials shall be No. 2 grade or better lumber, preservative-treated in accordance with Section 317, or approved, naturally durable lumber, and termite protected where required in accordance with Section 318. Where design in accordance with Section 301 is provided, wood structural members shall be designed using the wet service factor defined in AWC NDS. Cuts, notches and drilled holes of preservative-treated wood members shall be treated in accordance with Section 317.1.1. All preservative-treated wood products in contact with the ground shall be labeled for such usage.

507.2.1.1 Engineered wood products. Engineered wood products shall be in accordance with Section 502.

507.2.2 Plastic composite deck boards, stair treads, guards, or handrails. Plastic composite exterior deck

507.1.1.1 Labeling. Plastic composite deck boards and stair treads, or their packaging, shall bear a label that indicates compliance with ASTM D7032 and includes the allowable load and maximum allowable span determined in accordance with ASTM D7032. Plastic or composite handrails and guards, or their packaging, shall bear a label that indicates compliance with ASTM D7032 and includes the maximum allowable span determined in accordance with ASTM D7032.

507.1.1.2 Flame spread index. Plastic composite deck boards, stair treads, guards, and handrails shall exhibit a flame spread index not exceeding 200 when tested in accordance with ASTM E84 or UL 723 with the test specimen remaining in place during the test.

Exception: Plastic composites determined to be noncombustible.

507.1.1.3 Decay resistance. Plastic composite deck boards, stair treads, guards and handrails containing wood, cellulosic or other biodegradable materials shall be decay resistant in accordance with ASTM D7032.

507.1.1.4 Termite resistance. Where required by Section 318, plastic composite deck boards, stair treads, guards and handrails containing wood, cellulosic or other biodegradable materials shall be termite resistant in accordance with ASTM D7032.

507.1.1.1 Installation of plastic composites. Plastic composite deck boards, stair treads, guards and handrails shall be installed in accordance with this code and the manufacturer's instructions.

507.1.2 Fasteners and connectors. Metal fasteners and connectors used for all decks shall be in accordance with Section 317.3 and Table 507.2.3.

**TABLE 507.2.3
FASTENER AND CONNECTOR SPECIFICATIONS FOR DECKS^{a, b}**

ITEM	MATERIAL	MINIMUM FINISH/COATING	ALTERNATE FINISH/COATING ^e
Nails and timber rivets	In accordance with ASTM F1667	Hot-dipped galvanized per ASTM A153	Stainless steel, silicon bronze or copper
Bolts ^c Lag screws ^d (including nuts and washers)	In accordance with ASTM A307 (bolts), ASTM A563 (nuts), ASTM F844 (washers)	Hot-dipped galvanized per ASTM A153, Class C (Class D for 3/8 -inch diameter and less) or mechanically galvanized per ASTM B695, Class 55 or 410 stainless steel	Stainless steel, silicon bronze or copper
Metal connectors	Per manufacturer's specification	ASTM A653 type G185 zinc coated galvanized steel or post hot-dipped galvanized per ASTM A123 providing a minimum average coating weight of 2.0 oz./ft ² (total both sides)	Stainless steel

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

- a. Equivalent materials, coatings and finishes shall be permitted.
- b. Fasteners and connectors exposed to salt water or located within 300 feet of a salt water shoreline shall be stainless steel.
- c. Holes for bolts shall be drilled a minimum 1/32 -inch and a maximum 1/16 -inch larger than the bolt.
- d. Lag screws 1/2 - inch and larger shall be predrilled to avoid wood splitting per the National Design Specification (NDS) for Wood Construction.
- e. Stainless-steel-driven fasteners shall be in accordance with ASTM F1667.

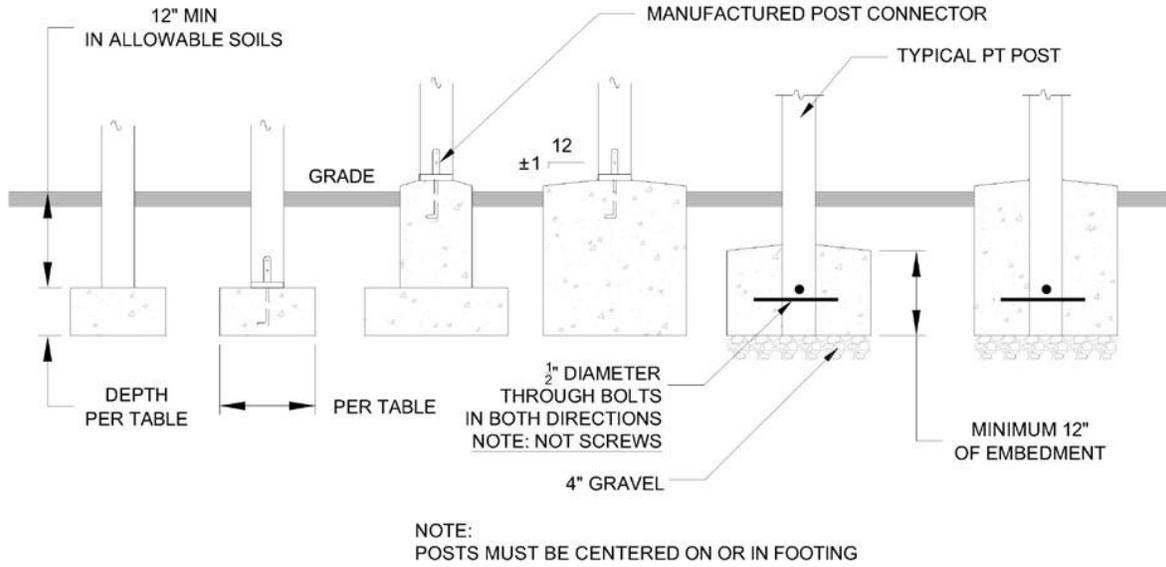
507.1.3 Flashing. Flashing shall be corrosion-resistant metal of nominal thickness not less than 0.019 inch (0.48 mm) or approved nonmetallic material that is compatible with the substrate of the structure and the decking materials.

507.1.4 Alternate materials. Alternative materials, including glass and metals, shall be permitted.

507.2 Footings. Decks shall be supported on concrete footings or other approved structural systems designed to accommodate all loads in accordance with Section 301. Deck footings shall be sized to carry the imposed loads from the deck structure to the ground as shown in Figure 507.3. The footing depth shall be in accordance with Section 403.1.4.

Exception: Free-standing decks consisting of joists directly supported on grade over their entire length.

507.3.1 Minimum size. The minimum size of concrete footings shall be in accordance with Table 507.3.1, based on the tributary area and allowable soil- bearing pressure in accordance with Table 401.4.1.



For SI: 1 inch = 25.4 mm.

FIGURE 507.3
DECK POSTS TO DECK FOOTING CONNECTION

**TABLE 507.3.1
MINIMUM FOOTING SIZE FOR DECKS**

LIVE OR GROUND SNOW LOAD ^b (psf)	TRIBUTARY AREA (sq. ft.)	LOAD BEARING VALUE OF SOILS ^{a, c, d} (psf)											
		1500 ^a			2000 ^a			2500 ^a			≥3000 ^a		
		Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)
40	20	12	14	6	12	14	6	12	14	6	12	14	6
	40	14	16	6	12	14	6	12	14	6	12	14	6
	60	17	19	6	15	17	6	13	15	6	12	14	6
	80	20	22	7	17	19	6	15	17	6	14	16	6
	100	22	25	8	19	21	6	17	19	6	15	17	6
	120	24	27	9	21	23	7	19	21	6	17	19	6
	140	26	29	10	22	25	8	20	23	7	18	21	6
	160	28	31	11	24	27	9	21	24	8	20	22	7
50	20	12	14	6	12	14	6	12	14	6	12	14	6
	40	15	17	6	13	15	6	12	14	6	12	14	6
	60	19	21	6	16	18	6	14	16	6	13	15	6
	80	21	24	8	19	21	6	17	19	6	15	17	6
	100	24	27	9	21	23	7	19	21	6	17	19	6
	120	26	30	10	23	26	8	20	23	7	19	21	6
	140	28	32	11	25	28	9	22	25	8	20	23	7
	160	30	34	12	26	30	10	24	27	9	21	24	8
60	20	12	14	6	12	14	6	12	14	6	12	14	6
	40	16	19	6	14	16	6	13	14	6	12	14	6
	60	20	23	7	17	20	6	16	18	6	14	16	6
	80	23	26	9	20	23	7	18	20	6	16	19	6
	100	26	29	10	22	25	8	20	23	7	18	21	6
	120	28	32	11	25	28	9	22	25	8	20	23	7
	140	31	35	12	27	30	10	24	27	9	22	24	8
	160	33	37	13	28	32	11	25	29	10	23	26	9
70	20	12	14	6	12	14	6	12	14	6	12	14	6
	40	18	20	6	15	17	6	14	15	6	12	14	6
	60	21	24	8	19	21	6	17	19	6	15	17	6
	80	25	28	9	21	24	8	19	22	7	18	20	6
	100	28	31	11	24	27	9	21	24	8	20	22	7
	120	30	34	12	26	30	10	24	27	9	21	24	8
	140	33	37	13	28	32	11	25	29	10	23	26	9
	160	35	40	15	30	34	12	27	31	11	25	28	9

For SI: 1 inch = 25.4 mm, 1 square foot = 0.0929 m², 1 pound per square foot = 0.0479 kPa.

- Interpolation permitted, extrapolation not permitted.
- Based on highest load case: Dead + Live or Dead + Snow.
- Assumes minimum square footing to be 12 inches x 12 inches x 6 inches for 6 x 6 post.
- If the support is a brick or CMU pier, the footing shall have a minimum 2-inch projection on all sides.
- Area, in square feet, of deck surface supported by post and footings.

507.3.2 Minimum depth. Deck footings shall extend below the frost line specified in Table 301.2(1) in accordance with Section 403.1.4.1.

Exceptions:

1. Free-standing decks that meet all of the following criteria:

1.1. The joists bear directly on precast concrete pier blocks at grade without support by beams or posts.

1.2. The area of the deck does not exceed 200 square feet (18.9 m²).

1.3. The walking surface is not more than 20 inches (514 mm) above grade at any point within 36 inches (914 mm) measured horizontally from the edge.

2. Free-standing decks need not be provided with footings that extend below the frost line.

507.4 Deck posts. For single-level wood-framed decks with beams sized in accordance with Table 507.5, deck post size shall be in accordance with Table 507.4.

TABLE 507.4 DECK POST HEIGHT^a

DECK POST SIZE	MAXIMUM HEIGHT ^{a,b} (feet-inches)
4 x4	6-9 ^c
4 x6	8
6 x6	14
8 x8	14

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- a. Measured to the underside of the beam.
- b. Based on 40 psf live load.
- c. The maximum permitted height is 8 feet for one-ply and two-ply beams. The maximum permitted height for three-ply beams on post cap is 6 feet 9 inches.

507.4.1 Deck post to deck footing connection. Where posts bear on concrete footings in accordance with Section 403 and Figure 507.4.1, lateral restraint shall be provided by manufactured connectors or a minimum post embedment of 12 inches (305 mm) in surrounding soils or concrete piers. Other footing systems shall be permitted.

Exception: Where expansive, compressible, shifting or other questionable soils are present, surrounding soils shall not be relied on for lateral support.

507.5 Deck Beams. Maximum allowable spans for wood deck beams, as shown in Figure 507.5, shall be in accordance with Table 507.5. Beam plies shall be fastened with two rows of 10d (3-inch x 0.128-inch) nails minimum at 16 inches (406 mm) on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the allowable beam span. Deck beams of other materials shall be permitted where designed in accordance with accepted engineering practices.

**TABLE 507.5
DECK BEAM SPAN LENGTHS^{a, b, g} (feet - inches)**

SPECIES ^c	SIZE ^d	DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)						
		6	8	10	12	14	16	18
Southern pine	1-2 x 6	4-11	4-0	3-7	3-3	3-0	2-10	2-8
	1-2 x 8	5-11	5-1	4-7	4-2	2-10	3-7	3-5
	1-2 x 10	7-0	6-0	5-5	4-11	4-7	4-3	4-0
	1-2 x 12	8-3	7-1	6-4	5-10	5-5	5-0	4-9
	2-2 x 6	6-11	5-11	5-4	4-10	4-6	4-3	4-0
	2-2 x 8	8-9	7-7	6-9	6-2	5-9	5-4	5-0
	2-2 x 10	10-4	9-0	8-0	7-4	6-9	6-4	6-0
	2-2 x 12	12-2	10-7	9-5	8-7	8-0	7-6	7-0
	3-2 x 6	8-2	7-5	6-8	6-1	5-8	5-3	5-0
	3-2 x 8	10-10	9-6	8-6	7-9	7-2	6-8	6-4
3-2 x 10	13-0	11-3	10-0	9-2	8-6	7-11	7-6	
3-2 x 12	15-3	13-3	11-10	10-9	10-0	9-4	8-10	
Douglas fir-larch ^e , hem-fir ^e , spruce-pine-fir ^e , redwood, western cedars, ponderosa pine ^f , red pine ^f	3 x 6 or 2-2 x 6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3 x 8 or 2-2 x 8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3 x 10 or 2-2 x 10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3 x 12 or 2-2 x 12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4 x 6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4 x 8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4 x 10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4 x 12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3-2 x 6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3-2 x 8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3-2 x 10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
3-2 x 12	13-11	12-1	10-9	9-10	9-1	8-6	8-1	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

- a. Ground snow load, live load = 40 psf, dead load = 10 psf, $L/\Delta = 360$ at main span, $L/\Delta = 180$ at cantilever with a 220-pound point load applied at the end.
- b. Beams supporting deck joists from one side only.
- c. No. 2 grade, wet service factor.
- d. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
- e. Includes incising factor.
- f. Northern species. Incising factor not included.
- g. Beam cantilevers are limited to the adjacent beam's span divided by 4.

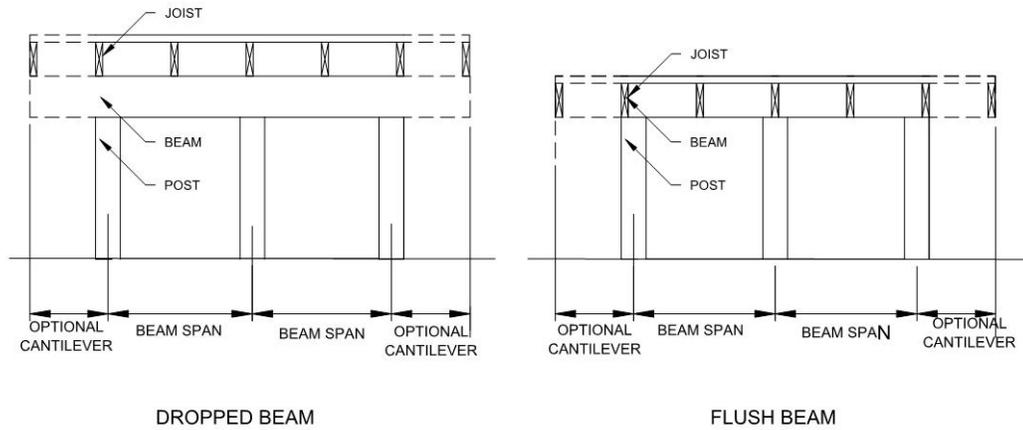
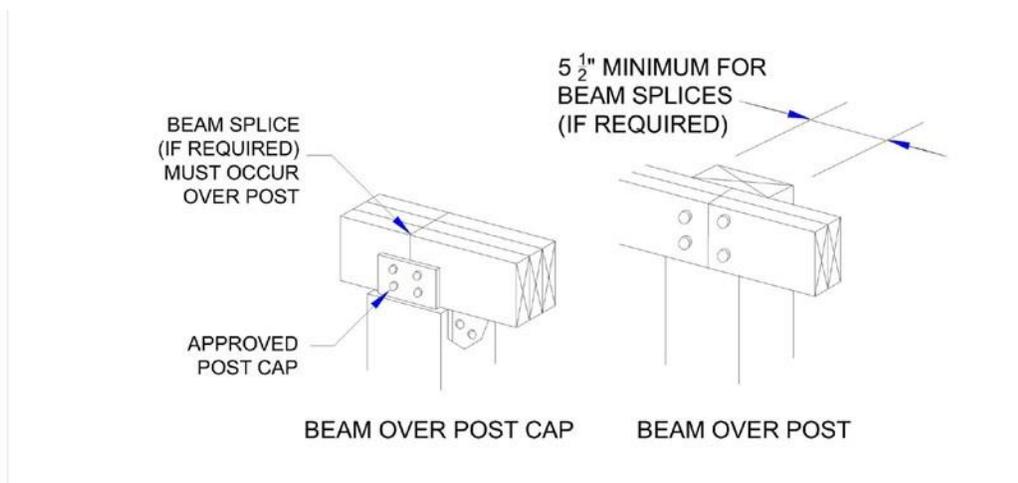


FIGURE 507.5 TYPICAL DECK JOIST SPANS

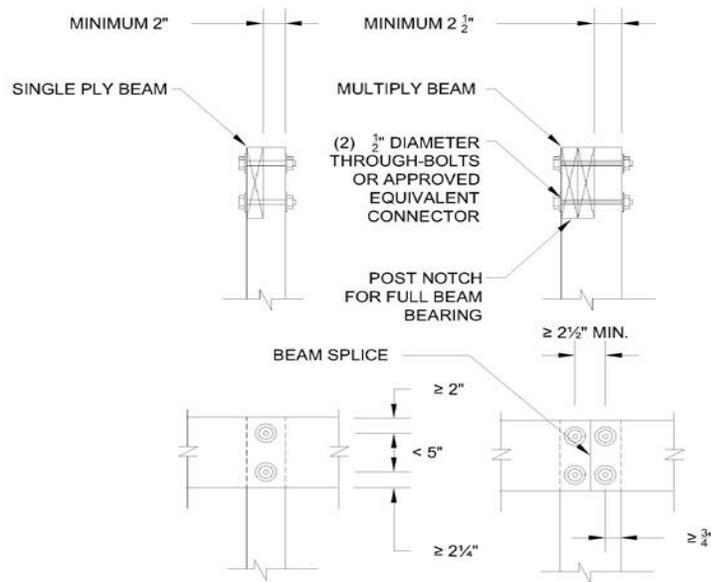
507.5.1 Deck beam bearing. The ends of beams shall have not less than 1 1/2 - inches (38 mm) of bearing on wood or metal and not less than 3 -inches (76 mm) of bearing on concrete or masonry for the entire width of the beam. Where multiple-span beams bear on intermediate posts, each ply must have full bearing on the post in accordance with Figures 507.5.1(1) and 507.5.1(2).

507.5.2 Deck beam connection to supports. Deck beams shall be attached to supports in a manner capable of transferring vertical loads and resisting horizontal displacement. Deck beam connections to wood posts shall be in accordance with Figures 507.5.1(1) and 507.5.1(2). Manufactured post-to-beam connectors shall be sized for the post and beam sizes. Bolts shall have washers under the head and nut.



For SI: 1 inch = 25.4 mm.

FIGURE 507.5.1(1) DECK BEAM TO DECK POST



For SI: 1 inch = 25.4 mm.

FIGURE 507.5.1(2)
NOTCHED POST-TO-BEAM CONNECTION

507.6 Deck joists. Maximum allowable spans for wood deck joists, as shown in Figure 507.6, shall be in accordance with Table 507.6. The maximum joist spacing shall be limited by the decking materials in accordance with Table 507.7. The maximum joist cantilever shall be limited to one-fourth of the joist span or the maximum cantilever length specified in Table 507.6, whichever is less.

507.6.1 Deck joist bearing. The ends of joists shall have not less than 1-1/2 - inches (38 mm) of bearing on wood or metal and not less than 3 -inches (76 mm) of bearing on concrete or masonry over its entire width. Joists bearing on top of a multiple-ply beam or ledger shall be fastened in accordance with Table 602.3(1). Joists bearing on top of a single-ply beam or ledger shall be attached by a mechanical connector. Joist framing into the side of a beam or ledger board shall be supported by approved joist hangers.

507.6.2 Deck joist lateral restraint. Joist ends and bearing locations shall be provided with lateral resistance to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with not fewer than three 10d (3-inch by 0.128-inch) (76 mm by 3.3 mm) nails or three No. 10 x 3-inch (76 mm) long wood screws.

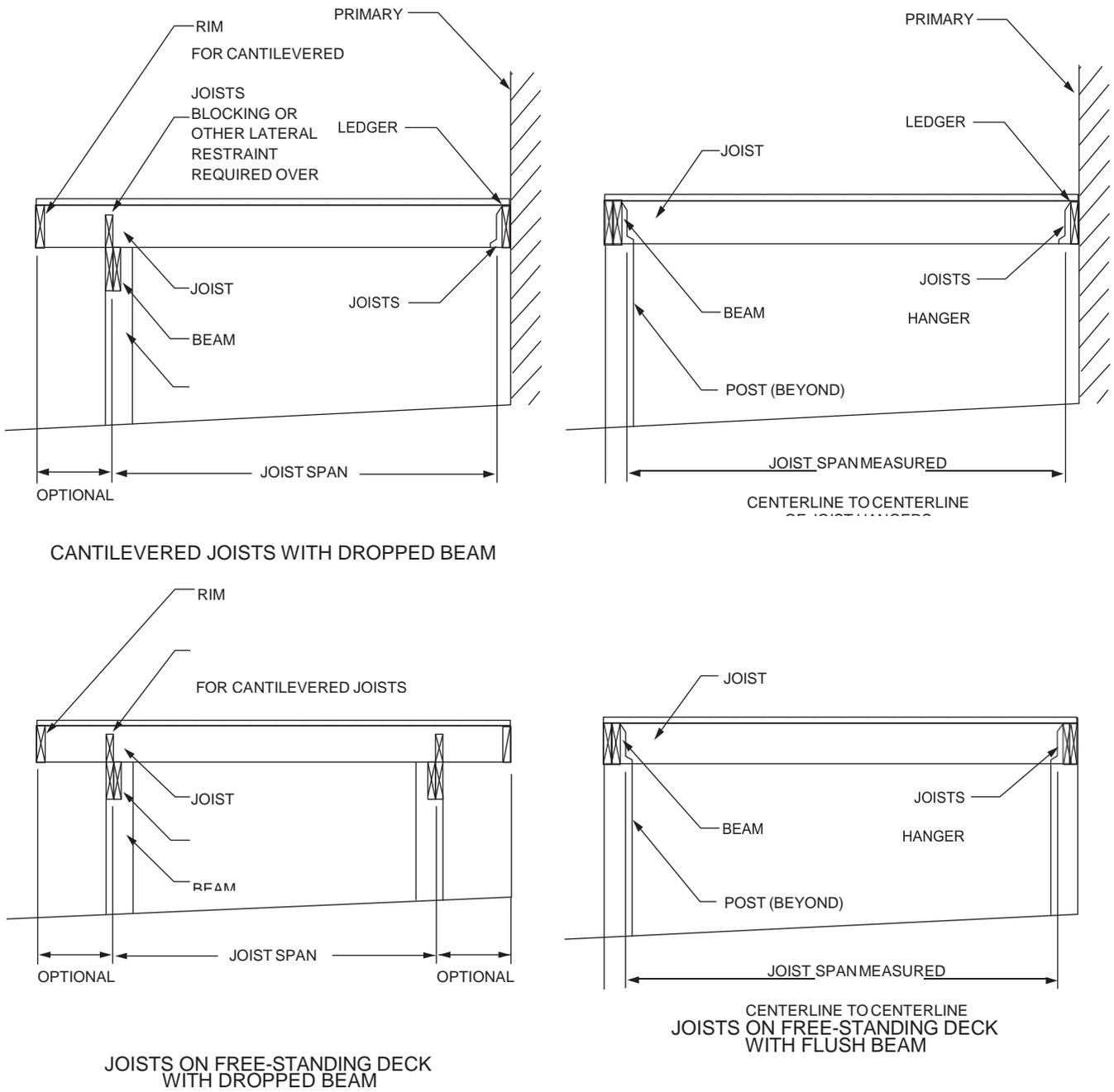


FIGURE 507.6
TYPICAL DECK JOIST SPANS

**TABLE 507.6
DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft. - in.)**

SPECIES ^a	SIZE	ALLOWABLE JOISTSPAN ^b			MAXIMUM CANTILEVER ^{c,f}		
		SPACING OF DECK JOISTS (inches)			SPACING OF DECK JOISTS WITH CANTILEVERS ^c (inches)		
		12	16	24	12	16	24
Southern pine	2 x6	9-11	9-0	7-7	1-3	1-4	1-6
	2 x8	13-1	11-10	9-8	2-1	2-3	2-5
	2 x10	16-2	14-0	11-5	3-4	3-6	2-10
	2 x12	18-0	16-6	13-6	4-6	4-2	3-4
Douglas fir-larch ^d , hem-fir ^d , spruce-pine-fir ^d ,	2 x6	9-6	8-8	7-2	1-2	1-3	1-5
	2 x8	12-6	11-1	9-1	1-11	2-1	2-3
	2 x10	15-8	13-7	11-1	3-1	3-5	2-9
	2 x12	18-0	15-9	12-10	4-6	3-11	3-3
Redwood, western cedars, ponderosa pine ^e , red pine ^e	2 x6	8-10	8-0	7-0	1-0	1-1	1-2
	2 x8	11-8	10-7	8-8	1-8	1-10	2-0
	2 x10	14-11	13-0	10-7	2-8	2-10	2-8
	2 x12	17-5	15-1	12-4	3-10	3-9	3-1

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

- a. No. 2 grade with wet service factor.
- b. Ground snow load, live load = 40 psf, dead load = 10 psf, $L/A = 360$.
- c. Ground snow load, live load = 40 psf, dead load = 10 psf, $L/A = 360$ at main span, $L/A = 180$ at cantilever with a 220-pound point load applied to end.
- d. Includes incising factor.
- e. Northern species with no incising factor.
- f. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

507.7 Decking. Maximum allowable spacing for joists supporting decking shall be in accordance with Table 507.7. Wood decking shall be attached to each supporting member with not less than two 8d threaded nails or two No. 8 wood screws. Other approved decking or fastener systems shall be installed in accordance with the manufacturer’s installation requirements.

**TABLE 507.7
MAXIMUM JOIST SPACING FOR DECKING**

DECKING MATERIAL TYPE AND NOMINAL SIZE	MAXIMUM ON-CENTER JOIST SPACING	
	Decking perpendicular to joist	Decking diagonal to joist ^a
1½ -inch-thick wood	16 inches	12 inches
2 -inch-thick wood	24 inches	16 inches
Plastic composite	In accordance with Section 507.2	In accordance with Section 507.2

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.01745 rad.

- a. Maximum angle of 45 degrees from perpendicular for wood deck boards.

507.8 Vertical and lateral supports. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. For decks with cantilevered framing members, connection to exterior walls or other framing members shall be designed and constructed to resist uplift resulting from the full live load specified in Table 301.5 acting on the cantilevered portion of the

deck. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting.

507.9 Vertical and lateral supports at band joist. Vertical and lateral supports for decks shall comply with this section.

507.9.1 Vertical supports. Vertical loads shall be transferred to band joists with ledgers in accordance with this section.

507.9.1.1 Ledger details. Deck ledgers shall be a minimum 2-inch by 8-inch (51 mm by 203 mm) nominal, pressure-preservative-treated Southern pine, incised pressure-preservative-treated hem-fir, or approved, naturally durable, No. 2 grade or better lumber. Deck ledgers shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.

Table 507.9.1.3(1) Deck ledger attachment, no longer has the foot note that has a maximum spacing between band board and ledger, which prohibited attached through brick veneer. *Does this mean we can bolt through brick or stone veneer into band board or wall framing? State says still not allowed.*

507.9.1.2 Band joist details. Band joists supporting a ledger shall be a minimum 2-inch-nominal (51 mm), solid-sawn, spruce-pine-fir or better lumber or a minimum 1-inch by 91/2 -inch (25 mm by 241 mm) dimensional, Douglas fir or better, laminated veneer lumber. Band joists shall bear fully on the primary structure capable of supporting all required loads.

507.9.1.3 Ledger to band joist details. Fasteners used in deck ledger connections in accordance with Table 507.9.1.3(1) shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table 507.9.1.3(2) and Figures 507.9.1.3(1) and 507.9.1.3(2).

507.9.1.4 Alternate ledger details. Alternate framing configurations supporting a ledger constructed to meet the load requirements of Section 301.5 shall be permitted.

TABLE 507.9.1.3(1)
DECK LEDGER CONNECTION TO BAND JOIST^{a, b}
(Deck live load = 40 psf, deck dead load = 10 psf, snow load ≤ 40 psf)

CONNECTION DETAILS	JOIST SPAN						
	6' and less	6' 1" to 8'	8' 1" to 10'	10' 1" to 12'	12' 1" to 14'	14' 1" to 16'	16' 1" to 18'
	On-center spacing of fasteners						
1/2-inch diameter lag screw with 1/2-inch maximum sheathing ^{c, d}	30	23	18	15	13	11	10
1/2-inch diameter bolt with 1/2-inch maximum sheathing ^d	36	36	34	29	24	21	19
1/2-inch diameter bolt with 1-inch maximum sheathing ^e	36	36	29	24	21	18	16

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- a. Ledgers shall be flashed in accordance with Section 703.4 to prevent water from contacting the house band joist.
- b. Snow load shall not be assumed to act concurrently with live load.
- c. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
- d. Sheathing shall be wood structural panel or solid sawn lumber.

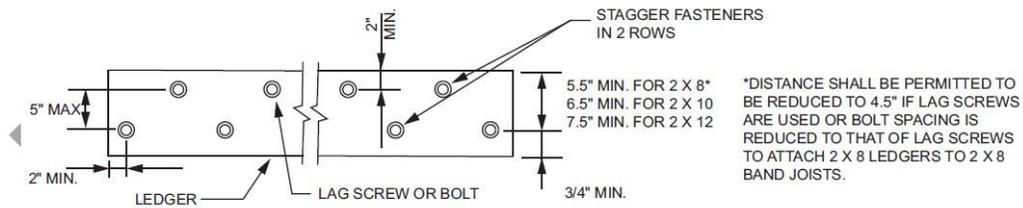
- e. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber or foam sheathing. Up to 1/2 -inch thickness of stacked washers shall be permitted to substitute for up to 1/2 -inch of allowable sheathing thickness where combined with wood structural panel or lumber sheathing.

TABLE 507.9.1.3(2)
PLACEMENT OF LAG SCREWS AND BOLTS IN
DECK LEDGERS AND BAND JOISTS *New Table*

MINIMUM END AND EDGE DISTANCES AND SPACING				
	TOP EDGE	BOTTOM EDGE	ENDS	ROW SPACING
Ledger ^a	2 inches ^d	3/4 -inch	2 inches ^b	1 5/8 inches ^b
Band Joist ^c	3/4 -inch	2 inches	2 inches ^b	1 5/8 inches ^b

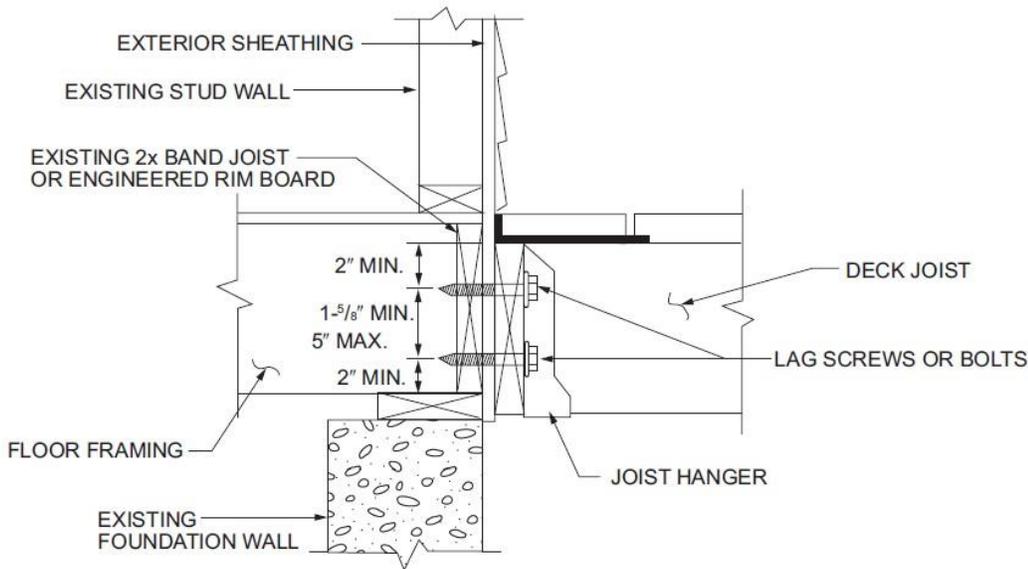
For SI: 1 inch = 25.4 mm.

- a. Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure 507.9.1.3(1).
- b. Maximum 5 inches.
- c. For engineered rim joists, the manufacturer’s recommendations shall govern.
- d. The minimum distance from bottom row of lag screws or bolts to the top edge of the ledger shall be in accordance with Figure 507.9.1.3(1).



For SI: 1 inch = 25.4 mm.

FIGURE 507.9.1.3(1)
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS *New Figure*



For SI: 1 inch = 25.4 mm.

**FIGURE 507.9.1.3(2)
PLACEMENT OF LAG SCREWS AND BOLTS IN BAND JOISTS**

CHAPTER 6 WALL CONSTRUCTION

**TABLE 602.3(6)
ALTERNATE WOOD BEARING WALL STUD SIZE, HEIGHT AND SPACING**

STUD HEIGHT	SUPPORTING	STUD SPACING ^a	ULTIMATE DESIGN WIND SPEED					
			115 mph		130 mph ^b		140 mph ^b	
			Maximum roof/floor span ^c		Maximum roof/floor span ^c		Maximum roof/floor span ^c	
			12 ft.	24 ft.	12 ft.	24 ft.	12 ft.	24 ft.
11 ft.	Roof Only	12 in.	2 x 4	2 x 4	2 x 4	2 x 4	2 x 4	2 x 4
		16 in.	2 x 4	2 x 4	2 x 4	2 x 6	2 x 4	2 x 6
		24 in.	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
	Roof and One Floor	12 in.	2 x 4	2 x 6	2 x 4	2 x 6	2 x 4	2 x 6
		16 in.	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
		24 in.	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
12 ft.	Roof Only	12 in.	2 x 4	2 x 4	2 x 4	2 x 6	2 x 4	2 x 6
		16 in.	2 x 4	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
		24 in.	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
	Roof and One Floor	12 in.	2 x 4	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
		16 in.	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
		24 in.	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	DR

For SI: 1 inch = 25.4mm, 1 foot = 304.8 mm, 1 mph = 0.447 m/s, 1 pound = 4.448 N. DR = Design Required.

a. Wall studs not exceeding 16 inches on center shall be sheathed with minimum 1/2-inch gypsum board on the interior and 3/8-inch wood structural panel sheathing on the exterior. Wood structural panel sheathing shall be attached with 8d (2.5" x 0.131") nails not greater than 6 inches on center along panel edges and 12 inches on center at intermediate supports, and all panel joints shall occur over studs or blocking.

Table 602.3(6); Bearing wall stud height only up to 12'. The old table 602.3.1 went to 24' 100 Mph Max.

602.3.1 Stud size, height and spacing. The size, height and spacing of studs shall be in accordance with Table 602.3(5).

Exceptions:

1. Utility grade studs shall not be spaced more than 16 inches (406 mm) on center, shall not support more than a roof and ceiling, and shall not exceed 8 feet (2438 mm) in height for exterior walls and load-bearing walls or 10 feet (3048 mm) for interior nonload-bearing walls.

2. Where snow loads are less than or equal to 25 pounds per square foot (1.2 kPa), and the ultimate design wind speed is less than or equal to 130 mph (58.1 m/s), 2-inch by 6-inch (38 mm by 140 mm) studs supporting a roof load with not more than 6 feet (1829 mm) of tributary length shall have a maximum height of 18 feet (5486 mm) where spaced at 16 inches (406 mm) on center, or 20 feet (6096 mm) where spaced at 12 inches (305 mm) on center. Studs shall be No. 2 grade lumber or better.

3. Exterior load-bearing studs not exceeding 12 feet (3658 mm) in height provided in accordance with Table 602.3(6). The minimum number of full-height studs adjacent to openings shall be in accordance with Section 602.7.5. The building shall be located in Exposure B, the roof live load shall not exceed 20 psf (0.96 kPa), and the ground snow load shall not exceed 30 psf (1.4 kPa). Studs and plates shall be No. 2 grade lumber or better. *602.3.1 Stud heights may go up to 20 feet with roof tributary length of 6'.*

TBL. 602.7(1) and 602.7(2) Headers spans for exterior and interior walls moved to chapter 6 from chapter 5.

TABLE 602.7(3)
GIRDER AND HEADER SPANS ^a FOR OPEN PORCHES
 (Maximum span for Douglas fir-larch, hem-fir, Southern pine and spruce-pine-fir ^b)

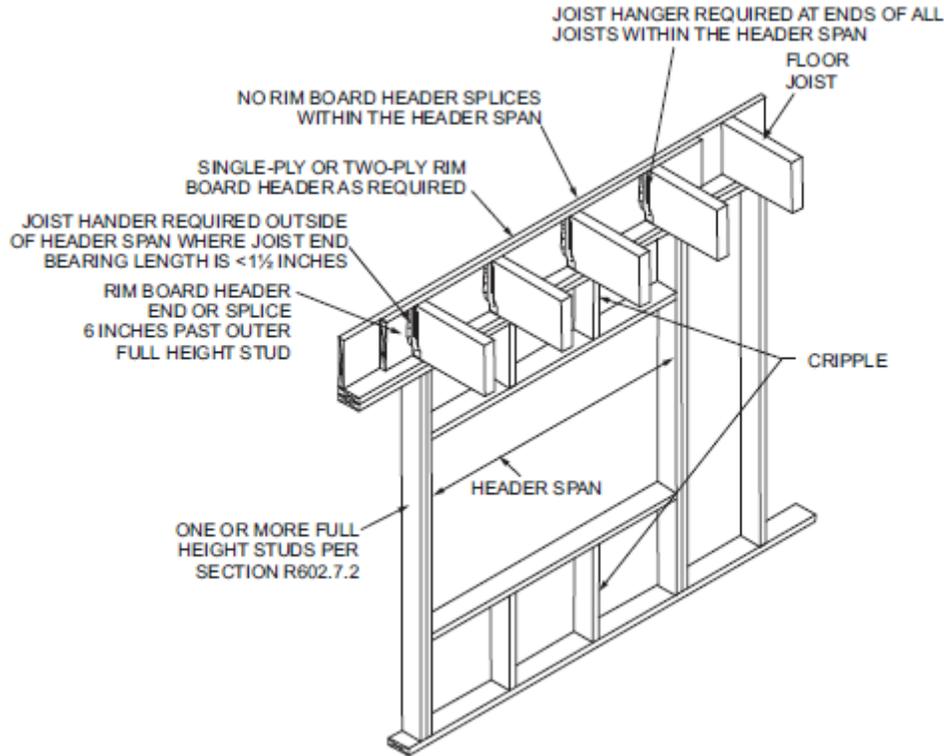
SIZE	SUPPORTING ROOF						SUPPORTING FLOOR	
	GROUND SNOW LOAD (psf)							
	30		50		70			
	DEPTH OF PORCH ^c (feet)							
	8	14	8	14	8	14	8	14
2-2 × 6	7-6	5-8	6-2	4-8	5-4	4-0	6-4	4-9
2-2 × 8	10-1	7-7	8-3	6-2	7-1	5-4	8-5	6-4
2-2 × 10	12-4	9-4	10-1	7-7	8-9	6-7	10-4	7-9
2-2 × 12	14-4	10-10	11-8	8-10	10-1	7-8	11-11	9-0

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- a. Spans are given in feet and inches.
- b. Tabulated values assume No. 2 grade lumber, wet service and incising for refractory species. Use 30 psf ground snow load for cases in which ground snowload is less than 30 psf and the roof live load is equal to or less than 20 psf.
- c. Porch depth is measured horizontally from building face to centerline of the header. For depths between those shown, spans are permitted to be interpolated.

Table 602.7.3; header spans for open porches.

602.7.3 Wood structural panel box headers. Wood structural panel box headers shall be constructed in accordance with Figure 602.7.3 and Table 602.7.3.



For SI: 25.4 mm = 1 inch.

**FIGURE 602.7.2
RIM BOARD HEADER CONSTRUCTION**

**TABLE 602.7.3
MAXIMUM SPANS FOR WOOD STRUCTURAL PANEL BOX HEADERS ^a**

HEADER CONSTRUCTION ^b	HEADER DEPTH (inches)	HOUSE DEPTH (feet)				
		24	26	28	30	32
Wood structural panel— one side	9	4	4	3	3	—
	15	5	5	4	3	3
Wood structural panel— both sides	9	7	5	5	4	3
	15	8	8	7	7	6

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

- a. Spans are based on single story with clear-span trussed roof or two story with floor and roof supported by interior-bearing walls.
- b. See Figure 602.7.3 for construction details.

Table 602.7.3: Span for rim board headers.

602.7.5 Supports for headers. Headers shall be supported on each end with one or more jack studs or with approved framing anchors in accordance with Table 602.7(1) or 602.7(2). The full-height stud adjacent to each end of the header shall be end nailed to each end of the header with four-16d nails (3.5 inches × 0.135 inches). The minimum number of full-height studs at each end of a header shall be in accordance with Table 602.7.5.

TABLE 602.7.5

**MINIMUM NUMBER OF FULL-HEIGHT STUDS AT EACH
END OF HEADERS IN EXTERIOR WALLS ^a**

MAXIMUM HEADER SPAN (feet)	ULTIMATE DESIGN WIND SPEED AND EXPOSURE CATEGORY	
	< 140 mph, Exposure B or < 130 mph, Exposure C	≤115 mph, Exposure B ^b
4	1	1
6	2	1
8	2	1
10	3	2
12	3	2
14	3	2
16	4	2
18	4	2

For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

- a. For header spans between those given, use the minimum number of full-height studs associated with the larger header span.
- b. The tabulated minimum number of full-height studs is applicable where jack studs are provided to support the header at each end in accordance with Table 602.7(1). Where a framing anchor is used to support the header in lieu of a jack stud in accordance with Note d of Table 602.7(1), the minimum number of full-height studs at each end of a header shall be in accordance with requirements for wind speed < 140 mph, Exposure B.

Table 602.7.5: Minimum number of full height studs beside headers based upon opening width.

602.10.8.2 Connections to roof framing. Top plates of exterior braced wall panels shall be attached to rafters or roof trusses above in accordance with Table 602.3(1) and this section. Where required by this section, blocking between rafters or roof trusses shall be attached to top plates of braced wall panels and to rafters and roof trusses in accordance with Table 602.3(1). A continuous band, rim or header joist or roof truss parallel to the braced wall panels shall be permitted to replace the blocking required by this section. Blocking shall not be required over openings in continuously sheathed braced wall lines. In addition to the requirements of this section, lateral support shall be provided for rafters and ceiling joists in accordance with Section 802.8 and for trusses in accordance with Section 802.10.3. Roof ventilation shall be provided in accordance with Section 806.1.

1. For Seismic Design Categories A, B and C, where the distance from the top of the braced wall panel to the top of the rafters or roof trusses above is 9-1/4 -inches (235 mm) or less, blocking between rafters or roof trusses shall not be required. Where the distance from the top of the braced wall panel to the top of the rafters or roof trusses above is between 9-1/4 -inches (235 mm) and 15-1/4 -inches (387 mm), blocking between rafters or roof trusses shall be provided above the braced wall panel in accordance with Figure 602.10.8.2(1).

Exception: Where the outside edge of truss vertical web members aligns with the outside face of the wall studs below, wood structural panel sheathing extending above the top plate as shown in Figure 602.10.8.2(3) shall be permitted to be fastened to each truss web with three-8d nails (21/2 -inches x 0.131 inch) and blocking between the trusses shall not be required.

2. Deleted

3. Where the distance from the top of the braced wall panel to the top of rafters or roof trusses exceeds 15-1/4 -inches (387 mm), the top plates of the braced wall panel shall be connected to perpendicular rafters or roof trusses above in accordance with one or more of the following methods:

- 3.1.** Soffit blocking panels constructed in accordance with Figure 602.10.8.2(2).
- 3.2.** Vertical blocking panels constructed in accordance with Figure 602.10.8.2(3).
- 3.3.** Blocking panels provided by the roof truss manufacturer and designed in accordance with Section 802.

3.4. Blocking, blocking panels or other methods of lateral load transfer designed in accordance with the AWC WFCM or accepted engineering practice.

602.10.8.2; Blocking between trusses, prescribed truss blocking panels.

606 Masonry walls – reorganized and expanded see section.

CHAPTER 7 WALL COVERINGS *Expanded details*

702.7 Vapor retarders. Class I or II vapor retarders are required on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4.

Exceptions:

1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.

703.2 Water-resistive barrier: Deleted the following exceptions to the requirement:

1. Detached accessory structures.
2. Under exterior wall finish materials as specified by Table 703.4
3. Under paperbacked stucco lath when the paper backing is an approved water-resistant barrier.

703.3 Wall covering nominal thickness and attachments. The nominal thickness and attachment of exterior wall coverings shall be in accordance with Table 703.3(1), the wall covering material requirements of this section, and the wall covering manufacturer’s installation instructions. Cladding attachment over foam sheathing shall comply with the additional requirements and limitations of Sections 703.15 through 703.17. Nominal material thicknesses in Table 703.3(1) are based on a maximum stud spacing of 16 inches (406 mm) on center. Where specified by the siding manufacturer’s instructions and supported by a test report or other documentation, attachment to studs with greater spacing is permitted. Fasteners for exterior wall coverings attached to wood framing shall be in accordance with Section 703.3.3 and Table 703.3(1). Exterior wall coverings shall be attached to cold-formed steel light frame construction in accordance with the cladding manufacturer’s installation instructions, the requirements of Table 703.3(1) using screw fasteners substituted for the nails specified in accordance with Table 703.3(2), or an approved design.

**TABLE 703.3(1)
SIDING MINIMUM ATTACHMENT AND MINIMUM THICKNESS**

SIDING MATERIAL	NOMINAL THICKNESS (inches)	JOINT TREATMENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS						
			Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud ¹	Direct to studs	Number or spacing of fasteners	
Anchored veneer: brick, concrete, masonry or stone (see Section 703.8)	2	Section 703.8	Section 703.8						
Adhered veneer: concrete, stone or masonry (see Section 703.12)	—	Section 703.12	Section 703.12						
Fiber cement siding	Panel siding (see Section 703.10.1)	5/16	Section 703.10.1	6d common (2"× 0.113")	6d common (2"× 0.113")	6d common (2"× 0.113")	6d common (2"× 0.113")	4d common (1½" x 0.099")	6" panel edges 12" inter. sup.
	Lap siding (see Section 703.10.2)	5/16	Section 703.10.2	6d common (2"× 0.113")	6d common (2"× 0.113")	6d common (2"× 0.113")	6d common (2"× 0.113")	6d common (2"× 0.113") or 11 gage roofing nail	Note f

Hardboard panel siding (see Section 703.5)		7/16	—	0.120" nail (shank) with 0.225" head	0.120" nail (shank) with 0.225" head	0.120" nail (shank) with 0.225" head	0.120" nail (shank) with 0.225" head	0.120" nail (shank) with 0.225" head	6" panel edges 12" inter. sup. ^d
SIDING MATERIAL		NOMINAL THICKNESS (inches)	JOINT TREATMENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud¹	Direct to studs	Number or spacing of fasteners
Hardboard lap siding (see Section 703.5)		7/16	Note e	0.099" nail (shank) with 0.240" head	0.099" nail (shank) with 0.240" head	0.099" nail (shank) with 0.240" head	0.099" nail (shank) with 0.240" head	0.099" nail (shank) with 0.240" head	Same as stud spacing 2 per bearing
Horizontal aluminum ^a	Without insulation	0.019 ^b	Lap	Siding nail 1 1/2" x 0.120"	Siding nail 2" x 0.120"	Siding nail 2" x 0.120"	Siding nail ^h 1 1/2" x 0.120"	Not allowed	Same as stud spacing
		0.024	Lap	Siding nail 1 1/2" x 0.120"	Siding nail 2" x 0.120"	Siding nail 2" x 0.120"	Siding nail ^h 1 1/2" x 0.120"	Not allowed	
	With insulation	0.019	Lap	Siding nail 1 1/2" x 0.120"	Siding nail 2 1/2" x 0.120"	Siding nail 2 1/2" x 0.120"	Siding nail ^h 1 1/2" x 0.120"	Siding nail 1 1/2" x 0.120"	
Insulated vinyl siding ^j		0.035 (vinyl siding layer only)	Lap	0.120 nail (shank) with a 0.313 head or 16-gage Crown ^{h,i}	0.120 nail (shank) with a 0.313 head or 16-gage Crown ^h	0.120 nail (shank) with a 0.313 head or 16-gage Crown ^h	0.120 nail (shank) with a 0.313 head Section 703.11.2	Not allowed	16 inches on center or specified by manufacturer instructions, test report or other sections of this code
Particleboard panels		3/8	—	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	Not allowed	6" panel edges 12" inter. sup.
		1/2	—	6d box nail (2" x 0.099<)	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	6d box nail (2" x 0.099<)	
		5/8	—	6d box nail (2" x 0.099")	8d box nail (2 1/2" x 0.113")	8d box nail (2 1/2" x 0.113")	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	
Polypropylene siding ^k		Not applicable	Lap	Section 703.14.1	Section 703.14.1	Section 703.14.1	Section 703.14.1	Not allowed	As specified by the manufacturer instructions, test report or other sections of this code
Steel ^c		29 ga.	Lap	Siding nail (1 3/4" x 0.113") Staple—1 3/4"	Siding nail (2 3/4" x 0.113") Staple—2 1/2"	Siding nail (2 1/2" x 0.113") Staple—2 1/4"	Siding nail (1 3/4" x 0.113") Staple—1 3/4"	Not allowed	Same as stud spacing
Vinyl siding (see Section 703.11)		0.035	Lap	0.120" nail (shank) with a 0.313" head or 16-gage staple with 3/8- to 1/2-inch crown ^{h,i}	0.120" nail (shank) with a 0.313" head or 16-gage staple with 3/8- to 1/2-inch crown ^h	0.120" nail (shank) with a 0.313" head or 16-gage staple with 3/8- to 1/2-inch crown ^h	0.120" nail (shank) with a 0.313 head Section 703.11.2	Not allowed	16 inches on center or as specified by the manufacturer instructions or test report
Wood siding (see Section 703.5)	Wood rustic, drop	3/8 min.	Lap	6d box or siding nail (2" x 0.099")	6d box or siding nail (2" x 0.099")	6d box or siding nail (2" x 0.099")	6d box or siding nail (2" x 0.099")	8d box or siding nail (2 1/2" x 0.113") Staple—2"	Face nailing up to 6" widths, 1 nail per bearing; 8" widths and over, 2 nails per bearing
	Shiplap	19/32 average	Lap						
	Bevel	7/16	Lap						
	Butt tip	3/16	Lap						
SIDING MATERIAL		NOMINAL THICKNESS (inches)	JOINT TREATMENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud¹	Direct to studs	Number or spacing of fasteners

Wood structural panel ANSI/APAPRP-210 siding (exteriorgrade) (see Section 703.5)	3/8 - 1/2	Note e	2"× 0.099" siding nail	2 1/2"× 0.113" siding nail	2 1/2"× 0.113" siding nail	2 1/2"× 0.113" siding nail	2"× 0.099" siding nail	6" panel edges 12" inter. sup.
Wood structural panel lap siding (see Section 703.5)	3/8 - 1/2	Note e Note g	2"× 0.099" siding nail	2 1/2"× 0.113" siding nail	2 1/2"× 0.113" siding nail	2 1/2"× 0.113" siding nail	2"× 0.099" siding nail	8" along bottom edge

For SI: 1 inch = 25.4 mm.

- a. Aluminum nails shall be used to attach aluminum siding.
- b. Aluminum (0.019 inch) shall be unbacked only where the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
- c. Shall be of approved type.
- d. Where used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
- e. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
- f. Face nailing: one 6d common nail through the overlapping planks at each stud. Concealed nailing: one 11-gage 1 1/2-inch-long galv. roofing nail through the top edge of each plank at each stud in accordance with the manufacturer’s installation instructions.
- g. Vertical joints, if staggered, shall be permitted to be away from studs if applied over wood structural panel sheathing.
- h. Minimum fastener length must be sufficient to penetrate sheathing other nailable substrate and framing a total of a minimum of 1 1/4 inches or in accordance with the manufacturer’s installation instructions.
- i. Where specified by the manufacturer’s instructions and supported by a test report, fasteners are permitted to penetrate into or fully through nailable sheathing or other nailable substrate of minimum thickness specified by the instructions or test report, without penetrating into framing.
- j. Insulated vinyl siding shall comply with ASTM D7793.
- k. Polypropylene siding shall comply with ASTM D7254.
- l. Cladding attachment over foam sheathing shall comply with the additional requirements and limitations of Sections 703.15, 703.16 and 703.17.

703.3.1 Soffit installation. Soffits shall comply with Section 703.3.1.1, Section 703.3.1.2 or the manufacturer’s installation instructions.

703.3.1.1 Wood structural panel soffit. The minimum nominal thickness for wood structural panel soffits shall be 3/8 inch (9.5 mm) and shall be fastened to framing or nailing strips with 2-inch by 0.099-inch (51 mm × 2.5 mm) nails. Fasteners shall be in spaced not less than 6 inches (152 mm) on center at panel edges and 12 inches (305 mm) on center at intermediate supports.

703.3.1.2 Vinyl soffit panels. Soffit panels shall be fastened at fascia and wall ends and to intermediate nailing strips as necessary to ensure that there is no unsupported span greater than 16 inches (406 mm), or as specified by the manufacturer’s instructions.

703.3.2 Wind limitations. Where the design wind pressure exceeds 30 psf or where the limits of Table 703.3.2 are exceeded, the attachment of wall coverings and soffits shall be designed to resist the component and cladding loads specified in Table 301.2(2) for walls, adjusted for height and exposure in accordance with Table 301.2(3). For the determination of wall covering and soffit attachment, component and cladding loads shall be determined using an effective wind area of 10 square feet (0.93 m2).

**TABLE 703.3.2
LIMITS FOR ATTACHMENT PER TABLE 703.3(1)**

Ultimate Wind Speed (mph 3-second gust)	MAXIMUM MEAN ROOF HEIGHT (feet)		
	Exposure		
	B	C	D
115	NL	50'	20'
120	NL	30'	DR
130	60'	15'	DR
140	35'	DR	DR

For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.
NL = Not Limited by Table 703.3.2, DR = Design Required.

703.3.3 Fasteners. Exterior wall coverings and roof overhang soffits shall be securely fastened with aluminum, galvanized, stainless steel or rust- preventative coated nails or staples in accordance with Table 703.3(1) or with other approved corrosion-resistant fasteners in accordance with the wall covering manufacturer’s installation instructions. Nails and staples shall comply with ASTM F1667. Nails shall be T-head, modified round head, or round head with smooth or deformed shanks. Staples shall have a minimum crown width of 7/16 inch (11.1 mm) outside diameter and be manufactured of minimum 16-gage wire. Where fiberboard, gypsum, or foam plastic sheathing backing is used, nails or staples shall be driven into the studs. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with either the siding manufacturer’s installation instructions or Table 703.3.3.

**TABLE 703.3.3
OPTIONAL SIDING ATTACHMENT SCHEDULE FOR FASTENERS WHERE NO
STUD PENETRATION NECESSARY**

APPLICATION	NUMBER AND TYPE OF FASTENER	SPACING OF FASTENERS ^b
Exterior wall covering (weighing 3 psf or less) attachment to wood structural panel sheathing, either direct or over foam sheathing a maximum of 2 inches thick. ^a Note: Does not apply to vertical siding.	Ring shank roofing nail (0.120" min. dia.)	12" o.c.
	Ring shank nail (0.148" min. dia.)	15" o.c.
	No. 6 screw (0.138" min. dia.)	12" o.c.
	No. 8 screw (0.164" min. dia.)	16" o.c.

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.479 kPa.

- a. Fastener length shall be sufficient to penetrate the back side of the wood structural panel sheathing by at least 1/4 inch. The wood structural panel sheathing shall be not less than 7/16 inch in thickness.
- b. Spacing of fasteners is per 12 inches of siding width. For other siding widths, multiply "Spacing of Fasteners" above by a factor of 12/s, where "s" is the siding width in inches. Fastener spacing shall never be greater than the manufacturer’s minimum recommendations.

703.3.4 Minimum fastener length and penetration. Fasteners shall have the greater of the minimum length specified in Table 703.3(1) or as required to provide a minimum penetration into framing as follows:

- 1.** Fasteners for horizontal aluminum siding, steel siding, particleboard panel siding, wood structural panel siding in accordance with ANSI/APA-PRP 210, fiber-cement panel siding and fiber-cement lap siding installed over foam plastic sheathing shall penetrate not less than 1 1/2 inches (38 mm) into framing or shall be in accordance with the manufacturer’s installation instructions.
- 2.** Fasteners for hardboard panel and lap siding shall penetrate not less than 1 1/2 inches (38 mm) into framing.
- 3.** Fasteners for vinyl siding and insulated vinyl siding installed over wood or wood structural panel sheathing shall penetrate not less than 1 1/4 inches (32 mm) into sheathing and framing combined. Vinyl siding and insulated vinyl siding shall be permitted to be installed with fasteners penetrating into or through wood or wood structural sheathing of minimum thickness as specified by the manufacturer’s instructions or test report, with or without penetration into the framing. Where the fastener penetrates fully through the sheathing, the end of the fastener shall extend not less than 1/4 inch (6.4 mm) beyond the opposite face of the sheathing. Fasteners for vinyl siding and insulated vinyl siding installed over foam plastic sheathing shall be in accordance with Section 703.11.2. Fasteners for vinyl siding and insulated vinyl siding installed over fiberboard or gypsum sheathing shall penetrate not less than 1 1/4 inches (32 mm) into framing.
- 4.** Fasteners for vertical or horizontal wood siding shall penetrate not less than 1 1/2 inches (38 mm) into studs, studs and wood sheathing combined, or blocking.
- 5.** Fasteners for siding material installed over foam plastic sheathing shall have sufficient length to accommodate foam plastic sheathing thickness and to penetrate framing or sheathing and framing combined, as specified in Items 1 through 4.

703.4 Flashing. 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. Self-adhered membranes used as flashing shall comply with AAMA 711. Fluid-applied membranes used as flashing 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-resistive barrier complying with Section 703.2 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 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, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water- resistive 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.
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.

703.5 Wood, hardboard and wood structural panel siding. Wood, hardboard, and wood structural panel siding shall be installed in accordance with this section and Table 703.3(1). Hardboard siding shall comply with CPA/ANSI A135.6. Hardboard siding used as architectural trim shall comply with CPA/ANSI A 135.7.

703.5.1 Vertical wood siding. Wood siding applied vertically shall be nailed to horizontal nailing strips or blocking set not more than 24 inches (610 mm) on center.

**TABLE 703.6.1
MAXIMUM WEATHER EXPOSURE FOR
WOOD SHAKES AND SHINGLES ON EXTERIOR WALLS^{a, b, c}
(Dimensions are in inches)**

LENGTH	EXPOSURE FOR SINGLE COURSE	EXPOSURE FOR DOUBLE COURSE
Shingles^a		
16	7	12 ^b
18	8	14 ^c
24	10 ^{1/2}	16 ^d
Shakes^a		
18	8	14
24	10 ^{1/2}	18

For SI: 1 inch = 25.4 mm.

- a. Dimensions given are for No. 1 grade.
- b. A maximum 9-inch exposure is permitted for No. 2 grade.
- c. A maximum 10-inch exposure is permitted for No. 2 grade.
- d. A maximum 14-inch exposure is permitted for No. 2 grade.

703.6.3 Attachment. Wood shakes or shingles shall be installed according to this chapter and the manufacturer's instructions. Each shake or shingle shall be held in place by two stainless steel Type 304, Type 316 or hot-dipped zinc-coated galvanized corrosion-resistant box nails in accordance with Table 703.6.3(1) or 703.6.3(2). The hot-dipped zinc-coated galvanizing shall be in compliance with ASTM A153, 1.0 ounce per square foot. Alternatively, 16-gage stainless steel Type 304 or Type 316 staples with crown widths 7/16 inch (11 mm) minimum, 3/4 inch (19 mm) maximum, shall be used and the crown of the staple shall be placed parallel with the butt of the shake or the shingle. In single-course application, the fasteners shall be concealed by the course above and shall be driven approximately 1 inch (25 mm) above the butt line of the succeeding course and 3/4 inch (19 mm) from the edge. In double-course applications, the exposed shake or shingle shall be face-nailed with two fasteners, driven approximately 2 inches (51 mm) above the butt line and 3/4 inch (19 mm) from each edge. Fasteners installed within 15 miles (24 km) of salt water coastal areas shall be stainless steel Type 316. Fasteners for fire-retardant-treated shakes or shingles in accordance with Section 902 or pressure-impregnated-preservative-treated shakes or shingles in accordance with AWWA U1 shall be stainless steel Type 316. The fasteners shall penetrate the sheathing or furring strips by not less than 1/2 inch (13 mm) and shall not be overdriven. Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.

TABLE 703.6.3(1)
SINGLE-COURSE SIDEWALL FASTENERS *New Table*

SINGLE-COURSE SIDEWALL FASTENERS			
Product type	Nail type and minimum length (inches)	Minimum head diameter (inches)	Minimum shank thickness (inches)
R & R and sanded shingles			
16" and 18" shingles	3d box 11/4	0.19	0.08
24" shingles	4d box 11/2	0.19	0.08
Grooved shingles			
16" and 18" shingles	3d box 11/4	0.19	0.08
24" shingles	4d box 11/2	0.19	0.08
Split and sawn shakes			
18" straight-split shakes	5d box 13/4	0.19	0.08
18" and 24" handsplit shakes	6d box 2	0.19	0.0915
24" tapersplit shakes	5d box 13/4	0.19	0.08
18" and 24" tapersawn shakes	6d box 2	0.19	0.0915

For SI: 1 inch = 25.4 mm.

TABLE 703.6.3(2)
DOUBLE-COURSE SIDEWALL FASTENERS *New Table*

DOUBLE-COURSE SIDEWALL FASTENERS			
Product type	Nail type and minimum length (inches)	Minimum head diameter (inches)	Minimum shank thickness (inches)
R & R and sanded shingles			
16", 18" and 24" shingles	5d box 1 ³ / ₄ or same size casing nails	0.19	0.08
Grooved shingles			
16", 18" and 24" shingles	5d box 1 ³ / ₄	0.19	0.08
Split and sawn shakes			
18" straight-split shakes	7d box 2 ¹ / ₄ or 8d 2 ¹ / ₂	0.19	0.099
18" and 24" handsplit shakes	7d box 2 ¹ / ₄ or 8d 2 ¹ / ₂	0.19	0.099
24" tapersplit shakes	7d box 2 ¹ / ₄ or 8d 2 ¹ / ₂	0.19	0.099
18" and 24" tapersawn shakes	7d box 2 ¹ / ₄ or 8d 2 ¹ / ₂	0.19	0.099

TABLE 703.8.4(1)
TIE ATTACHMENT AND AIRSPACE REQUIREMENTS

BACKING AND TIE	MINIMUM TIE	MINIMUM TIE FASTENER ^a	AIRSPACE ^c	
Wood stud backing with corrugated sheet metal	22 U.S. gage (0.0299 in.) × 7/8 in. wide	8d common nail ^b (2 1/2 in. × 0.131 in.)	Nominal 1 in. between sheathing and veneer	
Wood stud backing with metal strand wire	W1.7 (No. 9 U.S. gage; 0.148 in.) with hook embedded in mortar joint	8d common nail ^b (2 1/2 in. × 0.131 in.)	Minimum nominal 1 in. between sheathing and veneer	Maximum 4 1/2 in. between backing and veneer
Cold-formed steel stud backing with adjustable metal strand wire	W1.7 (No. 9 U.S. gage; 0.148 in.) with hook embedded in mortar joint	No. 10 screw extending through the steel framing a minimum of three exposed threads	Minimum nominal 1 in. between sheathing and veneer	Maximum 4 1/2 in. between backing and veneer

For SI: 1 inch = 25.4 mm.

- a. Deleted.
- b. All fasteners shall have rust-inhibitive coating suitable for the installation in which they are being used, or be manufactured from material not susceptible to corrosion.
- c. An airspace that provides drainage shall be permitted to contain mortar from construction.

TABLE 703.8.4(2) Revised

REQUIRED BRICK TIE SPACING FOR DIRECT APPLICATION TO WOOD STRUCTURAL PANEL SHEATHING ^{a, b, c}

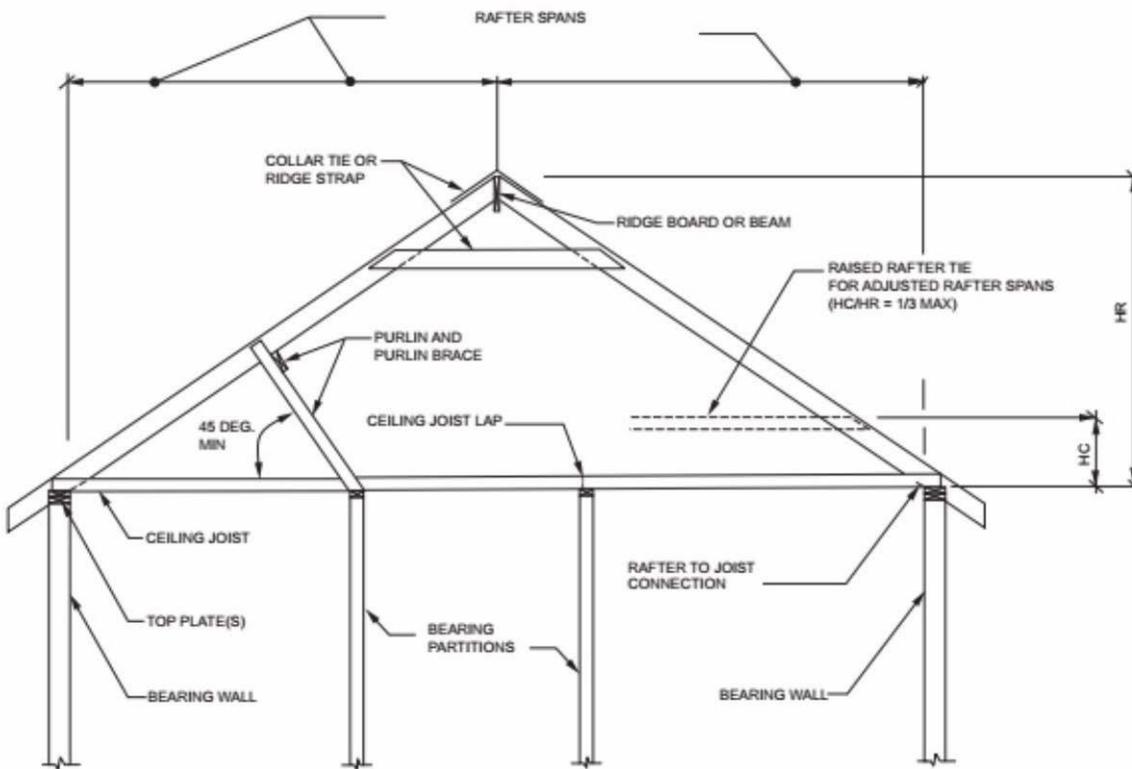
FASTENER TYPE ^d	SIZE (DIA. OR SCREW #)	REQUIRED BRICK-TIE SPACING (VERTICAL-TIE SPACING/HORIZONTAL-TIE SPACING) (inches/inches)		
		115 mph V Ultimate		
		Zone 5, Exposure B	Zone 5, Exposure C	Zone 5, Exposure D
Ring Shank Nails	0.091	16/16, 16/12, 12/16, 12/12	16/12, 12/16, 12/12	12/12
	0.148	24/16, 16/24, 16/16, 16/12, 12/16, 12/12	16/16, 16/12, 12/16, 12/12	16/16, 16/12, 12/16, 12/12
Screws	#6	24/16, 16/24, 16/16, 16/12, 12/16, 12/12	16/16, 16/12, 12/16, 12/12	16/16, 16/12, 12/16, 12/12
	#8	24/16, 16/24, 16/16, 16/12, 12/16, 12/12	16/16, 16/12, 12/16, 12/12	16/16, 16/12, 12/16, 12/12
	#10	24/16, 16/24, 16/16, 16/12, 12/16, 12/12	24/16, 16/24, 16/16, 16/12, 12/16, 12/12	16/16, 16/12, 12/16, 12/12
	#14	24/16, 16/24, 16/16, 16/12, 12/16, 12/12	24/16, 16/24, 16/16, 16/12, 12/16, 12/12	24/16, 16/24, 16/16, 16/12, 12/16, 12/12

For SI: 1 inch = 25.4 mm, 1 mph = 0.447 m/s.

- a. This table is based on attachment of brick ties directly to wood structural panel sheathing only. Additional attachment of the brick tie to lumber framing is not required. The brick ties shall be permitted to be placed over any insulating sheathing, not to exceed 2 inches in thickness. Wood structural panel sheathing shall be a minimum 7/16 performance category. The table is based on a building height of 30 feet or less.
- b. Wood structural panels shall have a specific gravity of 0.42 or greater in accordance with NDS.
- c. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C578 or ASTM C1289.
- d. Fasteners shall be sized such that the tip of the fastener passes completely through the wood structural panel sheathing by not less than 1/4 inch.

CHAPTER 8 ROOF-CEILING CONSTRUCTION

SECTION 802 WOOD ROOF FRAMING



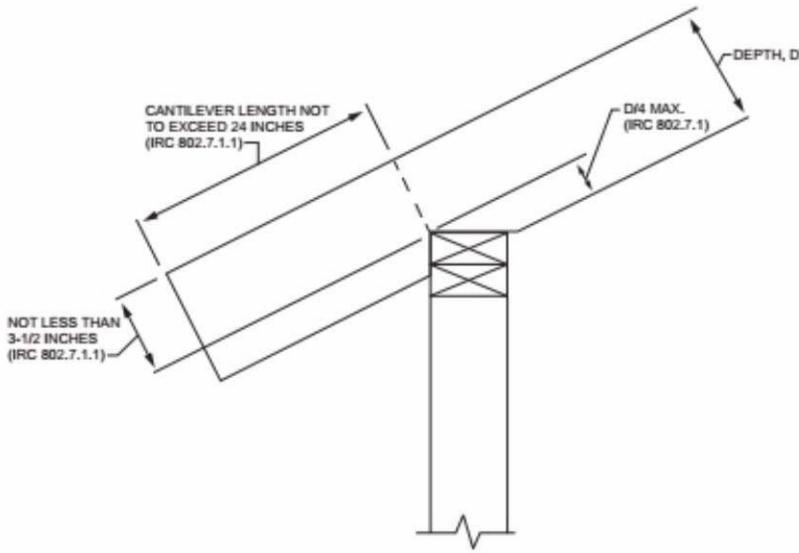
For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 degree = 0.018 rad.

- H_c = Height of ceiling joists or rafter ties measured vertically above the top of rafter support walls.
- H_r = Height of roof ridge measured vertically above the top of the rafter support walls.

FIGURE 802.4.5
BRACED RAFTER CONSTRUCTION *Revised*

802.7.1.1 Cantilevered portions of rafters. Notches on cantilevered portions of rafters are permitted provided the dimension of the remaining portion of the rafter is not less than 3 1/2 inches (89 mm) and the length of the cantilever does not exceed 24 inches (610 mm) in accordance with Figure 802.7.1.1. *Revised*

802.7.1.1 Ceiling joist taper cut. Taper cuts at the ends of the ceiling joist shall not exceed one-fourth depth of the member in accordance with Figure 802.7.1.2. *Revised*



For SI: 1 inch = 25.4 mm.

FIGURE 802.7.1.1 RAFTER NOTCH *New figure*

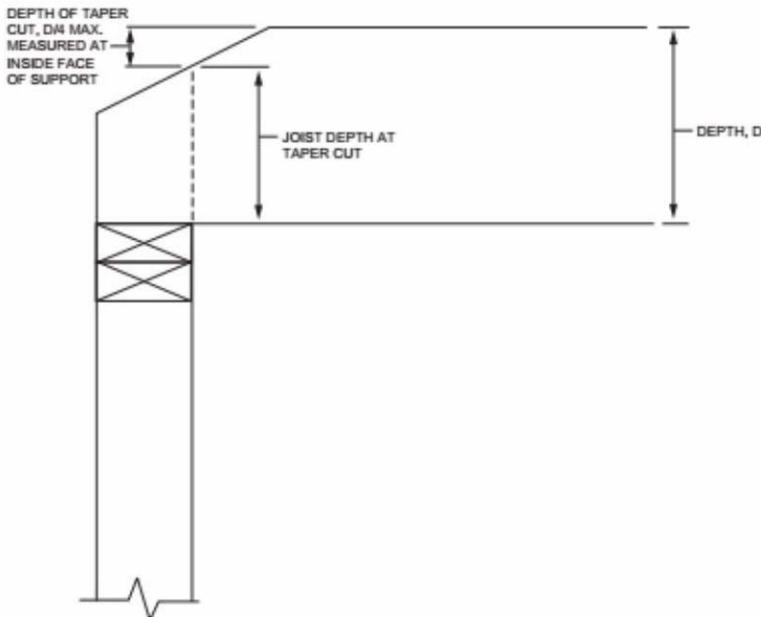


FIGURE 802.7.1.2 CEILING JOIST TAPER CUT *New figure*

802.11.1 Uplift resistance. Roof assemblies shall have uplift resistance in accordance with Sections 802.11.1.1 and 802.11.1.2.

Where the uplift force does not exceed 200 pounds (90.8 kg), rafters and trusses spaced not more than 24 inches (610 mm) on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table 602.3(1).

Where the basic wind speed does not exceed 115 mph, the wind exposure category is B, the roof pitch is 5:12 (42-percent slope) or greater, and the roof span is 32 feet (9754 mm) or less, rafters and trusses spaced not more than 24 inches (610 mm) on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table 602.3(1). *Revised*

802.11.1.1 Truss uplift resistance. Trusses shall be attached to supporting wall assemblies by connections capable of resisting uplift forces as specified on the truss design drawings for the ultimate design wind speed as determined by Figure 301.2(5)A and listed in Table 301.2(1) or as shown on the construction documents. Uplift forces shall be permitted to be determined as specified by Table 802.11, if applicable, or as determined by accepted engineering practice.

802.11.1.2 Rafter uplift resistance. Individual rafters shall be attached to supporting wall assemblies by connections capable of resisting uplift forces as determined by Table 802.11 or as determined by accepted engineering practice. Connections for beams used in a roof system shall be designed in accordance with accepted engineering practice. *Revised*

TABLE 802.11 *Expanded Tables*

RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (ASD) (POUNDS PER CONNECTION)^{a, b, c, d, e, f, g, h}

RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE B									
		Ultimate Design Wind Speed V_{ULT} (mph)									
		110		115		120		130		140	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		< 5:12	≥ 5:12	< 5:12	≥ 5:12	< 5:12	≥ 5:12	< 5:12	≥ 5:12	< 5:12	≥ 5:12
12" o.c.	12	48	43	59	53	70	64	95	88	122	113
	18	59	52	74	66	89	81	122	112	157	146
	24	71	62	89	79	108	98	149	137	192	178
	28	79	69	99	88	121	109	167	153	216	200
	32	86	75	109	97	134	120	185	170	240	222
	36	94	82	120	106	146	132	203	186	264	244
	42	106	92	135	120	166	149	230	211	300	278
	48	118	102	151	134	185	166	258	236	336	311
16" o.c.	12	64	57	78	70	93	85	126	117	162	150
	18	78	69	98	88	118	108	162	149	209	194
	24	94	82	118	105	144	130	198	182	255	237
	28	105	92	132	117	161	145	222	203	287	266
	32	114	100	145	129	178	160	246	226	319	295
	36	125	109	160	141	194	176	270	247	351	325
	42	141	122	180	160	221	198	306	281	399	370
	48	157	136	201	178	246	221	343	314	447	414
24" o.c.	12	96	86	118	106	140	128	190	176	244	226
	18	118	104	148	132	178	162	244	224	314	292
	24	142	124	178	158	216	196	298	274	384	356
	28	158	138	198	176	242	218	334	306	432	400
	32	172	150	218	194	268	240	370	340	480	444
	36	188	164	240	212	292	264	406	372	528	488
	42	212	184	270	240	332	298	460	422	600	556
	48	236	204	302	268	370	332	516	472	672	622

(continued)

TABLE 802.11—continued
RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (ASD)
(POUNDS PER CONNECTION)^{a, b, c, d, e, f, g, h}

RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE C									
		Ultimate Design Wind Speed V_{ULR} (mph)									
		110		115		120		130		140	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		< 5:12	≥5:12	< 5:12	≥5:12	< 5:12	≥5:12	< 5:12	≥5:12	< 5:12	≥5:12
12" o.c.	12	95	88	110	102	126	118	161	151	198	186
	18	121	111	141	131	163	151	208	195	257	242
	24	148	136	173	160	200	185	256	239	317	298
	28	166	152	195	179	225	208	289	269	358	335
	32	184	168	216	199	249	231	321	299	398	373
	36	202	185	237	219	274	254	353	329	438	411
	42	229	210	269	248	312	289	402	375	499	468
	48	256	234	302	278	349	323	450	420	560	524
16" o.c.	12	126	117	146	136	168	157	214	201	263	247
	18	161	148	188	174	217	201	277	259	342	322
	24	197	181	230	213	266	246	340	318	422	396
	28	221	202	259	238	299	277	384	358	476	446
	32	245	223	287	265	331	307	427	398	529	496
	36	269	246	315	291	364	338	469	438	583	547
	42	305	279	358	330	415	384	535	499	664	622
	48	340	311	402	370	464	430	599	559	745	697
24" o.c.	12	190	176	220	204	252	236	322	302	396	372
	18	242	222	282	262	326	302	416	390	514	484
	24	296	272	346	320	400	370	512	478	634	596
	28	332	304	390	358	450	416	578	538	716	670
	32	368	336	432	398	498	462	642	598	796	746
	36	404	370	474	438	548	508	706	658	876	822
	42	458	420	538	496	624	578	804	750	998	936
	48	512	468	604	556	698	646	900	840	1120	1048

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound = 0.454 kg, 1 pound per square foot =

47.9 N/m², 1 pound per linear foot = 14.6 N/m.

- a. The uplift connection forces are based on a maximum 33-foot mean roof height and Wind Exposure Category B or C. For Exposure D, the uplift connection force shall be selected from the Exposure C portion of the table using the next highest tabulated ultimate design wind speed. The adjustment coefficients in Table 301.2(3) shall not be used to multiply the tabulated forces for Exposures C and D or for other mean roof heights.
- b. The uplift connection forces include an allowance for roof and ceiling assembly dead load of 15 psf.
- c. The tabulated uplift connection forces are limited to a maximum roof overhang of 24 inches.
- d. The tabulated uplift connection forces shall be permitted to be multiplied by 0.75 for connections not located within 8 feet of building corners.
- e. For buildings with hip roofs with 5:12 and greater pitch, the tabulated uplift connection forces shall be permitted to be multiplied by 0.70. This reduction shall not be combined with any other reduction in tabulated forces.
- f. For wall-to-wall and wall-to-foundation connections, the uplift connection force shall be permitted to be reduced by 60 plf for each full wall above.
- g. Linear interpolation between tabulated roof spans and wind speeds shall be permitted.
- h. The tabulated forces for a 12-inch on-center spacing shall be permitted to be used to determine the uplift load in pounds per linear foot.

Expanded tables

806.5 Unvented attic and unvented enclosed rafter assemblies. *Added alternative section*

5.1.4 Alternatively, sufficient rigid board or sheet insulation shall be installed directly above the structural roof sheathing to maintain the monthly average temperature of the underside of the structural roof sheathing above 45°F (7°C). For calculation purposes, an interior air temperature of 68°F (20°C) is assumed and the exterior air temperature is assumed to be the monthly average outside air temperature of the three coldest months.

5.3. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

CHAPTER 9 ROOF ASSEMBLIES

905.8 Photovoltaic shingles. The installation of photovoltaic shingles shall comply with the provisions of this section, Section 324 and NFPA 70. *New Section*

906 Building-integrated Photovoltaic (BIPV) roof panels applied directly to the roof deck. The installation of BIPV roof panels shall comply with the provisions of this section, Section 324 and NFPA 70. *New Section*

907.1 Rooftop-mounted photovoltaic panel systems. Rooftop-mounted photovoltaic panel systems shall be designed and installed in accordance with Section 324 and NFPA 70. *New Section*

CHAPTER 10 FIREPLACES

1003.9.1 Chimney caps. Masonry chimneys shall have a concrete, metal or stone cap, a drip edge and a caulked bond break around any flue liners in accordance with ASTM C1283. The concrete, metal or stone cap shall be sloped to shed water. *Modified Section*

1003.9.3 Rain caps. Where a masonry or metal rain cap is installed on a masonry chimney, the net free area under the cap shall be not less than four times the net free area of the outlet of the chimney flue it serves. *Caps – rain. Not required, applies when installed*

1005.7 Factory-built chimney offsets. 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. *New Section*

1005.8 Insulation shield. Where factory-built chimneys pass through insulated assemblies, an insulation shield constructed of steel having a thickness of not less than 0.0187 inch (0.4712 mm) (No. 26 gage) shall be installed to provide clearance between the chimney and the insulation material. The clearance shall be not less than the clearance to combustibles specified by the chimney manufacturer's installation instructions. Where chimneys pass through attic space, the shield shall terminate not less than 2 inches (51 mm) above the insulation materials and shall be secured in place to prevent displacement. Insulation shields provided as part of a listed chimney system shall be installed in accordance with the manufacturer's installation instructions. *New Section*

CHAPTER 11 ENERGY EFFICIENCY

1101.2 Compliance paths. Compliance shall be demonstrated by meeting the requirements of one of the following options:

1. Sections 1101.14 through 1104 of this chapter, or
2. Section 1105 (the Simulated Performance approach) and the provisions of Sections 1101.14 through 1104 indicated as “Mandatory,” or
3. Section 1106 (the Energy Rating Index (ERI) approach) and the provisions of Sections 1101.14 through 1104 indicated as “Mandatory,” and Section 1103.5.3, or
4. Section 1112 (“The Ohio Home Builder’s Association (OHBA) Alternative Energy Code Option”), or
5. The “International Energy Conservation Code.”

1102.4.1.2 Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not *more than five* air changes per hour. Testing shall be conducted in accordance with RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). A written report of the results of the test shall be signed by the party conducting the test and provided to the building official. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope. *1102.4.1.2 requirement of maximum 5 =<air changes per hour infiltration rate will require outside ventilation air.*

1105.4.2.1 Compliance report for permit application. A compliance report submitted with the application for building permit shall include the following:

1. Building street address, or other building site identification.
2. A statement indicating that the proposed design complies with Section 1105.3.
3. An inspection checklist documenting the building component characteristics of the proposed design as indicated in Table 1105.5.2(1). The inspection checklist shall show results for both the standard reference design and the proposed design with user inputs to the compliance software to generate the results.
4. A site-specific energy analysis report that is in compliance with Section 1105.3.
5. The name of the individual performing the analysis and generating the report.
6. The name and version of the compliance software tool.

1105.4.2.2 Compliance report for certificate of occupancy. A compliance report submitted for obtaining the certificate of occupancy shall include the following:

1. Building street address, or other building site identification.
2. A statement indicating that the as-built building complies with Section 1105.3.
3. A certificate indicating that the building passes the performance matrix for code compliance and indicating the energy saving features of the buildings.
4. A site-specific energy analysis report that is in compliance with Section 1105.3.
5. The name of the individual performing the analysis and generating the report.
6. The name and version of the compliance software tool.

SECTION 1107 EXISTING BUILDINGS—GENERAL *New Section*

Scope. The provisions of Sections 1107 through 1111 shall control the alteration, repair, addition and change of occupancy of existing buildings and structures. Where provisions of Sections 1107 through 1111 conflict with Section 113, the provisions of Section 113 shall take precedence.

1107.1.1 Additions, alterations, or repairs: General. Additions, alterations, or repairs to an existing building, building system or portion thereof shall comply with Section 1108, 1109 or 1110. Unaltered portions of the existing building or building supply system shall not be required to comply with this chapter.

1107.2 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, alteration or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

1107.3 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices and systems that are required by this code shall be maintained in compliance with the code edition under which installed. The owner or the owner's authorized agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

1107.4 Compliance. Alterations, repairs, additions and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for alterations, repairs, additions and changes of occupancy or relocation, respectively, in this code.

1107.4.1 Compliance alternative for existing buildings. Table 1107.4.1 may be used for existing buildings in lieu of Table 1102.1.2.

**TABLE 1107.4.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a**

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^b	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE AND DEPTH	CRAWL SPACE ^e WALL R-VALUE
4	0.35	0.60	NR	38	13	5/10	19	10/13	10, 2 ft	10/13
5	0.35	0.60	NR	38	20 or 13 + 5 ^h	13/17	30 ^g	10/13	10, 2 ft	10/13

- a. R-values are minimums. U-factors and solar heat gain coefficient (SHGC) are maximums. R-19 batts compressed in to nominal 2 x 6 framing cavity such that the R-value is reduced by R-1 or more shall be marked with the compressed batt 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. "10/13" means R-10 continuous insulated sheathing on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.
- d. R-5 shall be added to the required slab edge R-values for heated slabs.
- e. Deleted.
- f. Deleted.
- g. Or insulation sufficient to fill the framing cavity, R-19 minimum.
- h. "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25% or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25% of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.
- i. The second R-value applies when more than half the insulation is on the interior of the mass wall.
- j. Deleted.

1107.5 New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs, provided that hazards to life, health or property are not created. Hazardous materials shall not be used where the code for new construction would not allow their use in buildings of similar occupancy, purpose and location.

1107.6 Historic buildings. Provisions of this chapter relating to the construction, repair, alteration, restoration and movement of structures, and change of occupancy shall not be mandatory for historic buildings provided that a report has been submitted to the building official and signed by the owner, a registered design professional, or a representative of the State Preservation Office at the Ohio History Connection or the historic preservation authority having jurisdiction, demonstrating that compliance with that provision would threaten, degrade or destroy the historic form, fabric or function of the building.

SECTION 1108 ADDITIONS *New Section*

1108.1 General. Additions to an existing building, building system or portion thereof shall conform to the provisions of this chapter as they relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this chapter. Additions shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this chapter where the addition alone complies, where the existing building and addition comply with this chapter as a single building, or where the building with the addition does not use more energy than the existing building. Additions shall be in accordance with Section 1108.1.1 or 1108.1.2.

1108.1.1 Prescriptive compliance. Additions shall comply with Sections 1108.1.1.1 through 1108.1.1.4.

1108.1.1.1 Building envelope. New building envelope assemblies that are part of the addition shall comply with Sections 1102.1, 1102.2, 1102.3.1 through 1102.3.5, and 1102.4.

Exceptions:

1. Where unconditioned space is changed to conditioned space, the building envelope of the addition shall comply where the Total UA, as determined in Section 1102.1.5, of the existing building and the addition, and any alterations that are part of the project, is less than or equal to the Total UA generated for the existing building.
2. Building thermal envelope testing is not required.

1108.1.1.2 Heating and cooling systems. New heating, cooling and duct systems that are part of the addition shall comply with Section 1103.

Exception: Where ducts from an existing heating and cooling system are extended to an addition, duct systems with less than 40 linear feet (12.19 m) in unconditioned spaces shall not be required to be tested in accordance with Section 1103.3.3

1108.1.1.3 Service hot water systems. New service hot water systems that are part of the addition shall comply with Section 1103.4.

1108.1.1.4 Lighting. New lighting systems that are part of the addition shall comply with Section 1104.1.

1108.1.2 Existing plus addition compliance (Simulated Performance Alternative). Where unconditioned space is changed to conditioned space, the addition shall comply where the annual energy cost or energy use of the addition and the existing building, and any alterations that are part of the project, is less than or equal to the annual energy cost of the existing building when modeled in accordance with Section 1105. The addition and any alterations that are part of the project shall comply with Section 1105 in its entirety.

SECTION 1109 ALTERATIONS *New Section*

1109.1 General. Alterations to any building or structure shall comply with the requirements of the code for new construction. Alterations shall be such that the existing building or structure is not less conforming with

the provisions of this chapter than the existing building or structure was prior to the alteration.

Alterations to an existing building, building system or portion thereof shall conform to the provisions of this chapter as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this chapter. Alterations shall not create an unsafe or hazardous condition or overload existing building systems. Alterations shall be such that the existing building or structure does not use more energy than the existing building or structure prior to the alteration. Alterations to existing buildings shall comply with Sections 1109.1.1 through 1109.2.

1109.1.1 Building envelope. Building envelope assemblies that are part of the alteration shall comply with Section 1102.1.2 or 1102.1.4, Sections 1102.2.1 through 1102.2.13, 1102.3.1, 1102.3.2, 1102.4.3 and 1102.4.5.

Exception: The following alterations shall not be required to comply with the requirements for new construction provided that the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Roof recover.
5. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Surface-applied window film installed on existing single-pane fenestration assemblies to reduce solar heat gain provided that the code does not require the glazing or fenestration assembly to be replaced.

1109.1.1.1 Replacement fenestration. 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 SHGC as specified in Table 1102.1.2. Where more than one replacement fenestration unit is to be installed, an area-weighted average of the U-factor, SHGC or both of all replacement fenestration units shall be an alternative that can be used to show compliance.

1109.1.2 Heating and cooling systems. New heating, cooling and duct systems that are part of the alteration shall comply with Section 1103.

Exception: Where ducts from an existing heating and cooling system are extended, duct systems with less than 40 linear feet (12.19 m) in unconditioned spaces shall not be required to be tested in accordance with Section 1103.3.3.

1109.1.3 Service hot water systems. New service hot water systems that are part of the alteration shall comply with Section 1103.5.

1109.1.4 Lighting. New lighting systems that are part of the alteration shall comply with Section 1104.1.

Exception: Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

1109.2 Change in space conditioning. Any non-conditioned or low energy space that is altered to become conditioned space shall be required to be brought into full compliance with this chapter.

Exception: Where the simulated performance option in Section 1105 is used to comply with this section, the annual energy cost of the proposed design is permitted to be 110 percent of the annual energy cost otherwise allowed by Section 1105.3.

SECTION 1110 REPAIRS *New Section*

1110.1 General. Buildings, structures and parts thereof shall be repaired in compliance with Section 1107.3 and this section. Work on nondamaged components necessary for the required repair of damaged components shall be considered to be part of the repair and shall not be subject to the requirements for alterations in this chapter. Routine maintenance required by Section 1107.3, ordinary repairs exempt from permit, and abatement of wear due to normal service conditions shall not be subject to the requirements for repairs in this section.

1110.2 Application. For the purposes of this code, the following shall be considered to be repairs:

1. Glass-only replacements in an existing sash and frame.
2. Roof repairs.
3. Repairs where only the bulb, ballast or both within the existing luminaires in a space are replaced provided that the replacement does not increase the installed interior lighting power.

SECTION 1111

CHANGE OF OCCUPANCY OR USE *New Section*

1110.1 General. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this chapter.

1110.2 General. Any space that is converted to a dwelling unit or portion thereof from another use or occupancy shall comply with this chapter.

Exception: Where the simulated performance option in Section 1105 is used to comply with this section, the annual energy cost of the proposed design is permitted to be 110 percent of the annual energy cost allowed by Section 1105.3.

Deleted old section 1102.4.2.1 of 2009 ORC that allowed a visual thermal envelope inspection in lieu of testing. All new homes must be tested.

CHAPTER 13 MECHANICAL SYSTEMS

1305.1.1 Appliances in rooms. Appliances installed in a compartment, alcove, basement or similar space shall be accessed by an opening or door and an unobstructed passageway measuring not less than 24 inches (610 mm) wide and large enough to allow removal of the largest appliance in the space, provided there is a level service space of not less than 30 inches (762 mm) deep and the height of the appliance, but not less than 30 inches (762 mm), at the front or service side of the appliance with the door open. *modified*

1305.1.3.2 Pit locations. Appliances installed in pits or excavations shall not come in direct contact with the surrounding soil and shall be installed not less than 3 inches (76 mm) above the pit floor. The sides of the pit or excavation shall be held back not less than 12 inches (305 mm) from the appliance. Where the depth exceeds 12 inches (305 mm) below adjoining grade, the walls of the pit or excavation shall be lined with concrete or masonry. Such concrete or masonry shall extend not less than 4 inches (102 mm) above adjoining grade and shall have sufficient lateral load-bearing capacity to resist collapse. Excavation on the control side of the appliance shall extend horizontally not less than 30 inches (762 mm). The appliance shall be protected from flooding in an approved manner. *New Section*

CHAPTER 15 EXHAUST SYSTEMS

SECTION 1502; CLOTHES DRYER EXHAUST.

1502.3.1 Exhaust termination outlet and passageway size. The passageway of dryer exhaust duct terminals shall be undiminished in size and shall provide an open area of not less than 12.5 square inches (8065 mm²).

New Section

1502.4.4 Dryer exhaust duct power ventilators. Domestic dryer exhaust duct power ventilators shall conform to UL 705 for use in dryer exhaust duct systems. The dryer exhaust duct power ventilator shall be installed in accordance with the manufacturer's instructions. *New Section*

1502.4.5.1 Specified length. The maximum length of the exhaust duct shall be **35 feet (10 668 mm)** from the connection to the transition duct from the dryer to the outlet terminal. Where fittings are used, the maximum length of the exhaust duct shall be reduced in accordance with Table 1502.4.5.1. The maximum length of the exhaust duct does not include the transition duct. *Modified*

1502.4.7 Dryer exhaust duct power ventilator. The maximum length of the exhaust duct shall be determined in accordance with the manufacturer's instructions for the dryer exhaust duct power ventilator. *Modified*

1503.2 Domestic cooking exhaust. Where domestic cooking exhaust equipment is provided, it shall comply with one of the following:

1. The fan for overhead range hoods and downdraft exhaust equipment not integral with the cooking appliance shall be listed and labeled in accordance with UL 507.
2. Overhead range hoods and downdraft exhaust equipment with integral fans shall comply with UL 507.
3. Domestic cooking appliances with integral downdraft exhaust equipment shall be listed and labeled in accordance with ANSI Z21.1 or UL 858.
4. Microwave ovens with integral exhaust for installation over the cooking surface shall be listed and labeled in accordance with UL 923. *Modified*

1503.3 Exhaust discharge. Domestic cooking exhaust equipment shall discharge to the outdoors through a duct. The duct shall have a smooth interior surface, shall be air tight, shall be equipped with a backdraft damper and shall be independent of all other exhaust systems. Ducts serving domestic cooking exhaust equipment shall not terminate in an attic or crawl space or areas inside the building. *Modified*

Exception: Where installed in accordance with the manufacturer's instructions and where mechanical or natural ventilation is otherwise provided, listed and labeled ductless range hoods shall not be required to discharge to the outdoors. *Modified*

1503.5 Makeup air required. Where one or more gas, liquid or solid fuel-burning appliance that is neither direct-vent nor uses a mechanical draft venting system is located within a dwelling unit's air barrier, each exhaust system capable of exhausting in excess of 400 cubic feet per minute (0.19 m³/s) shall be mechanically or passively provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with not fewer than one damper complying with Section 1503.6.2.

Exceptions:

1. If an exhaust hood system's manufacturer's instructions and/or specifications differ from this requirement, the system shall be installed per the manufacturer's instructions and/or specifications.

2. Makeup air is not required for exhaust systems installed for the exclusive purpose of space cooling and intended to be operated only when windows or other air inlets are open. Modified

1503.6.1 Location. Kitchen exhaust makeup air shall be discharged into the same room in which the exhaust system is located or into rooms or duct systems that communicate through one or more permanent openings with the room in which such exhaust system is located. Such permanent openings shall have a net cross-sectional area not less than the required area of the makeup air supply openings. *Modified*

1503.6.2 Makeup air dampers. Where makeup air is required by Section 1503.6, makeup air dampers shall comply with this section. Each damper shall be a gravity damper or an electrically operated damper that automatically opens when the exhaust system operates. Dampers shall be located to allow access for inspection, service, repair and replacement without removing permanent construction or any other ducts not connected to the damper being inspected, serviced, repaired or replaced. Gravity or barometric dampers shall not be used in passive makeup air systems except where the dampers are rated to provide the design makeup airflow at a pressure differential of 0.01 in. w.c. (3 Pa) or less. *Modify make up air requirements*

SECTION 1504 EXHAUST DUCTS AND EXHAUST OPENINGS *Expanded Section*

1504.1 Duct construction. Where exhaust duct construction is not specified in this chapter, construction shall comply with Chapter 16.

1504.2 Duct length. The length of exhaust and supply ducts used with ventilating equipment shall not exceed the lengths determined in accordance with Table 1504.2.

Exception: Duct length shall not be limited where the duct system complies with the manufacturer’s design criteria or where the flow rate of the installed ventilating equipment is verified by the installer or approved third party using a flow hood, flow grid or other airflow measuring device.

TABLE 1504.2 DUCT LENGTH

DUCT TYPE	FLEX DUCT								SMOOTH-WALL DUCT							
	50	80	100	125	150	200	250	300	50	80	100	125	150	200	250	300
Fan airflow rating (CFM @ 0.25 inch wc ^a)																
Diameter ^b (inches)	Maximum length ^{c, d, e} (feet)															
3	X	X	X	X	X	X	X	X	5	X	X	X	X	X	X	X
4	56	4	X	X	X	X	X	X	114	31	10	X	X	X	X	X
5	NL	81	42	16	2	X	X	X	NL	152	91	51	28	4	X	X
6	NL	NL	158	91	55	18	1	X	NL	NL	NL	168	112	53	25	9
7	NL	NL	NL	NL	161	78	40	19	NL	NL	NL	NL	NL	148	88	54
8 and above	NL	NL	NL	NL	NL	189	111	69	NL	NL	NL	NL	NL	NL	198	133

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

- a. Fan airflow rating shall be in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.
- b. For noncircular ducts, calculate the diameter as four times the cross-sectional area divided by the perimeter.
- c. This table assumes that elbows are not used. Fifteen feet of allowable duct length shall be deducted for each elbow installed in the duct run.
- d. NL = no limit on duct length of this size.
- e. X = not allowed. Any length of duct of this size with assumed turns and fittings will exceed the rated pressure drop.

1504.3 Exhaust openings. Air exhaust openings shall terminate as follows:

1. Not less than 3 feet (914 mm) from property lines.
2. Not less than 3 feet (914 mm) from gravity air intake openings, operable windows and doors.
3. Not less than 10 feet (3048 mm) from mechanical air intake openings except where the exhaust opening is located not less than 3 feet (914 mm) above the air intake opening. Openings shall comply with Sections 303.5.2 and 303.6.

SECTION 1505 MECHANICAL VENTILATION *Expanded Section*

1505.1 General. Where local exhaust or whole-house mechanical ventilation is provided, the equipment shall be designed in accordance with this section.

1505.2 Recirculation of air. Exhaust air from bathrooms and toilet rooms shall not be recirculated within a residence or circulated to another dwelling unit and shall be exhausted directly to the outdoors. Exhaust air from bathrooms, toilet rooms and kitchens shall not discharge into an attic, crawl space or other areas inside the building. This section shall not prohibit the installation of ductless range hoods in accordance with the exception to Section 1503.3.

1505.3 Exhaust equipment. Exhaust equipment serving single dwelling units shall be listed and labeled as providing the minimum required airflow in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.

1505.4. Whole-house mechanical ventilation system. Whole-house mechanical ventilation systems shall be designed in accordance with Sections 1505.4.1 through 1505.4.4.

1505.4.1 System design. The whole-house ventilation system shall consist of one or more supply or exhaust fans, or a combination of such, and associated ducts and controls. Local exhaust or supply fans are permitted to serve as such a system. Outdoor air ducts connected to the return side of an air handler shall be considered as providing supply ventilation.

1505.4.2 System controls. The whole-house mechanical ventilation system shall be provided with controls that enable manual override.

1505.4.3 Mechanical ventilation rate. The whole-house mechanical ventilation system shall provide outdoor air at a continuous rate as determined in accordance with Table 1505.4.3(1) or Equation 15-1.

Ventilation rate in cubic feet per minute = $(0.01 \times \text{total square foot area of house}) + [7.5 \times (\text{number of bedrooms} + 1)]$ **Equation 15-1**

Exception: The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25 percent of each 4-hour segment and the ventilation rate prescribed in Table 1505.4.3(1) is multiplied by the factor determined in accordance with Table 1505.4.3(2).

TABLE 1505.4.3(1) New Table
CONTINUOUS WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM
AIRFLOW RATE REQUIREMENTS

DWELLING UNIT FLOOR AREA (square feet)	NUMBER OF BEDROOMS				
	0 – 1	2 – 3	4 – 5	6 – 7	> 7
Airflow in CFM					
< 1,500	30	45	60	75	90

1,501 – 3,000	45	60	75	90	105
3,001 – 4,500	60	75	90	105	120
4,501 – 6,000	75	90	105	120	135
6,001 – 7,500	90	105	120	135	150
> 7,500	105	120	135	150	165

For SI: 1 square foot = 0.0929 m², 1 cubic foot per minute = 0.0004719 m³/s.

TABLE 1505.4.3(2) *New Table*
INTERMITTENT WHOLE-HOUSE MECHANICAL VENTILATION RATE
FACTORS^{a, b}

RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT	25%	33%	50%	66%	75%	100%
Factor ^a	4	3	2	1.5	1.3	1.0

- a. For ventilation system run time values between those given, the factors are permitted to be determined by interpolation.
b. Extrapolation beyond the table is prohibited.

1505.4.4 Local exhaust rates. Local exhaust systems shall be designed to have the capacity to exhaust the minimum airflow rate determined in accordance with Table 1505.4.4.

TABLE 1505.4.4 *New Table*
MINIMUM REQUIRED LOCAL EXHAUST RATES FOR ONE-, TWO-AND
THREE FAMILY DWELLINGS

AREA TO BE EXHAUSTED	EXHAUST RATES
Kitchens	100 cfm intermittent or 25 cfm continuous
Bathrooms-Toilet Rooms	Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous

For SI: 1 cubic foot per minute = 0.0004719 m³/s.

CHAPTER 16 DUCT SYSTEMS

1601.1 (8) Above ground duct systems. Volume dampers, equipment and other means of supply, return and exhaust air adjustment used in system balancing shall be provided with access. *New section*

1601.1.2 Underground duct systems. Underground duct systems shall be constructed of approved concrete, clay, metal or plastic. The maximum design temperature for systems utilizing plastic duct and fittings shall be 150°F (66°C). Metal ducts shall be protected from corrosion in an approved manner or shall be completely encased in concrete not less than 2 inches (51 mm) thick. Nonmetallic ducts shall be installed in accordance with the manufacturer's instructions. Plastic pipe and fitting materials shall conform to cell classification 12454-B of ASTM D1248 or ASTM D1784 and external loading properties of ASTM D2412. Ducts shall slope to a drainage point that has access. Ducts shall be sealed, secured **and tested** prior to encasing the ducts in concrete or direct burial. Duct tightness shall be verified as required by Section 1103.3. Metallic ducts having an approved protective coating and nonmetallic ducts shall be installed in accordance with the manufacturer's instructions. *Modify underground duct – Seal and test*

1601.4.2 Duct lap. Crimp joints for round and oval metal ducts shall be lapped not less than 1 inch (25 mm) and the male end of the duct shall extend into the adjoining duct in the direction of airflow. *New section*

CHAPTER 21 HYDRONIC PIPING *Expanded Section*

2101.10 Tests. Hydronic piping systems shall be tested hydrostatically at a pressure of one and one-half times the maximum system design pressure, but not less than 100 pounds per square inch (689 kPa). The duration of each test shall be not less than 15 minutes.

Exception: For PEX piping systems, testing with a compressed gas shall be an alternative to hydrostatic testing where compressed air or other gas pressure testing is specifically authorized by all of the manufacturers' instructions for the PEX pipe and fittings products installed at the time the system is being tested, and compressed air or other gas testing is not otherwise prohibited by applicable codes, laws, or regulations outside of this code.

SECTION 2105 GROUND-SOURCE HEAT-PUMP SYSTEM LOOP PIPING

2105.1 Plastic ground-source heat-pump loop piping. Plastic piping and tubing material used in water-based ground-source heat-pump ground-loop systems shall conform to the standards specified in this section.

2105.2 Used materials. Reused pipe, fittings, valves, and other materials shall not be used in ground-source heat-pump loop systems.

2105.3 Material rating. Pipe and tubing shall be rated for the operating temperature and pressure of the ground-source heat-pump loop system. Fittings shall be suitable for the pressure applications and recommended by the manufacturer for installation with the pipe and tubing material installed. Where used underground, materials shall be suitable for burial.

2105.4 Piping and tubing materials standards. Ground-source heat-pump ground-loop pipe and tubing shall conform to the standards listed in Table 2105.4.

TABLE 2105.4 GROUND-SOURCE LOOP PIPE

MATERIAL	STANDARD
Chlorinated polyvinyl chloride (CPVC)	ASTM D2846; ASTM F437; ASTM F438; ASTM F439; ASTM F441; ASTM F442; CSA B137.6
Cross-linked polyethylene (PEX)	ASTM F876; ASTM F 877 ; CSA B137.5
High-density polyethylene (HDPE)	ASTM D2737; ASTM D3035; ASTM F714; AWWA C901; CSA B137.1; CSA C448; NSF 358-1
Polyethylene/aluminum/polyethylene pressure pipe (PE-AL-PE)	ASTM F1282; AWWA C 903; CSA B137.9
Polypropylene (PP-R)	ASTM F2389; CSA B137.11, NSF 358-2
Polyvinyl chloride (PVC)	ASTM D1785; ASTM D2241; CSA 137.3
Raised temperature polyethylene (PE-RT)	ASTM F2623; ASTM F2769, CSA B137.18

2105.5 Fittings. Ground-source heat-pump pipe fittings shall be approved for installation with the piping materials to be installed, shall conform to the standards listed in Table 2105.5 and, where installed underground, shall be suitable for burial.

**TABLE 2105.5
GROUND-SOURCE LOOP PIPE FITTINGS**

PIPE MATERIAL	STANDARD
Chlorinated polyvinyl chloride (CPVC)	ASTM D2846; ASTM F437; ASTM F438; ASTM F439; ASTM F1970; CSA B137.6
Cross-linked polyethylene (PEX)	ASTM F877; ASTM F1807; ASTM F1960; ASTM F2080; ASTM F2159; ASTM F2434; CSA B137.5
High-density polyethylene (HDPE)	ASTM D2683; ASTM D3261; ASTM F1055; CSA B137.1; CSA C448; NSF 358-1
Polyethylene/aluminum/polyethylene (PE-AL-PE)	ASTM F1282; ASTM F2434; CSA B137.9
Polypropylene (PP-R)	ASTM F2389; CSA B137.11; NSF 358-2
Polyvinyl chloride (PVC)	ASTM D2464; ASTM D2466; ASTM D2467; ASTM F1970, CSA B137.2; CSA B137.3
Raised temperature polyethylene (PE-RT)	ASTM D2683; ASTM D3261; ASTM F1055; ASTM F1807; ASTM F2098; ASTM F2159; ASTM F2735; ASTM F2769; CSA B137.1; CSA B137.18

2105.6 Joints and connections. Joints and connections shall be of an approved type. Joints and connections shall be tight for the pressure of the ground-source loop system. Joints used underground shall be approved for such applications.

2105.6.1 Joints between different piping materials. Joints between different piping materials shall be made with approved transition fittings.

2105.7 Preparation of pipe ends. Pipe shall be cut square, reamed, and shall be free of burrs and obstructions. CPVC, PE and PVC pipe shall be chamfered. Pipe ends shall have full-bore openings and shall not be undercut.

2105.8 Joint preparation and installation. Where required by Sections 2105.9 through 2105.11, the preparation and installation of mechanical and thermoplastic- welded joints shall comply with Sections 2105.8.1 and 2105.8.2.

2105.8.1 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

2105.8.2 Thermoplastic-welded joints. Joint surfaces for thermoplastic- welded joints shall be cleaned by an approved procedure. Joints shall be welded in accordance with the manufacturer's instructions.

2105.9 CPVC plastic pipe. Joints between CPVC plastic pipe or fittings shall be solvent-cemented in accordance with Section 2906.9.1.2. Threaded joints between fittings and CPVC plastic pipe shall be in accordance with Section 2105.9.1.

2105.9.1 Threaded joints. Threads shall conform to ASME B1.20.1. The pipe shall be Schedule 80 or heavier plastic pipe and shall be threaded with dies specifically designed for plastic pipe. Thread lubricant, pipe-joint compound or tape shall be applied on the male threads only and shall be approved for application on the piping material.

2105.10 Cross-linked polyethylene (PEX) plastic tubing. Joints between cross- linked polyethylene plastic tubing and fittings shall comply with Sections 2105.10.1 and 2105.10.2. Mechanical joints shall comply with Section 2105.8.1.

2105.10.1 Compression-type fittings. Where compression-type fittings include inserts and ferrules or O-rings, the fittings shall be installed without omitting the inserts and ferrules or O-rings.

2105.10.2 Plastic-to-metal connections. Solder joints in a metal pipe shall not occur within 18 inches (457 mm) of a transition from such metal pipe to plastic pipe or tubing.

2105.11 Polyethylene plastic pipe and tubing. Joints between polyethylene plastic pipe and tubing or fittings for ground-source heat-pump loop systems shall be heat-fusion joints complying with Section 2105.11.1, electrofusion joints complying with Section 2105.11.2, or stab-type insertion joints complying with Section 2105.11.3.

2105.11.1 Heat-fusion joints. Joints shall be of the socket-fusion, saddle-fusion or butt-fusion type, and joined in accordance with ASTM D2657. Joint surfaces shall be clean and free from moisture. Joint surfaces shall be heated to melt temperatures and joined. The joint shall remain undisturbed until cool. Fittings shall be manufactured in accordance with ASTM D2683 or ASTM D3261.

2105.11.2 Electrofusion joints. Joints shall be of the electrofusion type. Joint surfaces shall be clean and free from moisture, and scoured to expose virgin resin. Joint surfaces shall be heated to melt temperatures for the period of time specified by the manufacturer. The joint shall remain undisturbed until cool. Fittings shall be manufactured in accordance with ASTM F1055.

2105.11.2 Stab-type insert fittings. Joint surfaces shall be clean and free from moisture. Pipe ends shall be chamfered and inserted into the fittings to full depth. Fittings shall be manufactured in accordance with ASTM F1924.

2105.12 Polypropylene (PP) plastic. Joints between PP plastic pipe and fittings shall comply with Sections 2105.12.1 and 2105.12.2.

2105.12.1 Heat-fusion joints. Heat-fusion joints for polypropylene (PP) pipe and tubing joints shall be installed with socket-type heat-fused polypropylene fittings, electrofusion polypropylene fittings or by butt fusion. Joint surfaces shall be clean and free from moisture. The joint shall remain undisturbed until cool. Joints shall be made in accordance with ASTM F2389.

2105.12.2 Mechanical and compression sleeve joints. Mechanical and compression sleeve joints shall be installed in accordance with the manufacturer's instructions.

2105.13 Raised temperature polyethylene (PE-RT) plastic tubing. Joints between raised temperature polyethylene tubing and fittings shall comply with Sections 2105.13.1 through 2105.13.4. Mechanical joints shall comply with Section 2105.8.1.

2105.13.1 Compression-type fittings. Where compression-type fittings include inserts and ferrules or O-rings, the fittings shall be installed without omitting the inserts and ferrules or O-rings.

2105.13.2 PE-RT-to-metal connections. Solder joints in a metal pipe shall not occur within 18 inches (457 mm) of a transition from such metal pipe to PE-RT pipe or tubing.

2105.13.3 Heat-fusion joints. Heat-fusion joints shall be of the socket-fusion, saddle-fusion or butt-fusion type, and shall be joined in accordance with ASTM D2657. Joint surfaces shall be clean and free from moisture. Joint

surfaces shall be heated to melt temperatures and joined. The joint shall remain undisturbed until cool. Fittings shall be manufactured in accordance with ASTM D2683 or ASTM D3261.

2105.13.4 Electrofusion joints. Joints shall be of the electrofusion type. Joint surfaces shall be clean and free from moisture and scoured to expose virgin resin. Joint surfaces shall be heated to melt temperatures for the period of time specified by the manufacturer and joined. The joint shall remain undisturbed until cool. Fittings shall be manufactured in accordance with ASTM F1055.

2105.14 PVC plastic pipe. Joints between PVC plastic pipe or fittings shall be solvent-cemented in accordance with Section 2906.9.1.4. Threaded joints between fittings and PVC plastic pipe shall be in accordance with Section 2105.9.1.

2105.15 Shutoff valves. Shutoff valves shall be installed in ground-source loop piping systems in the locations indicated in Sections 2105.15.1 through 2105.15.6.

2105.15.1 Heat exchangers. Shutoff valves shall be installed on the supply and return side of a heat exchanger. **Exception:** Shutoff valves shall not be required where heat exchangers are integral with a boiler or are a component of a manufacturer's boiler and heat exchanger packaged unit and are capable of being isolated from the hydronic system by the supply and return valves required by Section 2001.3.

2105.15.2 Central systems. Shutoff valves shall be installed on the building supply and return of a central utility system.

2105.15.3 Pressure vessels. Shutoff valves shall be installed on the connection to any pressure vessel.

2105.15.4 Pressure-reducing valves. Shutoff valves shall be installed on both sides of a pressure-reducing valve.

2105.15.5 Equipment and appliances. Shutoff valves shall be installed on connections to mechanical equipment and appliances. This requirement does not apply to components of ground-source loop systems such as pumps, air separators, metering devices, and similar equipment.

2105.15.6 Expansion tanks. Shutoff valves shall be installed at connections to non-diaphragm-type expansion tanks.

2105.16 Reduced pressure. A pressure relief valve shall be installed on the low- pressure side of a hydronic piping system that has been reduced in pressure. The relief valve shall be set at the maximum pressure of the system design. The valve shall be installed in accordance with Section 2002.

2105.17 Installation. Piping, valves, fittings, and connections shall be installed in accordance with the manufacturer's instructions.

2105.18 Protection of potable water. Where ground-source heat-pump ground- loop systems have a connection to a potable water supply, the potable water system shall be protected from backflow in accordance with Section 2902.

2105.19 Pipe penetrations. Openings for pipe penetrations in walls, floors and ceilings shall be larger than the penetrating pipe. Openings through concrete or masonry building elements shall be sleeved. The annular space surrounding pipe penetrations shall be protected in accordance with Section 2606.1.

2105.20 Clearance from combustibles. A pipe in a ground-source heat pump piping system having an exterior surface temperature exceeding 250°F (121°C) shall have a clearance of not less than 1 inch (25 mm) from combustible materials.

2105.21 Contact with building material. A ground-source heat-pump ground- loop piping system shall not be in direct contact with building materials that cause the piping or fitting material to degrade or corrode, or that interfere with the operation of the system.

2105.22 Strains and stresses. Piping shall be installed so as to prevent detrimental strains and stresses in the pipe. Provisions shall be made to protect piping from damage resulting from expansion, contraction and structural settlement. Piping shall be installed so as to avoid structural stresses or strains within building components.

2105.22.1 Flood hazard. Piping located in a flood hazard area shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design flood elevation.

2105.23 Pipe support. Pipe shall be supported in accordance with Section 2101.9.

2105.24 Velocities. Ground-source heat-pump ground-loop systems shall be designed so that the flow velocities do not exceed the maximum flow velocity recommended by the pipe and fittings manufacturer. Flow velocities shall be controlled to reduce the possibility of water hammer.

2105.26 Labeling and marking. Ground-source heat-pump ground-loop system piping shall be marked with tape, metal tags or other methods where it enters a building. The marking shall state the following words: "GROUND-SOURCE HEAT-PUMP LOOP SYSTEM." The marking shall indicate if antifreeze is used in the system and shall indicate the chemicals by name and concentration.

2105.26 Chemical compatibility. Antifreeze and other materials used in the system shall be chemically compatible with the pipe, tubing, fittings and mechanical systems.

2105.27 Makeup water. The transfer fluid shall be compatible with the makeup water supplied to the system.

2105.28 Testing. Before connection header trenches are backfilled, the assembled loop system shall be pressure tested with water at 100 psi (689 kPa) for 15 minutes without observed leaks. Flow and pressure loss testing shall be performed and the actual flow rates and pressure drops shall be compared to the calculated design values. If actual flow rate or pressure drop values differ from calculated design values by more than 10 percent, the cause shall be identified and corrective action taken.

2105.29 Embedded piping. Ground-source heat-pump ground-loop piping to be embedded in concrete shall be pressure tested prior to pouring concrete. During pouring, the pipe shall be maintained at the proposed operating pressure.

CHAPTER 23 SOLAR SYSTEMS. *Expanded Section*

SECTION 2301 SOLAR THERMAL ENERGY SYSTEMS

2301.1 General. This section provides for the design, construction, installation, alteration and repair of equipment and systems using solar thermal energy to provide space heating or cooling, hot water heating and swimming pool heating.

2301.2 Design and installation. The design and installation of solar thermal energy systems shall comply with Sections 2301.2.1 through 2301.2.13.

2301.2.1 Access. Access shall be provided to solar energy equipment for maintenance. Solar systems and appurtenances shall not obstruct or interfere with the operation of any doors, windows or other building components requiring operation or access. Roof-mounted solar thermal equipment shall not obstruct or interfere with the operation of roof-mounted equipment, appliances, chimneys, plumbing vents, roof hatches, smoke vents, skylights and other roof penetrations and openings.

2301.2.2 Collectors and panels. Solar collectors and panels shall comply with Sections 2301.2.2.1 and 2301.2.2.2.

2302.2.2.1 Roof-mounted collectors. The roof shall be constructed to support the loads imposed by roof-mounted solar collectors. Roof-mounted solar collectors that serve as a roof covering shall conform to the requirements for roof coverings in Chapter 9 of this code. Where mounted on or above the roof coverings, the collectors and supporting structure shall be constructed of noncombustible materials or fire-retardant-treated wood equivalent to that required for the roof construction.

23.1.2.2.2 Collector sensors. Collector sensor installation, sensor location and the protection of exposed sensor wires from degradation shall be in accordance with ICC/900/SRCC 300.

2301.2.3 Pressure and temperature relief valves and system components. System components containing fluids shall be protected with temperature and pressure relief valves or pressure relief valves. Relief devices shall be installed in sections of the system so that a section cannot be valved off or isolated from a relief device. Direct systems and the potable water portion of indirect systems shall be equipped with a relief valve in accordance with the plumbing code as modified by Chapter 25. For indirect systems, pressure relief valves in solar loops shall comply with ICC 900/SRCC 300. System components shall have a working pressure rating of not less than the setting of the pressure relief device.

2301.2.4 Vacuum relief. System components that might be subjected to a vacuum during operation or shutdown shall be designed to withstand such a vacuum or shall be protected with vacuum relief valves.

2301.2.5 Piping insulation. Piping shall be insulated in accordance with the requirements of Chapter 11. Exterior insulation shall be protected from ultraviolet degradation. The entire solar loop shall be insulated. Where split-style insulation is used, the seam shall be sealed. Fittings shall be fully insulated.

Exceptions:

1. Those portions of the piping that are used to help prevent the system from overheating shall not be required to be insulated.
2. Those portions of piping that are exposed to solar radiation, made of the same material as the solar collector absorber plate and are covered in the same manner as the solar collector absorber, or that are used to collect additional solar energy, shall not be required to be insulated.

3. Piping in thermal solar systems using unglazed solar collectors to heat a swimming pool shall not be required to be insulated.

2301.2.6 Protection from freezing. System components shall be protected from damage resulting from freezing of heat-transfer liquids at the winter design temperature provided in Table 301.2(1). Freeze protection shall be provided in accordance with ICC 900/SRCC 300. Drain-back systems shall be installed in compliance with Section 2301.2.6.1. Systems utilizing freeze- protection valves shall comply with Section 2301.2.6.2.

Exception: Where the 97.5-percent winter design temperature is greater than or equal to 48°F (9°C).

2301.2.6.1 Drain-back systems. Drain-back systems shall be designed and installed to allow for manual gravity draining of fluids from areas subject to freezing to locations not subject to freezing, and air filling of the components and piping. Such piping and components shall maintain a horizontal slope in the direction of flow of not less than one-fourth unit vertical in 12 units horizontal (2-percent slope). Piping and components subject to manual gravity draining shall permit subsequent air filling upon drainage and air venting upon refilling.

2301.2.6.2 Freeze-protection valves. Freeze-protection valves shall discharge in a manner that does not create a hazard or structural damage.

2301.2.7 Storage tank sensors. Storage tank sensors shall comply with ICC 900/SRCC 300.

2101.2.8 Expansion tanks. Expansion tanks in solar energy systems shall be installed in accordance with Section 2003 in solar collector loops that contain pressurized heat transfer fluid. Where expansion tanks are used, the system shall be designed in accordance with ICC 900/SRCC 300 to provide an expansion tank that is sized to withstand the maximum operating pressure of the system.

Exception: Expansion tanks shall not be required in the collector loop of drain-back systems.

2301.2.9 Roof and wall penetrations. Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents and insects.

2301.2.10 Description and warning labels. Solar thermal systems shall comply with description label and warning label requirements of Section 2301.2.11.2 and ICC 900/SRCC 300.

2301.2.11 Solar loop. Solar loops shall be in accordance with Sections 2301.2.11.1 and 2301.2.11.2.

2301.2.11 Solar loop isolation. Valves shall be installed to allow the solar loop to be isolated from the remainder of the system.

2301.2.11.2 Drain and fill valve labels and caps. Drain and fill valves shall be labeled with a description and warning that identifies the fluid in the solar loop and a warning that the fluid might be discharged at high temperature and pressure. Drain caps shall be installed at drain and fill valves.

2301.2.12 Maximum temperature limitation. Systems shall be equipped with means to limit the maximum water temperature of the system fluid entering or exchanging heat with any pressurized vessel inside the dwelling to 180°F (82°C). This protection is in addition to the required temperature and pressure relief valves required by Section 2301.2.3.

2301.2.13 Deleted.

2301.3 Labeling. Labeling shall comply with Sections 2301.3.1 and 2301.3.2.

2301.3.1 Collectors and panels. Solar thermal collectors and panels shall be listed and labeled in accordance with I C C 901/ SRCC 100. Factory- built collectors shall bear a label indicating the manufacturer's name, model number and serial number.

2301.4 Thermal storage units. Pressurized water storage tanks shall bear a label indicating the manufacturer's name and address, model number, serial number, storage unit maximum and minimum allowable operating temperatures and storage unit maximum and minimum allowable operating pressures. The label shall clarify that these specifications apply only to the water storage tanks.

2301.4 Heat transfer gases or liquids and heat exchangers. Essentially toxic transfer fluids, ethylene glycol, flammable gases and flammable liquids shall not be used as heat transfer fluids. Heat transfer gases and liquids shall be rated to withstand the system's maximum design temperature under operating conditions without degradation. Heat exchangers used in solar thermal systems shall comply with the plumbing code as modified by Chapter 25, and ICC 900/SRCC 300.

Heat transfer fluids shall be in accordance with SRCC 300. The flash point of the heat transfer fluids utilized in solar thermal systems shall be not less than 50°F (28°C) above the design maximum non-operating or no-flow temperature attained by the fluid in the collector.

2301.5 Backflow protection. Connections from the potable water supply to solar systems shall comply with the plumbing code as modified by Chapter 25.

2301.6 Filtering. Air provided to occupied spaces that passes through thermal mass storage systems by mechanical means shall be filtered for particulates at the outlet of the thermal mass storage system.

2301.7 Solar thermal systems for heating potable water. Where a solar thermal system heats potable water to supply a potable hot water distribution system, the solar thermal system shall be in accordance with Sections 2301.7.1, 2301.7.2 and the plumbing code as modified by Chapter 25.

2301.7.1 Indirect systems. Heat exchangers that are components of indirect solar thermal heating systems shall comply with Section the plumbing code as modified by Chapter 25.

2301.7.2 Direct systems. Where potable water is directly heated by a solar thermal system, the pipe, fittings, valves and other components that are in contact with the potable water in the solar heating system shall comply with the requirements of the plumbing code as modified by Chapter 25.

CHAPTER 24 FUEL GAS

2404.11 Condensate pumps. Condensate pumps located in uninhabitable spaces, such as attics and crawl spaces, shall be connected to the appliance or equipment served such that when the pump fails, the appliance or equipment will be prevented from operating. Pumps shall be installed in accordance with the manufacturer's instructions. *Add condensate pump requirements*

2406.2 Prohibited locations. Appliances shall not be located in sleeping rooms, bathrooms, toilet rooms, storage closets or surgical rooms, or in a space that opens only into such rooms or spaces, except where the installation complies with one of the following:

1. The appliance is a direct-vent appliance installed in accordance with the conditions of the listing and the manufacturer's instructions.
2. Vented room heaters, wall furnaces, vented decorative appliances, vented gas fireplaces, vented gas fireplace heaters and decorative appliances for installation in vented solid fuel-burning fireplaces are installed in rooms that meet the required volume criteria of Section 2407.5.

3. A single wall-mounted unvented room heater is installed in a bathroom and such unvented room heater is equipped as specified in Section 2445.6 and has an input rating not greater than 6,000 Btu/h (1.76 kW). The bathroom shall meet the required volume criteria of Section 2407.5.

4. A single wall-mounted unvented room heater is installed in a bedroom and such unvented room heater is equipped as specified in Section G2445.6 and has an input rating not greater than 10,000 Btu/h (2.93 kW). The bedroom shall meet the required volume criteria of Section 2407.5.

5. The appliance is installed in a room or space that opens only into a bedroom or bathroom, and such room or space is used for no other purpose and is provided with a solid weather-stripped door equipped with an approved self-closing device. Combustion air shall be taken directly from the outdoors in accordance with Section 2407.6.

6. A clothes dryer is installed in a residential bathroom or toilet room having a permanent opening with an area of not less than 100 square inches (0.06 m²) that communicates with a space outside of a sleeping room, bathroom, toilet room or storage closet. *Added an exception to prohibited location of appliance, #6.*

SECTION 2409 CLEARANCE REDUCTION

2409.1 Scope. This section shall govern the reduction in required clearances to combustible materials, including gypsum board, and combustible assemblies for chimneys, vents, appliances, devices and equipment. Clearance requirements for air-conditioning equipment and central heating boilers and furnaces shall comply with Sections 2409.3 and 2409.4. *Clarification to include gypsum board as a combustible material.*

SECTION 2411 GAS PIPING

2411.2: CSST BONDING. This section applies to corrugated stainless steel tubing (CSST) that is not listed with an arc-resistant jacket or coating system in accordance with ANSI LC1/CSA 6.26. CSST gas piping systems and piping systems containing one or more segments of CSST shall be electrically continuous and bonded to the electrical service grounding electrode system or, where provided, the lightning protection grounding electrode system. *Renumber CSST sections*

2411.3 Arc-resistant CSST. This section applies to corrugated stainless steel tubing (CSST) that is listed with an arc-resistant jacket or coating system in accordance with ANSI LC1/CSA 6.26. The CSST shall be electrically continuous and bonded to an effective ground fault current path. Where any CSST component of a piping system does not have an arc-resistant jacket or coating system, the bonding requirements of Section 2411.2 shall apply. Arc-resistant-jacketed CSST shall be considered to be bonded where it is connected to an appliance that is connected to the appliance grounding conductor of the circuit that supplies that appliance. *New*

2412.9 Identification. Each length of pipe and tubing and each pipe fitting, utilized in a fuel gas system, shall bear the identification of the manufacturer.

Exceptions:

1. Steel pipe sections that are 2 feet (610 mm) and less in length and are cut from longer sections of pipe.
2. Steel pipe fittings 2 inches and less in size.
3. Where identification is provided on the product packaging or crating.
4. Where other approved documentation is provided. *Revised section*

2412.10 Piping materials standards. Piping, tubing and fittings shall either be tested or listed by an approved agency as complying with the applicable referenced standards, specifications and performance criteria of this code and shall be identified in accordance with Section 2412.9. *Pipe material testing and certification per Ohio process.*

2413.2 Maximum gas demand. The volumetric flow rate of gas to be provided shall be the sum of the maximum input of the appliances served.

The total connected hourly load shall be used as the basis for pipe sizing, assuming that all appliances could be operating at full capacity simultaneously. Where a diversity of load can be established, pipe sizing shall be permitted to be based on such loads. *Modify calculation for maximum gas demand*

The volumetric flow rate of gas to be provided shall be adjusted for altitude where the installation is above 2,000 feet (610 m) in elevation. *Modify calculation for maximum gas demand*

2414.4.2 Steel. Steel, stainless steel and wrought-iron pipe shall not be lighter than Schedule 10 and shall comply with the dimensional standards of ASME B36.10, 10M and one of the following standards:

1. ASTM A53/A53M.
2. ASTM A106.
3. ASTM A312. *Modify to allow schedule 10 piping*

2414.6 Plastic pipe, tubing and fittings. Polyethylene plastic pipe, tubing and fittings used to supply fuel gas shall conform to ASTM D2513. Such pipe shall be marked “Gas” and “ASTM D2513.”

Polyamide pipe, tubing and fittings shall be identified and conform to ASTM F2945. Such pipe shall be marked “Gas” and “ASTM F2945.”

Polyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC) plastic pipe, tubing and fittings shall not be used to supply fuel gas. *Modify to prohibit PVC & CPVC for pipe, tubing & fittings*

2414.10.1 Pipe joints. Schedule 40 and heavier pipe joints shall be threaded, flanged, brazed, welded or assembled with press-connect fittings listed in accordance with ANSI LC4/CSA 6.32. Pipe lighter than Schedule 40 shall be connected using press-connect fittings, flanges, brazing or welding. Where nonferrous pipe is brazed, the brazing materials shall have a melting point in excess of 1,000°F (538°C). Brazing alloys shall not contain more than 0.05- percent phosphorus. *Modify to allow pressure connect fittings.*

2415.5 Fittings in concealed locations. Fittings installed in concealed locations shall be limited to the following types:

1. Threaded elbows, tees and couplings.
2. Brazed fittings.
3. Welded fittings.
4. Fittings listed to ANSI LC1/CSA 6.26 or ANSI LC4/ CSA 6.32.

Clarify permitted fittings in concealed locations

2415.6 Protection against physical damage. Where piping will be concealed within light-frame construction assemblies, the piping shall be protected against penetration by fasteners in accordance with Sections 2415.7.1 through 2415.7.3.

Exception: Black steel piping and galvanized steel piping shall not be required to be protected. *Modify protection of piping in concealed locations*

2415.7.1 Piping through bored holes or notches. Where piping is installed through holes or notches in framing members and the piping is located less than 1 1/2 -inches (38 mm) from the framing member face to which wall, ceiling or floor membranes will be attached, the pipe shall be protected by shield plates that cover the width of the pipe and the framing member and that extend not less than 4 inches (102 mm) to each side of

the framing member. Where the framing member that the piping passes through is a bottom plate, bottom track, top plate or top track, the shield plates shall cover the framing member and extend not less than 4 inches (102 mm) above the bottom framing member and not less than 4 inches (102 mm) below the top framing member.

Modify protection of piping in concealed locations

2415.7.2 Piping installed in other locations. Where the piping is located within a framing member and is less than 1 1/2 -inches (38 mm) from the framing member face to which wall, ceiling or floor membranes will be attached, the piping shall be protected by shield plates that cover the width and length of the piping. Where the piping is located outside of a framing member and is located less than 1 1/2 -inches (38 mm) from the nearest edge of the face of the framing member to which the membrane will be attached, the piping shall be protected by shield plates that cover the width and length of the piping. *Modify protection of piping in concealed locations*

2415.7.3 Shield plates. Shield plates shall be of steel material having a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 gage). *Modify protection of piping in concealed locations*

2415.11.2 Protection methods. Underground piping shall comply with one or more of the following:

1. The piping shall be made of corrosion-resistant material that is suitable for the environment in which it will be installed.
2. Pipe shall have a factory-applied, electrically-insulating coating. Fittings and joints between sections of coated pipe shall be coated in accordance with the coating manufacturer's instructions.
3. The piping shall have a cathodic protection system installed and the system shall be monitored and maintained in accordance with an approved program. *Reorganize section and add corrosion protection requirements*

2419.4 Sediment trap. Where a sediment trap is not incorporated as part of the appliance, a sediment trap shall be installed downstream of the appliance shutoff valve as close to the inlet of the appliance as practical. The sediment trap shall be either a tee fitting having a capped nipple of any length installed vertically in the bottommost opening of the tee as illustrated in Figure 2419.4 or other device approved as an effective sediment trap. Illuminating appliances, ranges, clothes dryers, decorative vented appliances for installation in vented fireplaces, gas fireplaces and outdoor grills need not be so equipped.

Add Figure 2419.4 to clarify sediment trap installation

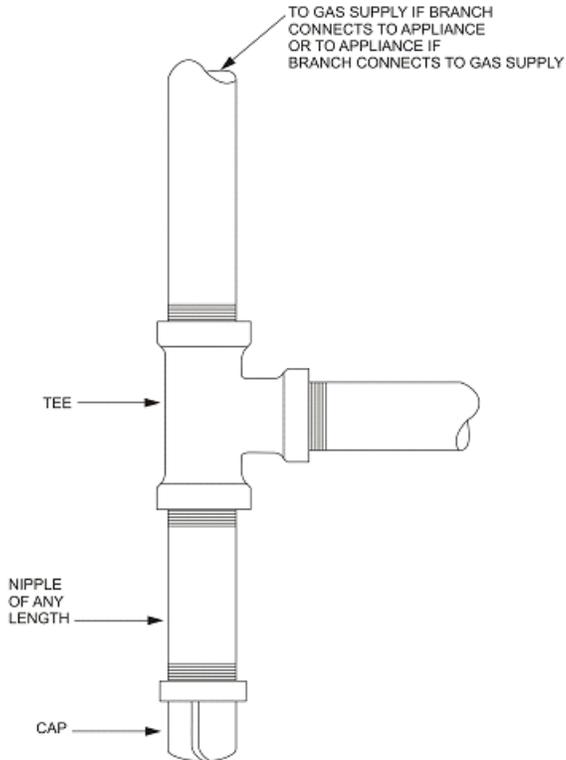


FIGURE 2419.4 METHOD OF INSTALLING A TEE FITTING SEDIMENT TRAP

2420.5.1 Located within same room. The shutoff valve shall be located in the same room as the appliance. The shutoff valve shall be within 6 feet (1829 mm) of the appliance, and shall be installed upstream of the union, connector or quick disconnect device it serves. Such shutoff valves shall be provided with access. Shutoff valves serving movable appliances, such as cooking appliances and clothes dryers, shall be considered to be provided with access where installed behind such appliances. Appliance shutoff valves located in the firebox of a fireplace shall be installed in accordance with the appliance manufacturer's instructions.

Clarify - Shut off valve location behind moveable appliance is ok

2420.6 Shutoff valves in tubing systems. Shutoff valves installed in tubing systems shall be rigidly and securely supported independently of the tubing. *Add requirement to support shut off valve in tubing systems*

SECTION 2421 FLOW CONTROLS

2421.2 MP regulators. MP pressure regulators shall comply with the following:

1. The MP regulator shall be approved and shall be suitable for the inlet and outlet gas pressures for the application.
2. The MP regulator shall maintain a reduced outlet pressure under lock-up (no-flow) conditions.
3. The capacity of the MP regulator, determined by published ratings of its manufacturer, shall be adequate to supply the appliances served.
4. The MP pressure regulator shall be provided with access. Where located indoors, the regulator shall be vented to the outdoors or shall be equipped with a leak-limiting device, in either case complying with Section 2421.3.

5. A tee fitting with one opening capped or plugged shall be installed between the MP regulator and its upstream shutoff valve. Such tee fitting shall be positioned to allow connection of a pressure-measuring instrument and to serve as a sediment trap.
6. A tee fitting with one opening capped or plugged shall be installed not less than 10 pipe diameters downstream of the MP regulator outlet. Such tee fitting shall be positioned to allow connection of a pressure-measuring instrument. The tee fitting is not required where the MP regulator serves an appliance that has a pressure test port on the gas control inlet side and the appliance is located in the same room as the MP regulator.
7. Where connected to rigid piping, a union shall be installed within 1 foot (304 mm) of either side of the MP regulator. *2015 Modify regulator (medium pressure) installed with unions.*

SECTION 2422 APPLIANCE CONNECTIONS

2422.1 Connecting appliances. Appliances shall be connected to the piping system by one of the following:

1. Rigid metallic pipe and fittings.
2. Corrugated stainless steel tubing (CSST) where installed in accordance with the manufacturer's instructions.
3. Listed and labeled appliance connectors in compliance with ANSI Z21.24/CSA 6.10 and installed in accordance with the manufacturer's instructions and located entirely in the same room as the appliance.
4. Listed and labeled quick-disconnect devices used in conjunction with listed and labeled appliance connectors.
5. Listed and labeled convenience outlets used in conjunction with listed and labeled appliance connectors.
6. Listed and labeled outdoor appliance connectors in compliance with ANSI Z21.75/CSA 6.27 and installed in accordance with the manufacturer's instructions.
7. Listed outdoor gas hose connectors in compliance with ANSI Z21.54 used to connect portable outdoor appliances. The gas hose connection shall be made only in the outdoor area where the appliance is used, and shall be to the gas piping supply at an appliance shutoff valve, a listed quick-disconnect device or listed gas convenience outlet. *Add referenced standard for portable outdoor appliance connect.*

SECTION 2426 VENTS

2426.7.1 Door swing. Appliance and equipment vent terminals shall be located such that doors cannot swing within 12 inches (305 mm) horizontally of the vent terminal. Door stops or closures shall not be installed to obtain this clearance. *Add door swing clearance at vent terminals.*

2427.1 Plastic piping. Where plastic piping is used to vent an appliance, the appliance shall be listed for use with such venting materials and the appliance manufacturer's installation instructions shall identify the specific plastic piping material. The plastic pipe venting materials shall be labeled in accordance with the product standards specified by the appliance manufacturer or shall be listed in accordance with UL 1738.

Modify use of listed plastic vent piping is per manufacturers instruction

2427.4.1.1 Plastic vent joints. Plastic pipe and fittings used to vent appliances shall be installed in accordance with the appliance manufacturer's instructions. Plastic pipe venting materials listed and labeled in accordance with UL 1738 shall be installed in accordance with the vent manufacturer's instructions. Where a primer is required, it shall be of a contrasting color. *Modify use of listed plastic vent piping is per manufacturers instruction.*

2427.8 Venting system termination location. The location of venting system terminations shall comply with the following (see Appendix C):

1. A mechanical draft venting system shall terminate not less than 3 feet (914 mm) above any forced-air inlet located within 10 feet (3048 mm).

Exceptions:

1. This provision shall not apply to the combustion air intake of a direct-vent appliance.

2. This provision shall not apply to the separation of the integral outdoor air inlet and flue gas discharge of listed outdoor appliances.

2. A mechanical draft venting system, excluding direct- vent appliances, shall terminate not less than 4 feet (1219 mm) below, 4 feet (1219 mm) horizontally from, or 1 foot (305 mm) above any door, operable window or gravity air inlet into any building. The bottom of the vent terminal shall be located not less than 12 inches (305 mm) above finished ground level.

3. The clearances for through-the-wall, direct-vent terminals shall be in accordance with Table 2427.8.

4. Through-the-wall vents for Category II and IV appliances and non- categorized condensing appliances shall not terminate over public walkways or over an area where condensate or vapor could create a nuisance or hazard or could be detrimental to the operation of regulators, relief valves or other equipment. Where local experience indicates that condensate is a problem with Category I and III appliances, this provision shall also apply. Drains for condensate shall be installed in accordance with the appliance and vent manufacturer’s instructions.

5. Vent systems for Category IV appliances that terminate through an outside wall of a building and discharge flue gases perpendicular to the adjacent wall shall be located not less than 10 feet (3048 mm) horizontally from an operable opening in an adjacent building. This requirement shall not apply to vent terminals that are 2 feet (607 mm) or more above or 25 feet (7620 mm) or more below operable openings. *Modify to include new requirements for sidewall vent systems*

**TABLE 2427.8
THROUGH-THE-WALL, DIRECT-VENT TERMINATION CLEARANCES**

DIRECT-VENT APPLIANCE INPUT RATING (Btu/hr)	THROUGH-THE-WALL VENT TERMINAL CLEARANCE FROM ANY AIR OPENING INTO THE BUILDING (inches)
< 10,000	6
≥ 10,000 ≤ 50,000	9
> 50,000 ≤ 150,000	12
> 150,000	In accordance with the appliance manufacturer’s instructions and not less than the clearances specified in Section 2427.8, Item 2

For SI: 1 inch = 25.4 mm, 1 Btu/hr = 0.2931 W.

2439.4 Dryer exhaust duct power ventilators. Domestic dryer exhaust duct power ventilators shall be listed and labeled to UL 705 for use in dryer exhaust duct systems. The dryer exhaust duct power ventilator shall be installed in accordance with the manufacturer’s instructions. *Added requirements for use of power vent in dryer exhaust for gas dryers.*

2439.4.1 Specified length. The maximum length of the exhaust duct shall be 35 feet (10 668 mm) from the connection to the transition duct from the dryer to the outlet terminal. Where fittings are used, the maximum length of the exhaust duct shall be reduced in accordance with Table 2439.7.4.1. *Modify duct length labeling. All ducts over 35' equivalent length*

2439.7.4.3(614.8.4.3) Dryer exhaust duct power ventilator length. The maximum length of the exhaust duct shall be determined by the dryer exhaust duct power ventilator manufacturer's installation instructions. *Added length per manufacturer when power vent is used*

2439.7.5 Length identification. Where the exhaust duct equivalent length exceeds 35 feet (10 668 mm), the equivalent length of the exhaust duct shall be determined by the dryer manufacturer's instructions and identified on a permanent label or tag. The label or tag shall be located within 6 feet (1829 mm) of the exhaust duct connection or at the electric panel. *Modify duct length labeling. All ducts over 35' equivalent length*

Deleted 2013 RCO 2442.2: *Remove prescriptive duct sizing in favor of other sizing methods.*

2442.4 Screen. Required outdoor air inlets shall be covered with a screen having 1/4 -inch (6.4 mm) openings. *Modify the screen size for outside & return air*

2447.2 Prohibited location. Cooking appliances designed, tested, listed and labeled for use in commercial occupancies shall not be installed within dwelling units or within any area where domestic cooking operations occur.

Exceptions:

1. Appliances that are also listed as domestic cooking appliances. *New Exception*