**CLACKAMAS COUNTY DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT**
**BUILDING CODES DIVISION**

# RESIDENTIAL CODE SUMMARY

## 2011 EDITION OF THE OREGON RESIDENTIAL SPECIALTY CODE (BASED ON 2009 IRC)

## STRUCTURAL AND MECHANICAL REQUIREMENTS

Oregon Residential Specialty Code is available at http://www.oregonbcd.org/.

***PROJECT ADDRESS*_____*PERMIT NUMBER*_____**

This checklist becomes part of the approved plans and permit. Construction must comply with the 2011 ORSC code requirements. Approved plans must be kept on the job site. Buildings must be built to conform to the approved plans. Plan changes require Building Codes Division approval and may require designer approval. Refer to the building permit card for required inspections. Final inspection approval and certificate of occupancy is required before occupancy.

### CERTIFICATE OF OCCUPANCY

**OAR 918-480-0140 Residential Certificate of Occupancy (See complete OAR for additional information.)**

(1) Prior to occupancy of a new residential dwelling or townhouse the building official must issue a certificate of occupancy in the form and format established by the division, unless a temporary certificate of occupancy is issued by the building official.

(2) This rule applies to a new residential dwelling or townhouse, if the structural permit for construction of the residential dwelling or townhouse was applied for on or after April 1, 2008.

See Oregon Residential Specialty Code (ORSC) Section R110 for complete information.

### BUILDING PLANNING

HABITABLE SPACE. A space in a building for living, sleeping, eating or cooking. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered habitable spaces. Section R202

SEISMIC DESIGN CATEGORY. Clackamas County is in Seismic Design Category D-1. ORSC Table 301.2(1) and Figure R301.2(2)

**Site Address:**

**1.** **Premises identification.** Approved numbers or addresses shall be provided for all new buildings in such a position as to be plainly visible and legible from the street or road fronting the property. Section R319.1

**Light and Ventilation:**

**2.** **Habitable room glazing.** All habitable rooms shall be provided with aggregate glazing area of not less than 8 percent of the floor area of such rooms. Natural ventilation shall be through windows, doors, louvers or other approved openings to the outdoor air. The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated. Section R303.1

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

2. The glazed areas need not be provided in rooms where EXCEPTION 1 above is satisfied and artificial light is provided capable of producing an average illumination of 6 footcandles (6.46 lux) over the area of the room at a height of 30 inches above the floor level.

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

**3.** **Rooms with bathing or spa facilities.** Any room with a bathtub, shower or spa facility shall be provided with mechanical ventilation which shall be designed and installed in accordance with Section M1507.4. Section R303.3.1

**Bathrooms without bathing or spa facilities.** Water closet compartments or toilet rooms without bathtub, shower or spa facilities shall be provided with aggregate glazing area of not less than 3 square feet (0.3 m2), one-half of which must be openable. Section R303.3.2

**EXCEPTION:** The glazed areas shall not be required where artificial light and a mechanical ventilation system are provided. The minimum ventilation rate shall be in accordance with Table M1507.3.

**4.** **Safety glazing** is required in windows where the nearest vertical edge is within 24 inches of a door, at sliding glass doors, French doors, tub enclosures and glazing adjacent to stairways, landings and ramps. For specific requirements, refer to Section R308.4.

**5.** **Required heating.** Every dwelling unit shall be provided with heating facilities capable of maintaining a minimum room temperature of $68^0$F ($20^0$C) at a point 3 feet above the floor and 2 feet from exterior walls in all habitable rooms at the design temperature. The installation of one or more portable space heaters shall not be used to achieve compliance with this section. Section R303.8

**Minimum Room Areas and Ceiling Height:**

**6.** Every dwelling unit shall have at least one habitable room that shall have not less than 120 square feet of floor area. Other habitable rooms shall have a floor area of not less than 70 square feet. Habitable rooms, except kitchens, shall not be less than 7 feet in any horizontal dimension. Section R304

**7.** Habitable rooms, hallways, bathrooms, toilet rooms, laundry rooms and portions of basements containing these spaces, shall have a ceiling height of not less than 7 feet. The required height shall be measured from the finished floor to the lowest projection from the ceiling. Section R305

**EXCEPTIONS:**

1. Beams and girders spaced not less than 4 feet on center may project not more then 6 inches below the required ceiling height.
2. Ceilings in portions of basements that don't contain spaces noted in 305.1.1 may project to within 6 feet, 8 inches of the finished floor; and beams, girders, ducts or other obstructions may project to within 6 feet 4 inches of the finished floor.
3. Not more than 50 percent of the required floor area of a room or space is permitted to have a sloped ceiling less than 7 feet in height with no portion of such floor area less than 5 feet in height.
4. Not more than 75 percent of the floor area of a bathroom or toilet is permitted to have a sloped ceiling less than 7 feet in height, provided an area of 21 inches by 24 inches in front of toilet and lavatories has a minimum of 6 feet, 4 inches in height, measured from the finished floor. An area of 24 inches by 30 inches in front of and inside a tub shower shall have a minimum of 6 feet, 4 inches in height, measured from the standing surface of the fixture.

**Toilet, Bath and Shower Spaces:**

**8.** **Space required.** Fixtures shall be spaced as shown in Figure R307.1.

**9.** **Bathtub and shower spaces.** Bathtub and shower floors and walls above bathtubs with installed showerheads and in shower compartments shall be finished with a nonabsorbent surface. Such wall surfaces shall extend to a height of not less than 6 feet above the floor. Section R307.2

**Exits:**

**10.** **Exit Door.** Not less than one side hinged 2'-8" clear width x 6'-6" exit door shall be provided from each dwelling unit. The required exit door shall provide for a continuous unobstructed path from all portions of the dwelling to the exterior without requiring travel through a garage or carport. Exterior landings or floors serving the required egress exit door but not located at grade shall be provided with access to grade by a ramp in accordance with Section R311.8 or a stairway in accordance with Section R311.7. All egress doors shall be readily openable from the side from which egress is to be made without the use of a key or special knowledge or effort. Sections R311.4.1, R311.4.2 & R311.4.4

**11.** **Hallway.** The minimum width of a hallway shall be not less than 3 feet. Section R311.6

**12.** **Attachment.** Exterior balconies, decks, landings stairs and similar facilities shall be positively anchored to the primary structure to resist both vertical and lateral forces or shall be designed to be self supporting. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Section R311.5.1, 502.2.2

**Clothes Dryer Exhaust:**

**13.** **Dryer exhaust systems** shall be independent of all other systems, shall convey the moisture to the outdoors and shall terminate on the outside of the building. Exhaust duct terminations shall be made with a full opening exhaust outlet or in accordance with the dryer manufacturer's installation instructions. Screens shall not be installed at the duct termination. Exhaust ducts shall not be connected with sheet-metal screws or fastening means which extend into the duct. Exhaust ducts shall be equipped with a backdraft damper. The entire exhaust system, excluding transition ducts, shall be supported and secured in place. Exhaust ducts shall be constructed of minimum 0.016-inch-thick rigid metal ducts, having smooth interior surfaces with joints running in the direction of airflow. Flexible transition ducts used to connect the dryer to the exhaust duct system shall be limited to single length, not to exceed 8 feet in length. Transition ducts shall not be concealed within construction. Sections M1502.1, M1502.2, M1502.4 & M1502.5

a) **Exhaust duct size.** The diameter of the exhaust duct shall be a minimum of 4 inches or as required by the clothes dryer's listing and the manufacturer's installation instructions. Section M1502.3

b) **Length limitation.** The maximum length of a clothes dryer exhaust duct shall not exceed 25 feet from the dryer location to the wall or roof termination. The length reduction of the duct for fittings shall comply with tables 1502.4.4.1. The maximum length of the exhaust duct does not include the transition duct. Section M1502.7.

**Emergency Escape and Rescue Openings:**

**14.** **Emergency Escape and Rescue**. Basements and every sleeping room shall have at least one openable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, emergency egress and rescue openings shall be required in each sleeping room, but shall not be required in adjoining areas of the basement. Where emergency escape and rescue openings are provided they shall have a sill height of not more than 44 inches above the floor. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with Section 310.3. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. Escape and rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with Section R310.2. Emergency escape and rescue

openings shall open directly into a public way, or to a yard or court that opens to a public way. Section R310.1 **EXCEPTION:** Basements used only to house mechanical equipment and not exceeding total floor area of 200 square feet. **(See R613.2 Window sills on Page 16 of this document. Effective Feb 1, 2009)**

a) **Minimum opening area.** All emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet. Section R310.1.1

**EXCEPTION:** Grade floor openings (sill height not more than 44 inches above or below finished ground level) shall have a minimum net clear opening of 5 square feet.

b) **Minimum opening height.** The minimum net clear opening height shall be 24 inches. Section R310.1.2

c) **Minimum opening width.** The minimum net clear opening width shall be 20 inches. Section R310.1.3

d) **Operational constraints.** Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge. Section R310.1.4

**ORSC Section R612.2 Window sills.** In dwelling units, where the opening of an operable window is located more than 72 inches (1829 mm) above the finished grade or surface below, the lowest part of the clear opening of the window shall be a minimum of 24 inches (610 mm) above the finished floor of the room in which the window is located. Operable sections of window shall not permit openings that allow the passage of a 4-inch diameter sphere where such openings are located within 24 inches of the finished floor.

**Exceptions:**

1. Windows whose openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the opening is in its largest opened position.
2. Openings that are provided with window fall prevention devices that comply with Section R612.3
3. Openings that are provided with fall prevention devices that comply with ASTM F2090.
4. Windows that are provided with opening limiting devices that comply with Section R612.4

**ORSC Section 612.4.2 Operation for Emergency Escape.** The window opening fall prevention device shall not reduce the minimum net clear opening area of the window unit below what is required by Section R310.1.1 of the code.

**Landings:**

**15.** **Landings at doors:** There shall be a floor or landing on each side of each exterior door. The floor or landing at the required exterior door shall not be more than 1.5 inches (38mm) lower than the top of the threshold. For other doors, the landing shall not be more than 8" below the top of the door threshold and provided the door does not swing over the landing. The landing shall be permitted to have a slope not to exceed 0.25 units vertical in 12 units horizontal (2-percent). Section R311.2, R311.3.

**EXCEPTIONS:**

1. Where a stairway of three or fewer risers is located on the exterior side of a door, other than the required exit door, a landing is not required for the exterior side of the door provided the door swings toward the interior. R311.1.1 exception

The width of each landing shall not be less than the door served. Every landing shall have a minimum dimension of 36 inches (914mm) measured in the direction of travel. Exception: Exterior balconies less than 60 square feet in area and only accessible by a door may be under 36 inches in depth.

**Stairways:**

**16.** A. There shall be a floor or landing at the top and bottom of each stairway. **EXCEPTION:** At the top of a flight of stairs, provided a door does not swing over the stairs. Section R311.7.5

B. The width of each landing shall not be less than the stairway or door served. Every landing shall have a minimum dimension of 36 inches measured in the direction of travel. Sections R311.7.5

C. Stairways shall be not less than 36 inches in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than 4.5 inches on either side of the stairway and the minimum clear width at and below the handrail height, including treads and landings, shall not be less than 31.5 inches where a handrail is installed on one side and 27 inches where handrails are provided on both sides. **EXCEPTIONS:** 1. The width of spiral stairways shall be in accordance with Section R311.5.8. 2. Where a floor is served by more than one stairway, stairways other than the first stairways may have a clear width of not less than 30 inches. Any handrail may encroach a maximum of 4.5 inches into the clear width. Section R311.5.1

a) **Treads and risers**. The maximum riser height shall be 8 inches and the minimum tread depth shall be 9 inches. The riser height shall be measured vertically between the leading edges of the adjacent treads. The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. The walking surface of treads and landings of a stairway shall be sloped no steeper than one unit vertical in 48 units horizontal (2-percent slope). The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than 3/8 inch. Sections R311.7.4.1, R311.7.4.2, R311.7.4.3

b) **Profile.** The radius of curvature at the leading edge of the tread shall be no greater than 9/16 inch. A nosing not less than 3/4 inch but not more than 1-1/4 inches shall be provided on stairways with solid risers. The greatest nosing projection shall not exceed the smallest nosing projection by more than 3/8 inch between two stories, including the nosing at the level of the floors and landings. Beveling of nosing shall not exceed ½ inch. Risers shall be vertical or sloped from the underside of the leading edge of the tread above at an angle not more than 30

degrees from the vertical. Open risers are permitted, provided that the opening between treads does not permit the passage of a 4-inch-diameter sphere. Section R311.5.3.3

**EXCEPTIONS:**

1. A nosing is not required where the tread depth is a minimum of 10 inches.
2. The opening between adjacent treads is not limited on stairs with a total rise of 30 inches or less.

c) **Steps.** The rise of a step or steps exclusive of a threshold shall not be less than 4 inches or greater than 8 inches. Section R311.7.4.5

d) **Slope.** Where the top or bottom riser adjoins a sloping walk, garage floor or driveway, the top or bottom riser may be reduced to less than 4 inches in height with the variation height of the riser not to exceed 3 inches in every 3 feet of walk or stairway width. Section R311.7.4.6

e) **Headroom:** The minimum headroom in all parts of the stairway shall not be less than 6 feet 8 inches measured vertically from the sloped plane adjoining the tread nosing or from the floor surface of the landing platform. Section R311.7.2

f) **Winders:** Winder treads shall have a minimum tread depth of 9 inches measured as above at a point 12 inches from the side where the treads are narrower. Winders tread shall have a minimum tread depth of 6 inches at any point. Within any flight of stairs, the greatest winder tread depth at the 12 inch walk line shall not exceed the smallest by more than 3/8 inch. Section R311.7.4.2

g) **Spiral stairways:** See Sections R311.7.9.1

h) **Stairway illumination:** All interior and exterior stairways shall be provided with a means to illuminate the stair, including landing and treads. Interior stairways shall be provided with an artificial light source located in the immediate vicinity of each landing of the stairway. Section R303.6

**Ramps:**

**17.** **Ramps** shall have a maximum slope of one unit vertical in twelve units horizontal (8.3 percent slope).

**EXCEPTION**: Where it is technically infeasible to comply because of site constraints, ramps may have a maximum slope of one unit vertical to eight units horizontal (12.5 percent slope). See Section R311.8.

**Accessibility:** Dwelling units required to be accessible by ORS 447.231 shall comply with Chapter 11 of the *Oregon Structural Specialty Code* as applicable.

**Handrails and Guards:**

**18.** **Handrails** shall be provided on at least one side of each continuous run of treads or flight with four or more risers. The continuous handrail required for winders shall be located on the side where the tread is narrower. Sec. R311.7.7

a) **Handrails height**, measured vertically from the sloped plane adjoining the tread nosing, or finish surface of ramp slope, shall be not less than 30 inches and not more than 38 inches. Section R311.7.7.1

b) **Continuity.** Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1 1/2 inch between the wall and the handrail. Section R311.7.7.2

**EXCEPTIONS:**

1. Handrails shall be permitted to be interrupted by a newel post at a turn.
2. The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread.

c) **Handrail grip size.** All required handrails shall be of one of the following types or provide equivalent graspability. Section R311.5.6.3

1. Type I. Handrails with a circular cross section shall have an outside diameter of at least 1¼ inches and not greater than 2 inches. If the handrail is not circular it shall have a perimeter dimension of at least 4 inches and not greater than 6¼ inches with a maximum cross section of dimension of 2¼ inches.
2. Type II. Handrails with a perimeter greater than 6¼ inches shall provide a graspable finger recess area on both sides of the profile. The finger recess shall begin within a distance of ¾ inch measured vertically from the tallest portion of the profile and achieve a depth of at least 5/16 inch with 7/8 inch below the widest portion of the profile. The minimum width of the handrail above the recess shall be 1¼ inches to a maximum of 2¾ inches. Edges shall have a minimum radius of 0.01 inches.

**19.** **Guards:**

a) **Guards required.** Porches, balconies or raised floor surfaces located more than 30 inches above the floor or grade below shall have guards not less than 36 inches in height. Open sides of stairs with a total rise of more than 30 inches above the floor or grade below shall have guards not less than 34 inches in height measured vertically from the nosing of the treads. Section R312.1

b) **Guard opening limitations.** Required guards shall have intermediate rails or ornamental closures which do not allow passage of a sphere 4 inches or more in diameter. Section R312.3

**EXCEPTIONS:**

1. The triangular openings formed by the riser, tread and bottom rail of a guard at the open side of a stairway are permitted to be of such size that a sphere 6 inches cannot pass through.
2. Openings for required guardrails on the sides of stairs shall not allow passage of a sphere 5 inches or more in

diameter to pass through. Opening limitations for required guardrails on open sides of stairways are applicable above the second riser of the stair.

**Smoke Alarms:**

**20.** **Smoke Alarms -** Section R314:

a) **Single- and multiple-station smoke alarms** shall be installed in the following locations:

1. In each sleeping rooms.
2. Outside of each separate sleeping area in the immediate vicinity of the bedrooms.
3. On each additional story of the dwelling, including basements but 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.

b) **Activation.** When more than one smoke alarm is required to be installed within an individual dwelling unit the alarm device shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual unit. All smoke alarms shall be listed and installed with the provisions of this code.

c) **Prohibited locations.** Required smoke alarms shall not be located within kitchens or garages, or in other spaces where temperatures can fall below $40^0$ F ($5^0$C). Ionization smoke alarms shall not be located closer than 3 feet horizontally from the following:

1. The door to a kitchen.
2. The door to a bathroom containing a tub or shower;
3. The supply registers of a forced air heating or cooling system, outside the airflow from those registers.

d) A smoke alarm installed within 20 feet (direct linear path) of a cooking appliance shall be a photoelectric-type smoke alarm or the alarm shall have an approved alarm silencing means.

e) **Alterations, repairs and additions**. When alterations, repairs or additions requiring a structural permit occur, or when one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with smoke alarms located as required for new dwellings. Section 314.3.1

**EXCEPTIONS:**

1. Interconnection and hard-wiring of smoke alarms in existing areas shall not be required when the alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure.
2. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, are exempt from the requirements of providing smoke detectors in existing areas.

f) **New buildings power source:** In new construction, the required smoke alarms shall receive their primary power from the building wiring when such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection. Smoke alarms shall be interconnected.Section R314.4

g) **Existing buildings power source:** Smoke alarms shall be permitted to be battery operated when installed in buildings without commercial power.

**Carbon Monoxide Detection**

a) For new construction approved single station carbon monoxide alarm or a household carbon monoxide detection systems shall be installed. R315.1

b) Where a new carbon monoxide source is introduced or work requiring a structural permit occurs in existing dwellings carbon monoxide alarms shall be provide in accordance with section 315.1 315.5

c) Detectors shall be installed in each bedroom or within 15 feet outside of each bedroom door. R315.2

d) Detectors shall be located on all floors containing sleeping rooms. R315.2

e) Carbon monoxide alarms shall be battery operated or may be hard wired to the household wiring . Plug-in devices securely fastened to the structure and installed per manufacturers instructions are acceptable. R315.4.1

f) Household carbon monoxide detection system: Required power supply shall be per NFPA 720.

g) Combination smoke and carbon monoxide alarms shall receive primary power from the building wiring when served by a commercial source and from a battery when primay source is interrupted. Smoke alarm feature of the combination detection system shall be interconnected.

Exception: Interconnection and hard-wiring of the combination smoke alarm/ carbon monoxide alarms isn't required in alterations of existing structure when the work involved does not result in the removal of interior wall or ceiling finishes exposing the structure.

**Garages and Carports:**

**21.** Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Section R302.5.1

22. **Duct penetration:** Ducts in the garage and ducts penetrating the walls or ceilings separating the dwelling from the garage shall be constructed of a minimum 26 gauge sheet steel or other approved material and shall have no openings into the garage.

23. **Garage separation. The garage shall be separated from the residence and its attic area by not less than 1/2-inch gypsum board applied to the garage side. Garages beneath habitable rooms shall be separated from all habitable rooms above by not less than 5/8-inch Type X gypsum board or equivalent attached per Table R702.3.5, footnote e.. Where the separation is a floor-ceiling assembly, the structure supporting the separation shall also be protected by not less than ½-inch gypsum board or equivalent. These separations aren't required if the dwelling and garage is protected with an automatic sprinkler system installed per Appendix T, NFPA 13D or other approved equivalent sprinkler system. Section R302.5.1, R302.5.1.1, R302.5.2 and Table R302.6**

24. **Openings between the garage and residence shall be equipped with solid wood doors not less than 1-3/8 inches in thickness, solid or honeycomb core steel doors not less than 1-3/8 inches thick, or 20-minute fire-rated doors. Section R302.5.1.1 Exception: This opening protection isn't required when the dwelling unit and the garage is protected by an automatic fire sprinkler system installed in accordance with Appendix Chapter T, NFPA 13D or other approved sprinkler system.**

25. **Garage and carport floors shall be of approved noncombustible materials. The area of floor used for parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway. Sections R309.1and R309.2**

    **EXCEPTION:** Asphalt surfaces shall be permitted at ground level in carports. Section R309.2

26. **Protection from impact. Appliances located in a garage or carport shall be protected from impact by automobiles. Figure M1307.1 contains examples of acceptable types of protection. Section M1307.3.1**

27. **Elevation of ignition source. Appliances having an ignition source shall be elevated such that the source of ignition is not less than 18 inches above the floor in garages. For the purpose of this section, rooms or spaces that are not part of the living space of a dwelling unit and that communicate with a private garage through openings shall be considered to be a part of the garage. Section M-1307.3**

**Footings and Foundations; Residential Concrete:**

28. **Compressive Strength. Required minimum compressive strength of concrete (psi) at 28 days:**

    a) Basement walls, foundation walls and other concrete not exposed to the weather ~~2500 psi~~

    Section 404.1.2.3.1 further restricts all concrete except flatwork to be 3000 psi

    b) Basement slabs and interior slabs on grade, except garage floor slabs 2500 psi

    c) Basement, foundation, exterior walls, other vertical concrete exposed to the weather 3000 psi

    d) Porches, carport slabs and steps exposed to the weather and garage floor slabs 3000 psi

    Concrete shall be air entrained (5%-7%) for strengths of 3000 psi and 3500 psi and when subject to freezing and thawing during construction for 2500 psi concrete. For garage floors steel troweled finish, air entrainment is allowed to be reduced to 3% if 4,000 psi concrete is used. See Table R402.2.

29. **Footings:** All exterior walls shall be supported on continuous solid or fully grouted or concrete footings, or other materials as specified in Section R403.1 and shall be supported on undisturbed natural soil or engineered fill. See Section R403.1.

30. **Minimum depth.** Bottoms of all exterior walls, bearing walls, pier and column footings shall extend beyond the frost depth which is not less than 12 inches below finished grade for areas up to Brightwood, 18 inches beyond Brightwood and up to Mt Hood Village and 24 inches beyond Mt Hood Village. See Section 403.1.5 and R403.1.5.1

31. **Minimum sizes** for concrete or masonry footings shall be as set forth in Table R403.1 and Figure R403.1(1). See R403.1.1. For minimum size of Isolated footings located in the crawl space see Section R403.1.2.1, for Outside isolated footings minimum size, see Section R403.1.2.2

32. **Slope.** The top surface of footings shall be level. The bottom surface of footings shall not have a slope exceeding 1 in 10. Footings shall be stepped where it is necessary to change the elevation of the top surface of the footing or where the slope of the bottom surface of the footing will exceed 1 in 10. See Section 403.1.6.

33. **Ground clearance.** Wood siding, sheathing and wall framing on the exterior of a building shall have a clearance of not less than 6 inches from the ground. See Section R317.1 Item 5.

34. **Footings on or adjacent to slopes:** For placement of buildings and structures on or adjacent to slopes steeper than one unit vertical in three units horizontal, see Section R403.1.9.1 through R403.1.9.4.

35. **Foundations and floor slabs** for buildings located on expansive soils shall be designed in accordance with Section 1805.8 of the Building Code (2010 OSSC). Section R403.1.10.

36. **Seismic reinforcing.** Foundation with stem walls shall be provided with a minimum of one No. 4 bar within 12 inches of the top of the wall and one No. 4 bar located 3 inches to 4 inches from the bottom of the footing.

    **EXCEPTION:** Foundations constructed monolithically shall be permitted to have a minimum of two No. 4 bars placed in the footing. Section R403.1.4.1

    Where a construction joint is created between a concrete footing and stem wall, a minimum of one No. 4 bar shall be provided at no more than 4 feet on center. The vertical bar shall extend 3 inches clear of the bottom of the footing, have a standard hook and extend a minimum of 14 inches into the stem wall. See Section R403.1.4.
    **NOTE:** Unless otherwise detailed on plan, a 6 inch 90 degree bend on the short leg (hook) will be considered as meeting the intent of this section.

**Where a grouted masonry stem wall is supported on a concrete footing and stem wall, a minimum of One no.**4 bar shall be installed at not more than 4 feet on center which shall extend to 3 inches clear of the bottom of the footing and have a standard hook. Masonry stem walls without solid grout and vertical reinforcement are not permitted. Section R403.1.4

**For Slabs on grade, see Section R403.**1.4.2.

**37.** **Grounding electrodes.** Following requirements shall be met to provide for a grounding electrode system:

1. Uncoated No. 4 reinforcing bar installed not less than 3 inches from the bottom of the footing and not less than 20 feet in length encased with a minimum of 2 inches of concrete.
2. An uncoated No. 4 reinforcing bar stubbed up at least 12 inches above the floor plate line and tightly attached to the reinforcing bar located in the footing. The spliced lap of the stubbed up bar to the footing bar shall be a minimum of 12 inches. Section R403.1.7

**38.** **Wood sill plate anchor bolts** shall be min. 1/2-inch diameter, 7 inches embedment, max. 6 feet on center and not more than 12 inches from a corner or less than 7 bolt diameters from mudsill splice. Min. 2 anchor bolts per plate. These requirements apply to all exterior walls, interior braced panel walls and interior load bearing walls. Walls connecting offset braced wall panels and 24 inches or shorter in length are permitted to be connected to the foundation with one anchor bolt located in the middle third of the plate and, such walls 12 inches or shorter in length are permitted without anchorage to the foundation as long as they are connected to the adjacent braced panels at the corners per Figure R602.10.4.4(1). Sections R403.1.8 and R403.1.8.1.

**Plate washers** conforming to Section R602.11.1 shall be provided for all anchor bolts over the full length of required braced wall lines. Properly sized cut washers shall be permitted for anchor bolts in wall lines not containing braced wall panels. Plate washers, a minimum of 0.229 inches by 3 inches by 3 inches in size, shall be installed between the foundation sill plate and the nut. The hole in the plate washer is permitted to be diagonally slotted with a width of up to 3/16 inch larger than the bolt diameter and a slot length not to exceed 1-3/4 inches, provided a standard cut washer is placed between the plate washer and the nut. See Section R602.11.1.

**39.** **Concrete slab** on ground floors shall be not less than 3 1/2 inches thick. Where slabs and footings are constructed monolithically, footings shall comply with requirements in Figure 403.1.1(1).

**40.** **Foundation walls.** Concrete and Masonry foundation walls shall be constructed in accordance with Section R404 .

**41.** **Retaining Walls:** Retaining walls that are not laterally supported at the top and that retain in excess of 48 inches of unbalanced fill shall be designed to ensure stability against overturning, sliding, excessive foundation pressure and water uplift in accordance with the design principles of the Building Code (2010 OSSC). A minimum factor of safety of 1.5 shall be used against sliding and overturning. Section R404.4.

**42.** **Foundation drainage:** Drains shall be provided around all concrete or masonry foundations that retain earth AND enclose habitable or usable space except that a drainage system isn't required when the foundation is installed on a well-drained ground or sand-gravel mixture soils. Section R405. Such walls requiring drainage system shall also be required to be waterproofed in accordance with Section R406.

**43.** **Columns:** Wood columns shall not be less than 4 inch by 4 inch, steel columns shall not be less than 3 inch in diameter schedule 40 pipes; wood column shall be protected against decay and steel column shall be given a shop coat of rust-inhibitive paint. Section R407.1 through R407.3

**Crawl spaces:**

**44.** **Access opening.** Crawl space opening through the floor shall be a minimum 18 inches by 24 inches . Openings through a perimeter wall shall be not less than 16 inches by 24 inches. When any portion of the through-wall access is below grade, an areaway not less than 16 inches by 24 inches shall be provided and the bottom of the areaway shall be below the threshold of the access opening. Through wall access opening shall not be located under a door to the residence.Pipes, ducts and other construction must not obstruct accessibility to and within the crawl space. Section. R408.3. See Section M1305.1.4 for access requirements where mechanical equipment is located under floor.

**45.** **Flood Resistance:** Buildings located in areas prone to flooding shall be provided with flood openings in the exterior walls enclosing under-floor space and the finished ground level of the under-floor space shall be equal to or higher than the outside finished ground level at least on one side. Section R408.6

**46.** **Under-floor space ventilation.** The under-floor space between the bottom of the floor joists and the earth under any building (except space occupied by a basement) shall have ventilation openings through foundation walls or exterior walls. The minimum net area of ventilation openings shall not be less than 1 square foot for each 1500 square feet of under-floor space area provided the ground is covered with a 6-mil black polyethylene sheeting with joints lapped 12 inches at seams and extending up the foundation walls 12 inches minimum. Ventilating openings shall be placed so as to provide cross ventilation of the space with one such opening located within 3 feet of each corner of the building. The openings shall be covered with corrosion resistant wire mesh or equivalent with 1/8-inch minimum dimension. Ventilation openings may be omitted on one side of a building. Ventilation openings may be omitted when continuously operated mechanical ventilation is provided at a rate of 1.0 cfm for each 50 square feet of crawl space floor area and ground surface is covered with an approved vapor barrier material. Ventilation openings in townhouses shall be permitted to be omitted on two sides when adjoining adjacent dwellings. Sections R408.1 and R408.2.

**47.** **Drainage.** Provide water drainage from the crawl space by means of crawl space and foundation drains sloped for gravity drainage and extending to a storm sewer, street gutter, road ditch or other drainage way or raise the finish grade in the crawl space to the level of finish grade outside. Section R408.5

**48.** **Removal of debris.** The under-floor grade shall be cleaned of all vegetation and organic material. All wood forms used for placing concrete shall be removed before a building is occupied or used for any purpose. All construction materials shall be removed before a building is occupied or used for any purpose. Section R408.4

**Surface and Groundwater Control, Damp Proofing:**

**49.** **Drainage.** Surface drainage shall be diverted to a storm sewer conveyance or other approved point of collection so as not to create a hazard. Lots shall be graded so as to drain surface water away from the foundation walls. The grade shall fall at least 6 inches in the first 10 feet. Section 401.3

**EXCEPTION:** Where lot lines, walls, slopes or other physical barriers prohibit 6 inches of fall within 10 feet, the final grade shall slope away from the foundation at a minimum slope of 5 percent and the water shall be directed to drains or swales or other means shall be provided to ensure drainage away from the structure. Swales shall be sloped a minimum of 2 percent when located within 10 feet of the building foundation. Impervious surfaces within 10 feet of the building foundation shall be sloped a minimum of 2 percent away from the building.

**Protection Against Decay:**

**50.** **Location required.** Protection from decay shall be provided in the following locations by the use of naturally durable wood or wood that is preservative treated in accordance with AWPA U1 for species, product, preservative and end use. Preservatives shall be listed in Section 4 of AWPA U1. Section R317.1

1. Wood joists or bottom of wood structural floor when closer than 18 inches or wood girders when closer than 12 inches to exposed ground in crawl spaces or unexcavated area located within the periphery of the building foundation.
2. All wood framing members and sill plates in contact with concrete or masonry foundation walls.
3. Sills and sleepers on a concrete or masonry slab that is in direct contact with the ground unless separated from such slab by an impervious moisture barrier.
4. The ends of wood girders entering exterior masonry or concrete walls having clearances of less than 0.5 inches on tops, sides and ends.
5. Wood siding, sheathing and wall framing on the exterior of a building having a clearance of less than 6 inches from the ground or less than 2 inches measured vertically from concrete steps, porch slabs, patio slabs, and similar horizontal surfaces exposed to the weather..
6. Wood structural members supporting moisture permeable floors or roofs that are exposed to the weather, such as concrete or masonry slabs, unless separated from such floors or roofs by an impervious moisture barrier.
7. Wood furring strips or other wood framing members attached directly to the interior of exterior masonry walls or concrete walls below grade except where an approved vapor retarder is applied between the wall and the furring strips or framing members.

**51.** **Field Treatment.** Field-cut ends, notches and drilled holes or preservative-treated wood shall be treated in the field in accordance with AWPA M4. Section R317.1.1

**52.** **Ground contact.** All wood in contact with the ground, embedded in concrete in direct contact with the ground or embedded in concrete exposed to the weather that supports permanent structures intended for human occupancy shall be approved pressure-preservative-treated wood suitable for ground contact use, except untreated wood may be used where entirely below groundwater level or continuously submerged in fresh water. Section R317.1.2

**53.** **Wood columns.** Wood columns shall be approved wood of natural decay resistance or approved pressure-preservative-treated wood. Section R317.1.4

**EXCEPTIONS:**

1. Columns exposed to the weather or in basements when supported by concrete piers or metal pedestals projecting 1 inch above a concrete floor or 6 inches 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 when supported by a concrete pier or metal pedestal at a height more than 8 inches from exposed earth and the earth is covered by an impervious moisture barrier.

Exposed glued-laminated timbers: Portions of glued-laminated timbers that form the structural supports of a building or other structure and are exposed to weather and not properly protected by a roof, eave, or similar covering shall be pressure treated with preservative, or be manufactured from naturally durable or preservative-treated wood. Section R317.1.5.

**54.** **Fasteners.** Fasteners and washers for pressure-preservative and fire-retardant-treated wood shall be of hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze or cooper. In the absence of manufacturer's recommendations, a minimum of ASTMA653 type G185 zinc-coated galvanized steel, or equivalent shall be used..

**EXCEPTIONS:**

1. One-half-inch diameter or larger steel bolts.
2. Fasteners other than nails and timber rivets shall be permitted to be of mechanically deposited zinc-coated steel with coating weights in accordance with ASTM B 695, Class 55, minimum.

**Framing:**

**55.** **Grading and Fasteners.** Load bearing dimension lumber (including logs used in log home construction) for joists, beams, and girders shall be identified by a grade mark of a lumber grading or inspection agency that has been approved by an accredited body that complies with DOCPS20. In lieue of a grade mark, a certificate of inspection issued by a lumber grading or inspection agency meeting the requirements of Section R502.1 shall be acceptable. Refer to Tables R602.3 (1) & R602.3 (2) for fastener (nails, staples, etc.) requirements. See Sections R502 and R602.

**56.** **Design and construction.** Floor framing shall be designed and constructed in accordance with Chapter 5, Figure R502.2 and Section R317 or in accordance with AF&PA/NDS and nailed in accordance with Tables R602.3 (1) and R602.3 (2). Section R502.2

**57.** **Bearing.** Joists and beams or girders must have not less than 1 1/2 inches of bearing on wood or metal or 3 inches on concrete or masonry except where supported on a 1-inch-by-4-inch ribbon strip and nailed to the adjacent stud or by the use of approved joist hangers. Section R502.6

**58.** **Floor systems**. Joist framing from opposite sides over a bearing support shall lap a minimum of 3 inches and shall be nailed together with a minimum of three 10d face nails. A wood or metal splice with strength equal to or greater than that provided by the nailed lap is permitted. Section R502.6.1

**59.** **Decks**: Decks when supported by attachment to an exterior wall shall be positively connected to the primary system for both vertical and lateral loads by means of a minimum ½ inch lag screws or bolts with washers in accordance with table R502.2.2.1. Such lag screws and bolts shall be placed 2 inches in from the bottom or top of the deck ledgers and between 2 and 5 inches in from the ends and shall be staggered from the top to the bottom along the horizontal run of the deck ledger. In addition, hold-down tension devices shall be required to be installed per Figure R502.2.2.3 at a minimum of two locations per deck with each device not less than 1500 pounds rated. Decks with cantilevered framing members shall be designed and constructed to resist uplift resulting from the full live load acting on the cantilevered portion of the framing. Decks that do not meet above requirements shall be designed and constructed as self-supporting structure. Section R502.2.2, R502.2.2.1, R502.2.2.1.1 and R502.2.2.3.

**60.** **Joists under bearing partitions** shall be of adequate size to support the load. Double joists, sized to adequately support the load, that are separated to permit the installation of piping or vents shall be full depth solid blocked with lumber not less than 2 inches in nominal thickness spaced not more than 4 feet on center. Bearing partitions perpendicular to joists shall not be offset from supporting girders, walls or partitions more than the joist depth unless such joists are of sufficient size to carry the additional load. Section 502.4

**61.** **Joist framing.** Joists framing into the side of a wood girder shall be supported by approved framing anchors or on ledger strips not less than nominal 2 inches by 2 inches. Section R502.6.2

**62.** **Lateral restraint at supports.** Joists shall be supported laterally at the ends by full-depth solid blocking not less than 2 inches nominal thickness; or by attachment to a full-depth header, band or rim joist, or to an adjoining stud or otherwise provided with lateral support to prevent rotation. Joists exceeding a nominal 2 inches by 12 inches shall be supported laterally by solid blocking, diagonal bridging (wood or metal), or a continuous 1 inch by 3 inch strip nailed across the bottom of joists perpendicular to joists at intervals not exceeding 8 feet**.** Section R502.7, Section R502.7.1

**Exception:** Trusses, structural composite lumber, structural glued-laminated members and I-joists shall be supported laterally as required by the manufacturer's recommendations.

**63.** **Plywood gussets.** Where posts and beam or girder construction is used to support floor framing, positive connections shall be provided to ensure against lateral displacement. See figure R502.9 for typical plywood gusset connections at all post-to-beam connections. Lateral bracing is required at the bottom end of posts exceeding 4'-0" in length. Section R502.9

**64.** **Wood floor and roof trusses** shall be designed in accordance with approved engineering practice and shall be prepared by a registered design professional. Design and manufacture of metal plate connected wood trusses shall comply with ANSI/TPI 1. Trusses shall not be notched drilled cut or altered unless so provided in the design. Sections R502.11, R502.11.3 and R802.10

**65.** **Truss Design Drawings:** Truss design drawings shall be prepared and submitted for approval in accordance with Section R502.11.4.

**66.** **Floor Sheathing:** See table R503.1 for allowable spans and minimum thicknesses required for lumbers used as subflooring. See table R503.2.1(1) for allowable spans and minimum thickness required for wood structural panel used in floor sheathing. A minimum of ¼ inch thickness is required for particle board floor underlayment and it shall be installed in accordance with the manufacturer recommendations and attached per Table R602.3(1). Section R503.

**67.** **Concrete floors on ground:** A minimum 3.5 inch thick concrete slab shall be provided with a 6 mil polyethylene ground cover placed between the concrete floor slab and the base course. See Section R506.2.3 for exceptions to the ground cover requirements and see R506.2.4 for the reinforcement support in the concrete floor on ground. Section R506.

**Cripple walls.** Foundation cripple walls shall be framed of studs not less in size than the studding above. When exceeding 4 feet in height, such walls shall be framed of studs having the size required for an additional story. **Cripple walls wi**th a stud height less than 14 inches shall be sheathed on at least one side with wood structural panel that is fastened to both the top and bottom plates in accordance with Table 602.3(1), or these cripple walls shall be constructed of solid blocking. Cripple walls shall be supported on continuous foundations and braced as required for lateral loads in accordance with Sections R602.10.2 and R602.10.9Section R602.9

**68.** **Wall bracing.** Braced wall lines shall be spaced not more than 25 feet on center except that it is allowed to exceed to 35 feet to accommodate a single room of area not exceeding 900 square feet. See exception to Section R602.10.1.5 for other exceptions to 25 foot rule. Braced panels in wall lines shall be provided based on either intermittent method or Continuous Sheathing methods specified in Sections R602.10.2 and R602.10.4 through R602.10.5 respectively. See section R602.10.1.1 for mixing of bracing methods in a braced wall line. For cripple wall bracing see Section R602.10.9 Sections R602.10.1 and R602.10.1.5

**69.** **Angled braced corners:** Braced wall lines are permitted to angle out of plane upto 45 degrees with a maximum diagonal length of 8 feet. When an angled corner is constructed at an angle equal to 45 degrees and the diagonal length is no more than 8 feet, the angled wall may be considered as part of either of the adjoining braced wall lines, but not both. Section R602.10.1.3

**70.** **Braced wall panel location:** Braced wall lines at exterior walls shall have a braced wall panel located at each end of the braced wall line and braced wall panels shall be located no more than 25 feet on center and shall begin no more than 8 feet from the end of a braced wall line for WSP method. See exceptions to Section R602.10.1.4.1 for additional requirements to allow location of WSP braced panel 8 feet from the corner. Braced wall panels may be offset out-of-

plane up to 4 feet from the designated braced wall line provided the total out-to-out offset of braced wall panels in a braced wall line is not more than 8 feet. Sections R602.10.1.4 and R602.10.1.4.1

**71.** **Braced wall panel connections:** For connection of braced wall panels to foundations, see Section R602.11. For connections of exterior braced wall panels to roof framing, see Section R602.10.6.2. For connections of braced wall panels to floor framing see Section R602.10.6 and R602.10.7**..**

**72.** **Wall Studs:** Studs shall be continuous from support at the sole plate to a support at the top plate to resist loads perpendicular to the wall. The support shall be a foundation or floor, ceiling or roof diaphragm or shall be designed in accordance with acceptable engineering practice. Exception: Jack studs, trimmer studs and cripple studs at openings in walls that comply with Table R502.5(1) and R502.5(2). Section R602.3

**73.** **Stud size, height and spacing:** shall be in accordance with Table R602.3(5) except that utility grade studs aren't allowed to be spaced more than 16 inches on center and aren't allowed to support more than a roof and ceiling with their maximum height restricted to 8 feet. Section R602.3.1

**74.** **Stud grade.** Studs shall be a minimum No. 3, Standard or Stud grade lumber. **EXCEPTION:** Bearing studs not supporting floors and nonbearing studs may be Utility grade lumber, provided the studs are spaced in accordance with Table R602.3(5). Section R602.2

**75.** **Fireblocking** shall be provided to cut off all concealed draft openings (both vertical and horizontal) and to form an effective fire barrier between stories, and between a top story and the roof space. Wood fireblocking shall be 2 inches nominal thickness, or two thicknesses of 1 inch nominal lumber with broken lap joints, or 23/32" wood structural panels with joints backed by 23/32 wood structural panels or 3/4 inch particleboard with joints backed with same material, 1/2" gypsum board, ¼" cement-based millboard or other noncombustible material securely fastened in place. Where unfaced fiberglass is used as fireblocking, it must fill the entire cross section of the wall cavity to a minimum height of 16". Sections 602.8, 602.8.1 and 602.8.1.1

Fireblocking shall be provided in wood-frame construction in the following locations:

1. In concealed spaces of stud walls and partitions, including furred spaces, at the ceiling and floor level and at 10 foot intervals both vertical and horizontal. Batts or blankets of mineral wool or glass fiber or other approved non-rigid materials shall be allowed as fireblocking in walls constructed using parallel rows of studs or staggered studs.
2. At all interconnections between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings, cove ceilings.
3. In concealed spaces between stair stringers at the top and bottom of the run. Enclosed spaces under stairs shall comply with Section R311.2.2.
4. At openings around vents, pipes, ducts, cables and wires at ceiling and floor level, with an approved material to resist the free passage of flame and products of combustion.
5. For the fireblocking of chimneys and fireplaces, see Section R1001.12.
6. Fireblocking of cornices of a two-family dwelling is required at the line of dwelling unit separation,

**76.** **Draftstopping required.** When there is usable space both above and below the concealed space of a floor/ceiling assembly, draftstops shall be installed so that the area of the concealed space does not exceed 1,000 square feet. Draftstopping shall divide the concealed space into approximately equal areas. Where the assembly is enclosed by a floor membrane above and a ceiling membrane below draftstopping shall be provided in floor/ceiling assemblies under the following circumstances:

1. Ceiling is suspended under the floor framing.
2. Floor framing is constructed of truss-type open-web or perforated members. Section R502.12

**77.** **Draftstopping materials** shall be 1/2-inch gypsum board, 3/8-inch wood structural panels, and 3/8" Type 2-M-W particleboard or other approved material adequately supported. Draftstops shall be installed parallel to the floor framing members. Section R502.12.1

**78.** **Grouted Masonry and Glass Unit Masonry:** Grouted masonry shall be constructed per Section R609 and Glass Unit Masonry walls shall be constructed in accordance with Section R610.

1. **Exterior Concrete Walls:** Prescriptive requirements provided in the 2011 ORSC aren't applicable for construction in the Clackamas County jurisdiction. For the construction of such walls, a design in accordance with ACI 318 or PCA 100 is required. Section R611.2

**Wall and Ceiling Covering:**

**79.** **Gypsum wallboard** shall be installed in accordance with Table R702.3.5. Section R702.3

**80.** **Flame spread.** Wall and ceiling finishes shall have a flame spread classification of not greater than 200 and a smoke-developed index of not greater than 450. Sections R315.1 and R315.2

**81.** **Installation.** Exterior sheathing shall be dry before applying exterior cover. Section R701.2

**82.** **Exterior Wall Envelope:** The exterior wall envelope shall be installed in a manner that water that enters the assembly can drain to the exterior. The envelope shall consist of an exterior veneer, a water-resistive barrier, a minimum 1/8 inch space between the water-resistive barrier and the exterior veneer, and integrated flashings. See Section R703.1.1 for exceptions to this requirement. Sections R703.1 and R703.1.1

**83.** **Water-resistive barrier.** One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches. Where joints occur, felt shall be lapped not less than 6 inches. The felt or other approved materials shall be

continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.2

Exceptions: Water-resistive barrier isn't required in th following:

1. Detached accessory buildings.
2. Under exterior wall finish material that are weather-resistant sidings as permitted in table R703.4
3. Under paperbacked stucco lath where the paper is an approved water-resistive barrier..

**84.** **Siding.** Weather resistant siding shall be installed per Table R703.4.

**85.** **Weather Exposure:** The maximum weather exposure for shakes and shingles shall not exceed the values provided in table R703.5.2

**86.** **Stone and Masonry Veneer:** These veneers installed over a backing of wood or cold formed steel shall be limited to the first story above grade and shall not exceed 5 inches in thickness. Section R703.7

**Exception:** Veneers up to 20 feet in height are permissible in structures with no cripple wall, concrete foundations, maximum 4 inch thickness of veneer and the maximum weight of the veneer limited to 40 psf. Table R703.7(2)

**87.** **Flashing.** Approved corrosion-resistive flashing shall be applied shingle-fashion in such a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. The flashing shall extend to the surface of the exterior wall finish. Approved corrosion-resistant flashings shall be installed at all of the following locations: Section R703.8

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 for subsequent drainage.
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-framed construction.
6. At wall and roof intersections.
7. At built-in gutters.

EIFS System: EIFS system with drainage is allowed to be installed in accordance with Section R703.9.1 through R703.9.3. Section R703.9

**Roof / Ceiling Construction and Attic Spaces:**

**88.** **Grade mark.** Load bearing dimension lumber for rafters, trusses and ceiling joists shall be identified by a grade mark. See Section R802.1.

**89.** **Roof Drainage control.** Where required by the building official, all dwellings shall have a controlled method of water disposal from roofs that will collect and discharge all roof drainage in accordance with the Plumbing Code. In areas where expansive or collapsible soils are known to exist, all dwellings shall have a controlled method of water disposal from roofs that will collect and discharge roof drainage to the ground surface at least 5 feet from foundation walls or to an approved drainage system. See Sections R801.3 and R801.4.

**90.** **Framing details.** Rafters shall be framed to a ridge board or to each other with a gusset plate as a tie. Ridge boards shall be at least 1-inch nominal thickness and not less in depth than the cut end of the rafter. At all valleys and hips there shall be a valley or hip rafter not less than 2-inch nominal thickness and not less in depth than the cut end of the rafter. Hip and valley rafters shall be supported at the ridge by a brace to a bearing partition or be designed to carry and distribute the specific load at that point. Where the roof pitch is less than 3 units vertical in 12 units horizontal, structural members that support rafters and ceiling joists, such as ridge beams, hips and valleys, shall be designed as beams. Section R802.3

**91.** **Ceiling joist and rafter connections.** Ceiling joists and rafters shall be nailed to each other in accordance with Table R802.5.1(9), and the rafter shall be nailed to the top plate in accordance with Table R602.3(1). Ceiling joists shall be continuous or securely joined in accordance with Table R802.5(9) where they meet over interior partitions and are nailed to adjacent rafters to provide a continuous tie across the building when such joists are parallel to the rafters. Where ceiling joists are not connected to the rafters at the top plate, joists connected higher in the attic shall be installed as rafter ties, or rafter ties shall be installed to provide a continuous tie. Where ceiling joists are not parallel to rafters, rafter ties shall be installed. Rafter ties shall be a minimum of 2-inch by 4-inch nominal, installed in accordance with the connection requirements in Table R802.5.1(9), or connections of equivalent capacities shall be provided. Where ceiling joists or rafter ties are not provided, the ridge formed by these rafters shall be supported by a wall or girder designed in accordance with accepted engineering practice. Collar ties shall be spaced not more than 4 feet on center. Section R802.3.1

**92.** **Ceiling joists lapped.** Ends of ceiling joists shall be lapped a minimum of 3 inches or butted over bearing partitions or beams and toenailed to the bearing members. Where ceiling joists are used to resist rafter thrust, lapped joists shall be nailed together in accordance with Table R602.3 (1) and butted joists shall be tied together in a manner to resist such thrust. Section R802.3.2

**93.** **Bearing.** The ends of each rafter or ceiling joist shall have not less than 1 1/2 inches of bearing on wood or metal and not less than 3 inches on masonry. Section R802.6

**94.** **Lateral support.** Rafters and ceiling joists having a depth-to-thickness ratio exceeding 5 to 1 based on nominal dimensions shall be provided with lateral support at points of bearing to prevent rotation. Section R802.8

**95.** **Truss to wall connection:** Trusses shall be connected to wall plates by the use of approved connectors whose resistance to uplift shall be as per table R802.11 but not less than 175 pounds. Section R802.10.5

**96.** **Lumber sheathing.** Allowable spans for lumber used as roof sheathing shall conform to Table R803.1. Spaced lumber sheathing for wood shingles and shake roofing shall conform to the requirements of Section R905.7 and R905.8. Spaced lumber sheathing is not allowed in Seismic Design Category $D_2$. Section R803.1

**97.** **Attic access.** Buildings with combustible ceiling or roof construction shall have an attic access opening to attic areas that exceed 30 square feet and have a vertical height of 30 inches or more. The rough-framed access opening shall be not less than 22 inches by 30 inches and shall be located in a hallway or other readily accessible location. Section R807.1.

**98.** **Ventilation required.** Enclosed attics and enclosed rafter spaces formed where ceiling is applied to the underside of roof rafters shall have cross ventilation for each separate space by ventilated openings protected against the entrance of rain or snow. Ventilation openings shall be provided with corrosion-resistant wire mesh, with 1/8 inch minimum to ¼ inch maximum openings. Section R806.1 (For unvented attic assemblies, see Section R806.4)

**99.** **Minimum area.** The total net free ventilating area shall be not less than 1/150 of the space ventilated. The area may be reduced to 1/300 if at least 50 percent but not more than 80 percent of the openings are in the upper part of the ventilated space and at least 3 feet above the eave or cornice vents or when a vapor barrier not exceeding 1 perm transmission rate is installed on the warm-in-winter side of the ceiling. Section R806.2

**Roof Coverings:**

**100.** For dwellings located in forest land, a fire-retardant roof is required per ORS 215.730 and see Section R325 for dwellings located in Wildfire Hazard Mitigation. Section R901.1

**101.** **Fasteners for roof covering** shall be in accordance with Chapter 9 of the Oregon Residential Specialty Code, based on type of material used. In all cases, fasteners shall be long enough to penetrate into roof sheathing 3/4 inches or through the thickness of sheathing, whichever is less. Sections R905.2.6 and R905.3.6

**102.** **Flashing** shall be installed in a manner that prevents moisture from entering the wall and roof through joints in coping, through moisture permeable materials and at intersections with parapet walls and other penetrations through the roof plane such as at junctions of chimneys and roofs, in roof valleys and around all roof openings. See Chapter 9 of the Oregon Residential Specialty Code for specific requirements. Section R903.2

**103.** **Roof covering application.** Roof coverings shall be applied in accordance with the applicable provisions of this section and the manufacture's installation instructions. Section R905.1 (A copy of code requirements for the kind of roofing material used shall be available on request.)

**Chimneys and Fireplaces (See ORSC Chapter 10 for complete list of requirements):**

**104.** For dwellings located in forest-zoned lands, each chimney provided in the dwelling shall have a spark arrester. ORS 215.730

**105.** **Seismic reinforcing.** Masonry or concrete chimneys in Seismic Design Category D1 or D2 shall be reinforced. Reinforcing shall conform to the requirements set forth in Table R1001.1 and Section R609, Grouted Masonry. Sections R1001.3, R1001.3.1, R1001.3.2, R1001.4 and R1001.4.1.

**106.** **Foundation.** Masonry fireplaces and their chimneys shall be supported on foundations of solid masonry or concrete at least 12 inches thick and shall extend at least 6 inches beyond the face of the fireplace or foundation wall on all sides. Footings shall be placed on natural, undisturbed earth or engineered fill below frost depth. In areas not subjected to freezing, footings shall be at least 12 inches below finished grade. Section R1001.2

**107.** **Termination.** Chimneys shall extend at least 2 feet higher than any portion of the building within 10 feet, but shall not be less than 3 feet above the highest point where the chimney passes through the roof. Section R1003.9

**108.** **Chimney clearances.** Any portion of masonry chimney located in the interior of the building or within the exterior wall of the building shall have a minimum air space clearance to combustibles of 2 inches. Chimneys located entirely outside the exterior walls of the building, including chimneys that pass through the soffit or cornice, shall have a minimum air space clearance of 1 inch. The air space shall not be filled, except to provide fire blocking in accordance with Section R1003.19. Section R1003.18

**109.** **Fireplace clearances.** All wood beams, joists, studs and other combustible materials shall have a clearance of not less than 2 inches from the front faces and sides of the masonry fireplace and not less than 4 inches from the back faces of masonry fireplaces. The air space shall not be filled, except to provide fire blocking in accordance with Section R1001.12. Section R1001.11

**110.** **Chimney crickets.** Chimney shall be provided with crickets when the dimension parallel to the ridgeline is greater than 30 inches and does not intersect the ridgeline. The intersection of the cricket and the chimney shall be flashed and counter flashed in the same manner as normal roof-chimney intersections. Crickets shall be constructed in compliance with Figure R1003.20 and Table R1003.20. Section R1003.20

**111.** **Lintel and throat.** Masonry over a fireplace opening shall be supported by a lintel of noncombustible material. The minimum required bearing length on each end of the fireplace opening shall be 4 inches. The fireplace throat or damper shall be located a minimum of 8 inches above the lintel. Section R1001.7

**112.** **Mantel and trim.** Woodwork or other combustible materials shall not be placed within 6 inches of fireplace opening. Combustible material within 12 inches of the fireplace opening shall not project more than 1/8 inch for each 1-inch distance from such opening. Section R1001.11 (Exception 4)

**113.** **Hearth and hearth extensions.** Masonry fireplaces hearths and hearth extensions shall be constructed of concrete or masonry, supported by noncombustible materials and reinforced to carry their own weight and all imposed loads. No

combustible material shall remain against the underside of hearths and hearth extensions after construction. Section R1001.9

**114.** **Hearth thickness.** The minimum thickness of fireplace hearths shall be 4 inches. Section R1001.9.1

**115.** **Hearth extension dimensions.** Hearth extensions shall extend at least 16 inches in front inches in front of and at least 8 inches beyond each side of the fireplace opening. Where the fireplace opening is 6 square feet or larger, the hearth extension shall extend at least 20 inches in front of, and at least 12 inches beyond, each side of the fireplace opening. Section R1001.10

**116.** **Exterior air**. Factory-built or masonry fireplaces covered in Chapter 10 shall be equipped with an exterior air supply to ensure proper fuel combustion unless the room is mechanically ventilated and controlled so that indoor pressure is neutral or positive. Section R1006.1.

**117.** **Exterior air intake.** The exterior air intake shall be capable of supplying all combustion air from the exterior of the dwelling or from spaces within the dwelling ventilated with outside air such as non-mechanically ventilated crawl or attic spaces. The exterior air intake shall not be located within the garage or basement of the dwelling nor shall the air intake be located at an elevation higher than the firebox. The exterior air intake shall be covered with a corrosion-resistant screen of 1/4-inch mesh. Section R1006.2

**General Mechanical System Requirements**

**118.** **Flood-resistant installation**: In areas prone to flooding, mechanical appliances, equipment and systems shall be located or installed in accordance with Section R322.1.6. Section M1301.1.1

**119.** **Listed and labeled.** Appliances regulated by this code shall be listed and labeled for the application in which they are installed and used, unless otherwise approved in accordance with Section R104.11. Section M1302.1

**120.** **Appliances access for inspection service, repair and replacement.** Appliances shall be accessible for inspection, service, repair and replacement without removing permanent construction, other appliances, or any piping or ducts not connected to the appliance being inspected, serviced, repaired or replaced. A level working space at least 30 inches deep and 30 inches wide shall be provided in front of the control side to service an appliance. Section M1305.1

**121.** **Central furnaces.** Central furnaces within compartments, alcoves or similar spaces shall conform to Sections M1305.1.1 and M1305.1.2.

**122.** **Appliances in attics.** Attics containing appliances requiring access shall be provided with an opening and a clear and unobstructed passageway large enough to allow removal of the largest appliance, but not less than 30" high and 22" wide and not more than 20 feet in length when measured along the centerline of the passageway from the opening to the appliance. The passageway shall have continuous solid flooring not less than 24" wide. A level service space at least 30" deep and 30" wide shall be present along all sides of the appliance where access is required. The clear access opening dimensions shall be a minimum of 20 inches by 30 inches where such dimensions are large enough to allow removal of the largest appliance. Section M1305.1.3. **Additionally, attic insulation shall be maintained continuous under the appliances.**

**EXCEPTIONS:**

1. The passageway and level service space are not required where the appliance is capable of being serviced while standing on a portable ladder extending through the required opening.
2. Where the passageway is unobstructed and not less than 6 feet high and 22 inches wide for its entire length, the passageway shall not be more than 50 feet long.
3. In existing structures the access opening shall be large enough for removal and replacement of the largest piece of the equipment.

**123.** **Appliance clearance.** Appliances shall be installed with the clearances from unprotected combustible materials as indicated on the appliance label and in the manufacturer's installation instructions. Section M1306.1

**124.** **General piping support.** Where mechanical system piping support requirements are not specified in other sections of this code, mechanical systems piping shall be supported in accordance with this section. Section M1309.1 and Table 1309.4

**125.** **Installation.** Heating and cooling equipment and appliances shall be installed in accordance with the manufacturer's installation instructions and the requirements of this code. The equipment shall be sized based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies. Section M1401.1 and M1401.3.

**126.** **Outdoor discharge.** The air removed by every mechanical exhaust system shall be discharged to the outdoors. Air shall not be exhausted into an attic, soffit, ridge vent or crawlspace. Section M1501.1

**Exception:** Whole-house ventilation-type attic fans that discharge into the attic space of dwelling units having private attics shall be permitted.

**127.** **Range hoods general.** Range hoods and down draft exhaust systems shall comply with the requirements of Sections M1503.1, M1503.2, M1503.3 and M1503.4.

**128.** **Mechanical ventilation general.** Where section R303.3 requires toilet rooms, bathrooms and rooms with bathing or spa facilities to be mechanically ventilated, the ventilation equipment shall be installed in accordance with Section M1507.1.

**129.** **Recirculation of air.** Exhaust air from range hoods, bathrooms, toilet rooms and rooms with bathing or spa facilities shall not be recirculated within a residence or to another dwelling unit and shall be exhausted directly to the outdoors.

Exhaust air from range hoods, bathrooms, toilet rooms and rooms with bathing or spa facilities shall not discharge into an attic, crawl space or other areas inside the building. Section M1507.2

**130.** **Rooms with bathing and spa facilities.** All rooms containing bathing or spa facilities shall be provided with a mechanical ventilation system controlled by a dehumidistat, timer or similar means of automatic control. M1507.4

**131.** **Duct systems.** Building cavities used for return air duct or plenums in new construction shall conform to Section M1601.1.1.1 and for existing buildings Section M1601.1.1.2.

**132.** **Combustion air:** Liquid and solid fuel-burning appliances shall be provided with a supply of air for fuel combustion, draft hood dilution and ventilation of the space in which the appliance is installed, in accordance with Section M1702 and Section M1703. Section M1701.1

**133.** **Radon Mitigation.** Clackamas County is listed as one of the counties in Oregon where a radon gas mitigating system is required to be included when constructing a new home. Refer to appendix chapter F of the ORSC for radon mitigating plan requirements.

## ENERGY EFFICIENCY: Chapter 11

**NOTE:** A link to ORSC Chapter 11 is available on line as "read only" on the **Oregon Building Codes Division (BCD)** web site http://www.oregonbcd.org/ . See **Oregon Department of Energy** at http://www.oregon.gov/ENERGY/index.shtml , *Building Codes* for additional information including several Residential Publications.

**134.** **N1101.4 Information on plans and specifications.** Plans and specification shall show in sufficient detail all pertinent data and features of the building and the equipment and systems as herein governed, including, but not limited to: exterior envelop component materials; R-values of insulation materials; HVAC equipment performance and system controls, lighting and other pertinent data to indicate conformance with the requirements of Chapter 11.

**135.** **N1101.1 General.** The provisions of this chapter (ORSC Chapter 11) regulate the exterior envelope as well as the design, construction and selection of heating, ventilating and air-conditioning systems, lighting and piping insulation required for the purpose of effective conservation of energy within a building or structure governed by this code.

**All conditioned spaces within residential buildings shall comply with Table N1101.1(1) and two additional measure from Table N1101.1(2).**

**EXCEPTION:**

1. Application to existing buildings shall comply with Section N1101.2.
2. Application to additions shall comply with Section N1101.3.

**136.** **N1101.2.1 Alteration and repair.** Alterations and repairs affecting energy conservation measures shall conform to the requirements specified in this chapter.

Alterations or repairs which affect components of existing conditioned spaces regulated in this chapter shall comply with this chapter (ORSC Chapter 11).

**EXCEPTION:** The minimum component requirements as specified in Table N110.1.2 may be used to the maximum extent practicable.

**137.** **N1101.3 Additions.** Additions to existing buildings or structures may be made without making the entire building or structure comply, if the new additions comply with the requirements of this chapter.

Additions that are either 40 percent of existing building heated space floor area or 600 square feet in area, whichever is less, shall be required to comply with Table N1101.1(2) and additions that are less than 40 percent of the existing building heated floor area or less than 600 square feet in area, whichever is less, shall be required to select one measure from table N1101.1(2) or comply with Table N1101.3. Exception: additions that are less than 15 percent of the existing building heated floor area or less than 200 square feet in area, whichever is less, shall not be required to comply with table N1101.1(2) or Table N1101.3.

**EXTERIOR ENVELOP REQUIREMENTS (See ORSC Section N1104 for complete list of requirements.)**

**138.** **N1104.2 Insulation materials.** Insulation materials shall be installed per manufacturer's listing and specifications and this section. Insulation R-values shall he specified as required in 16 CFR Ch. I(1-1-91 Edition) Part 460-Labeling and Advertising of Home Insulation. **Some general requirements for insulation are:**

**139.** **N1104.2.1 Loose-fill insulation.** Blown, poured and spray-on type insulation complying with Section R316 may be used in attic spaces where roof slope is 4 units vertical in 12 units horizontal (33.3 percent slope) or greater and there is at least 44 inches (1 118 mm) of headroom at the roof ridge. (Clear headroom is defined as the distance from the top of the bottom chord of the truss or ceiling joists to the underside of the roof sheathing.) Adequate baffling of the vent opening shall be provided so as to deflect the incoming air above the surface of the blown or poured insulation. Baffles shall be of weather-resistant, rigid material capable of retaining the insulation and shall be in place at the time of framing inspection.

**140.** **N1104.2.2 Batt-type insulation.** Batt-type insulation shall be installed flush against the warm side of the cavity insofar as practicable.

**141.** **N1104.2.3 Insulation protection.** Insulation exposed to the exterior shall be protected from physical and solar damage.

**142.** **N1104.2.4 Clearances. Recessed light fixtures** shall not be installed in cavities intended to be insulated.

**EXCEPTION:** Fixtures designed and labeled as suitable for being installed in direct contact with insulation; i.e., insulation coverage (IC) rated.

**143.** Thermal insulation shall not be installed within 3 inches (76 2. mm) of any metal chimney or gas vent that is not listed for insulation clearances. Section N1104.2.4

**144.** Thermal insulation shall not be installed in a manner that would obstruct openings required for attic ventilation.

**145.** A permanent sleeve of fine wire mesh screen, sheet metal or other noncombustible material shall be installed to maintain the required clearances.

**ENERGY EFFICIENCY**

**TABLE N1101.1(1)**
**PRESCRIPTIVE ENVELOPE REQUIREMENTS[a]**

| BUILDING COMPONENT | STANDARD BASE CASE | | LOG HOMES ONLY | |
|---|---|---|---|---|
| | Required Performance | Equiv. Value[b] | Required Performance | Equiv. Value[b] |
| Wall insulation-above grade | U-0.060 | R-21[c] | Note d | Note d |
| Wall insulation-below grade[e] | F-0.565 | R-15 | F-0.565 | R-15 |
| Flat ceilings[f] | U-0.031 | R-38 | U-0.025 | R-49 |
| Vaulted ceilings[g] | U-0.042 | R-38[g] | U-0.027 | R-38A[h] |
| Underfloors | U-0.028 | R-30 | U-0.028 | R-30 |
| Slab edge perimeter | F-0.520 | R-15 | F-0.520 | R-15 |
| Heated slab interior[i] | n/a | R-10 | n/a | R-10 |
| Windows[j] | U-0.35 | U-0.35 | U-0.35 | U-0.35 |
| Window area limitation[j, k] | n/a | n/a | n/a | n/a |
| Skylights[l] | U-0.60 | U-0.60 | U-0.60 | U-0.60 |
| Exterior doors[m] | U-0.20 | U-0.20 | U-0.54 | U-0.54 |
| Exterior doors w/ > 2.5 ft² glazing[n] | U-0.40 | U-0.40 | U-0.40 | U-0.40 |
| Forced air duct insulation | n/a | R-8 | n/a | R-8 |

For SI: 1 inch = 25.4 mm, 1 square foot = 0.0929 m², 1 degree = 0.0175 rad.

a. As allowed in Section N1104.1, thermal performance of a component may be adjusted provided that overall heat loss does not exceed the total resulting from conformance to the required *U*-value standards. Calculations to document equivalent heat loss shall be performed using the procedure and approved *U*-values contained in Table N1104.1(1).

b. *R*-values used in this table are nominal for the insulation only in standard wood framed construction and not for the entire assembly.

c. Wall insulation requirements apply to all exterior wood framed, concrete or masonry walls that are above grade. This includes cripple walls and rim joist areas. R-19 Advanced Frame or 2 × 4 wall with rigid insulation may be substituted if total nominal insulation *R*-value is 18.5 or greater.

d. The wall component shall be a minimum solid log or timber wall thickness of 3.5 inches (90 mm).

e. Below-grade wood, concrete or masonry walls include all walls that are below grade and do not include those portions of such wall that extend more than 24 inches (609.6 mm) above grade.

f. Insulation levels for ceilings that have limited attic/rafter depth such as dormers, bay windows or similar architectural features totaling not more than 150 square feet (13.9 m²) in area may be reduced to not less than R-21. When reduced, the cavity shall be filled (except for required ventilation spaces).

g. The maximum vaulted ceiling surface area shall not be greater than 50 percent of the total heated space floor area unless area has a *U*-factor no greater than U-0.031. The *U*-factor of 0.042 is representative of a vaulted scissor truss. A 10-inch (254 mm) deep rafter vaulted ceiling with R-30 insulation is U-0.033 and complies with this requirement, not to exceed 50 percent of the total heated space floor area.

h. A = Advanced frame construction, which shall provide full required insulating value to the outside of exterior walls.

i. Heated slab interior applies to concrete slab floors (both on and below grade) that incorporate a radiant heating system within the slab. Insulation shall be installed underneath the entire slab.

j. Sliding glass doors shall comply with window performance requirements. Windows exempt from testing in accordance with Section NF1111.2, Item 3 shall comply with window performance requirements if constructed with thermal break aluminum or wood, or vinyl, or fiberglass frames and double-pane glazing with low-emissivity coatings of 0.10 or less. Buildings designed to incorporate passive solar elements may include glazing with a *U*-factor greater than 0.35 by using Table N1104.1(1) to demonstrate equivalence to building envelope requirements.

k. Reduced window area may not be used as a trade-off criterion for thermal performance of any component.

l. Skylight area installed at 2 percent or less of total heated space floor area shall be deemed to satisfy this requirement with vinyl, wood or thermally broken aluminum frames and double-pane glazing with low-emissivity coatings. Skylight *U*-factor is tested in the 20 degree (0.35 rad) overhead plane in accordance with NFRC standards.

m. A maximum of 28 square feet (2.6 m²) of exterior door area per dwelling unit can have a *U*-factor of 0.54 or less.

n. Glazing that is either double pane with low-e coating on one surface, or triple pane shall be deemed to comply with this U-0.40 requirement.

11-2 2011 OREGON RESIDENTIAL SPECIALTY CODE

**146.** Cellulose insulation shall conform to Interim Safety Standard for Cellulose Insulation (16 CFR Part 1209) issued by the Consumer Product Safety Commission July 6, 1979 (44FR39938). For other insulation, see Section R316. Foam plastic shall be as specified in Section R314. Section N1104.2.4

**147.** **N1104.2.6 Recessed lighting fixtures.** Recessed light fixtures installed within the building envelop shall meet one of the following requirements.

1. Type IC rated, manufactured with no penetrations between the inside of the recessed fixture and ceiling cavity, and the annular space between the ceiling cutout and lighting fixture shall be sealed.

2. Type IC rated in accordance with ASTM E283 with not more than 2.0 cubic feet per minute (cfm) air movement from the conditioned space to the ceiling cavity at 1.57 psi pressure (75Pa) difference and shall be labeled and the annular space between the ceiling cutout and lighting fixture shall be sealed.

3. Type IC rated installed inside a sealed box constructed from a minimum 0.5-inch-thick gypsum wallboard or constructed from a preformed polymeric vapor barrier, or other air-tight assembly manufactured for this purpose.

**148.** **Flame spread.** All exposed insulation materials, including facings, shall have a flame-spread index not to exceed 25 with an accompanying smoke developed index not to exceed 450 when tested in accordance with ASTM E84 except for insulation facing in contact with unexposed ceiling, floor & wall surfaces. See ORSC Section R316 complete requirements.

**149.** **Foam plastic insulation** shall be as specified in Section R314.

**WINDOWS AND DOORS (GENERAL)**

**150.** **N1104.3 Exterior doors.** Doors shall be tested according to the requirements of Section N1104.4. When calculating the energy performance of the exterior envelop, the area of doors shall be the actual unit size.

**EXCEPTIONS:**

1. Unglazed doors that are not tested according to the requirements of Section N1104.4 shall be assigned a default *U*-value of 0.54.

2. Sliding glass doors and swinging glass doors shall meet the specification for glazing and shall be treated as such.

3. Doors that incorporate glazed areas more than 2.5 square feet in area shall be considered windows.

Doors shall meet the air leakage requirements of Section N1104.8.

**151.** **N1104.4 Windows.** All windows installed in Oregon shall meet the requirements of Part III, Fenestration Standard.

1. Decorative or unique architectural feature glazing not exceeding 1 percent of the heated space floor area is exempt from thermal performance requirements and does not need to be included in Table N1104.1(1) thermal performance calculations.

2. Glass block assemblies may use a U-factor of 0.51

3. The U-factor for windows may be a weighted average of total window area when all other building envelope measures are in compliance with performance requirements specified in this code. This calculation shall be provided to the building official and the windows that are less than required for prescriptive compliance shall be identified on the plans.

**152.** **Thermal performance labeling.** All windows shall have performance labels. See N1104.4.1 and N1104.4.2 for requirements.

**153.** **Air leakage requirement.** All windows and doors must meet the air leakage requirements of Section N1104.8.

**154.** **N1104.8.2 Sealing required.** Exterior joints around window and doorframes, between wall cavities and windows or door frames, between wall and foundation, between wall and roof, between wall panels, at penetrations of utility services through walls, floors and roofs and all other openings in the exterior envelope shall be sealed in a manner approved by the building official.

**MOISTURE CONTROL (VAPOR BARRIERS) (See ORSC Section N1104.9 for complete list of requirements.)**

**155.** **N1104.9.1 Vapor retarders.** A 1-perm, dry cup rating vapor retarder shall be installed on the warm side (in winter) of all insulation.

**EXCEPTIONS:**

1. When insulation is installed in ceilings in an existing structure and ventilation is provided as specified in Section R806, a vapor retarder need not be installed.

2. Below-grade walls are not required to have a vapor retarder.

3. Slab-on-grade floors need not have a warm-side vapor retarder.

**156.** **N1104.9.2 Ground cover.** A ground cover shall be installed in the crawl space for both new and existing buildings when insulation is installed. Ground cover shall be 6-mil (0.15 mm) black polyethylene or other approved material of equivalent perm rating. Ground cover shall be lapped 12 inches (305 mm) at all joints and cover the entire surface area extending full width and length of the crawl space and turn 12 inches (305 mm) up the foundation wall. Ground cover of 6-mil (0.15 mm) polyethylene or an approved equal (that is as durable) shall be installed on the ground beneath concrete floor slabs located in conditioned spaces.

**SLAB-ON-GRADE FLOORS**

**157.** **N1104.7 Slab-on-grade floors.** For slab-on-grade floors, the perimeter of the floor shall be insulated. The insulation shall extend downward from the top of the slab for a minimum of 24 inches (610 mm) or downward to the bottom of the slab, then horizontally beneath the slab for a minimum total distance of 24 inches (610 mm).

**EXCEPTION:** For monolithic slabs, the insulation shall extend downward from the top of the slab to the bottom of the thickened edge.

**158.** **N1104.7.1 Slab-on-grade floors with hydronic heat.** For slab-on-grade floors that incorporate hydronic heating, in addition to perimeter insulation, the entire underside of slab shall be insulated to **R-10**.

**HEATING, VENTILATION AND AIR-CONDITIONING SYSTEMS**

**159.** **N1105.2 Insulation of ducts**. All new duct systems, or new portions thereof, exposed to unconditioned spaces shall be insulated according to Table N1101.1(1).

**EXCEPTION:** The replacement or addition of a furnace, air conditioner or heat pump shall not require existing ducts to be insulated to current code.

**160.** **N1105.3 HVAC controls**. A11 heating, ventilating and air-conditioning systems shall be provided controls as specified herein.

**161.** **N1105.3.1 Temperature.** Each heating, ventilating and air-conditioning system shall be provided with at least one thermostat for the regulation of temperature. Each thermostat shall be capable of being set from 55°F to 75°F (13°C to 24°C) where used to control heating only and from 70°F to 85°F (21°C to 29°C) where used to control cooling only. Where used to control both heating and cooling, it shall be capable of being set from 55°F to 85°F (13°C to 29°C) and shall be capable of operating the system heating and cooling in sequence. It shall be capable of providing a temperature range of at least 5°F (3°C) within which the supply of heating and cooling energy to the zone is shut off or reduced to a minimum.

**162.** **N1105.3.2 Humidity.** If a heating, ventilating and air-conditioning system is equipped with a means for adding moisture to maintain specific selected relative humidity in spaces or zones, a humidistat shall be provided. This device shall be capable of being set to prevent new energy from being used to produce space relative humidity above 30 percent. Where a humidistat is used in a heating, ventilating and air-conditioning system for controlling moisture removal to maintain specific selected relative humidity in spaces or zones, it shall be capable of being set to prevent new energy from being used to produce a space relative humidity below 60 percent.

**163.** **N1105.3.3 Temperature zoning.** Each separate heating, ventilating and air-conditioning system shall be provided at least one thermostat for regulation of space temperature. In addition, a readily accessible manual or automatic means shall be provided to partially restrict or shut off the heating or cooling input to each zone or floor, excluding unheated or noncooled basements and garages.

**164.** **N1105.3.4 Setback and shutoff.** The thermostat, or an alternate means such as a switch or clock, shall provide a readily accessible manual or automatic means for reducing the energy required for heating and cooling during periods of nonuse or reduced need.

**EXCEPTION:**

2. Where it can be shown that setback or shutdown will not result in a decrease in overall building energy.
3. Equipment with full load demand of 2 kilowatt (6.826 Btu/h) or less may be controlled by readily accessible off-hour controls.

Lowering thermostat set points to reduce energy consumption of the heating system shall not cause energy to be expended to reach the reduced setting.

**165.** **N1105.3.4.1 Heat pump controls.** All heat pump system thermostats shall be capable of manual setback and limiting the use of supplemental heat during warm-up periods.

**166.** **N1105.3.4.1.1 Outdoor thermostat required.** An outdoor thermostat or factory installed temperature sensor with electronic controls shall be used to lock-out supplemental heat based on outdoor air temperature. The lock-out temperature shall be set at 400 degree F. There shall be no compressor lock-out temperature.

**167.** **N1105.**4 **Outside combustion air.** See R1006 for required outside combustion air for masonry fireplaces, factory-built fireplaces(s) and factory-built stoves.

**LIGHTING SECTION N1107**

**168.** **N1107.1 General.** The provisions of this section apply to lighting equipment, related controls and electric circuits serving all conditioned and unconditioned interior floor space and exterior building facades of all dwelling units and guest rooms within residential buildings and structures, or portions thereof.

**169.** **N1107.2 High-efficiency lamps.** A minimum of fifty percent of the permanently installed lighting fixtures shall contain high efficiency lamps . Screw-in compact florescent lamps comply with this requirement.

The building official shall be notified in writing at the final inspection that a minimum of fifty percent of the permanently installed lighting fixtures have met this requirement .

***ADDITIONAL COMMENTS:***

***CHECKED BY:*** _____ ***DATE:*** _____