



**MASON COUNTY  
DEPARTMENT OF COMMUNITY SERVICES  
BUILDING DIVISION**

615 W Alder Street, Shelton, WA 98584

[www.masoncountywa.gov](http://www.masoncountywa.gov)

(360)427-9670 ext. 352 Belfair (360)275-4467 ext. 352 Elma (360)482-5269 ext. 352

Owner: \_\_\_\_\_ Contractor: \_\_\_\_\_

Permit Number: \_\_\_\_\_ Site Address: \_\_\_\_\_

Plans Examiner: \_\_\_\_\_ Date: \_\_\_\_\_

**Current Codes:**

- 2021 International Residential Code (IRC) WAC 51-51
- 2021 International Building Code (IBC) WAC 51-50
- 2021 International Mechanical Code (IMC) WAC 51-52
- 2021 Uniform Plumbing Code (UPC) WAC 51-56
- 2021 International Energy Conservation Code (IECC), WAC 51-11R & 51-11C
- 2021 International Fire Code WAC 51-54A
- 2021 International Existing Building Code WAC 51-50

**Design Criteria:**

- Seismic Zone D2, Wind load 85 mph, Exposure \_\_\_\_\_ (as determined in R301.2.1.4)
- Ground snow load \_\_\_\_\_ lbs. Floor live load vary, see Section R301.5.
- Climate Zone: 4C (marine)
- Outdoor Design temperature 23 degrees
- Interior Design Temp/ 72° min. & 75° max for cooling.

**The numbered items on the following pages are associated with the above referenced codes, as adopted by Mason County Building Department. Each number identifies an item in the attached checklist, as noted on the approved plans. This checklist shall remain attached to the approved plans and be available during inspections by Mason County Building Inspectors. This checklist is submitted as information only and shall not be construed as an all-inclusive list of code requirements. Errors or omissions in the plans and specifications shall not prevent the Building Official, or his authorized agents, from requiring revisions or corrections to these plans and stopping the progress of the project under permit.**

Office hours are from 8:00 a.m. until 4:30 p.m. We are closed for lunch noon to 1:00 PM

**Inspections may be scheduled via the Mason County website [www.masoncountywa.gov](http://www.masoncountywa.gov) . While on the home page under Online Services, located on the side bar, click the link Request a Building Inspection. You may also call 360-427-9670 ext. 352 & From Belfair call (360) 275-4467 ext. 352.**

When scheduling an inspection, the following information will be needed: Permit number, site address, name of owner, type inspection requested, preferred day of inspection, and the telephone number Mason County staff should use when they call to confirm the inspection.

**Inspections are conducted between 8:30 AM and 4:00 PM**



# Plan Review Checklist-2021 International Residential Code

## **1. CONSTRUCTION DOCUMENTS & COMPLIANCE**

### **TO APPROVED PLANS:** IRC Section R106. (1)

Approved site plans shall be attached to the approved building plans during inspection. (2) Property lines shall be marked. (3)

### **Setback distances will be measured from the furthest projection of the permitted structure.** (3)

Manufacturer's installation instructions shall be available on the job site at the time of inspection. (4) All work shall be installed in accordance with the approved construction documents. (5) Any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents. To request approval of revisions, complete a "Request to Revise Approved Plan" application and submit to the Mason County Permit Center **along with the approved plans and documents detailing the proposed changes.**

## **2. EGRESS WINDOWS:** IRC Section R 310 & R311. All sleeping rooms and basements with habitable attic space shall have at least one open able emergency escape and rescue opening. Such opening shall open directly into a public way or yard, or court having a minimum width of 36" that opens to a public way. Emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet. Exception: grade floor openings shall have a minimum net clear opening of 5 square feet (*see definition below*). The minimum net clear opening height dimension shall be 24". The minimum net clear opening width dimension shall be 20". **The openings shall have a maximum height of not more than 44" measured from the floor to the bottom of the clear opening.**

Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys or tools or special knowledge. Area wells shall be provided when egress windows have a finished sill height below adjacent grade elevation. The well shall allow the window to be fully opened and provide a minimum horizontal area of 9 sq. ft, with a minimum horizontal projection and width of 36-inches. Area wells with a vertical depth of more than 44" shall be equipped with an approved and permanent ladder. *Grade floor Emergency Escape and Rescue Opening: An emergency escape and Rescue opening located such that the bottom of the opening is not more than 44" above or below the finished ground level adjacent to the opening.*

## **3. SMOKE, CARBON, HEAT DETECTION:** IRC Section R314 & R315. All smoke alarms, heat detection and heat alarms shall comply with NFPA 72. Smoke alarms shall be listed in accordance with UL217. Combination Smoke and Carbon shall be listed with UL 217 and UL2034. Installation in accordance with the provisions of the International Residential Code and the household warning equipment provisions of NFPA 72. Smoke alarms shall be installed in each sleeping room, outside each separate sleeping area in the immediate vicinity of the bedrooms, in napping areas of family

child daycare homes, on each additional story of the dwelling including basements and habitable attics. Each story, including basements and habitable attics, shall have at least one detector. In dwelling or dwelling units with split levels with an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the lower adjacent lower level provided that the lower level is less than on full story below the upper level. Not less than 3 ft from the door or opening that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by this section.

In the hallway and in the room open to the hallway in the *dwelling units* where the ceiling height of a room open to a hallway serving bedrooms exceeds that of the hallway by 24 inches or more. Within the room to which a loft is open, in the immediate vicinity of the loft. When more than one smoke alarm is required to be installed the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all the alarms in the individual unit. The alarm shall be clearly audible in all bedrooms over background noise levels with all intervening doors closed. 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. Additions, interior alterations, and repairs shall be provided with smoke alarms as required for new dwellings; the smoke alarms shall be interconnected and hard wired.

*Exception: Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, the addition or replacement of windows or doors, or the addition of a porch or deck are exempt. Smoke alarms and alarms installed to satisfy Section R314.4.1 shall not be required to be interconnected to existing smoke alarms where such existing smoke alarms are not interconnected or where such new smoke alarm or alarm is not capable of being interconnected to the existing smoke alarms.* Carbon monoxide alarms are required in new residential construction. Carbon monoxide alarms shall be listed in accordance with UL 2034. Combination carbon monoxide and smoke alarms shall be listed in accordance with UL 2034 and UL 217. Detectors shall be installed outside of each separate sleeping room in the immediate vicinity outside of the bedroom in the dwelling and on each level of the dwelling in accordance with manufacturer's specifications.

### **Where a fuel burning appliance is located within a bedroom or its attached bathroom, a carbon monoxide alarm shall be installed within the bedroom.**

Heat Detector/Heat alarms: Must be installed in newly attached garages. Must be rated for the ambient outdoor temperature and humidity, shall be installed in new garages that are attached to or located under new and existing dwellings. Heat detectors and heat alarms shall be installed in a central location and in accordance with the manufacturer's instructions. Must be interconnected to alarm or smoke alarm that is installed in the dwelling. Alarms and smoke alarms that are installed for this purpose shall be in a hallway, room or other location that will provide occupant notification. Heat Detectors and alarms shall receive their primary power from the building wiring with a battery backup.

**4. SAFETY GLAZING :** R308. Each pane of glazing installed in a hazardous location shall be provided with a manufacturer's designation specifying who applied the designation, designating the type of glass and the safety glazing standard. The designation shall be visible in the final installation and shall be acid etched, sand-blasted, ceramic fired, laser etched, embossed or on that cannot be removed without being destroyed.

R308.4. Hazardous locations. The following shall be considered specific hazardous locations for the purposes of glazing:

R308.4.1 Glazing in all fixed and operable panels of swinging, sliding and bi-fold doors.

*Exceptions:*

- *Glazed openings of a size through which a 3-inch diameter sphere is unable to pass.*
- *Decorative glazing.*

R308.4.2. Glazing in an individual fixed or operable panel adjacent to a door shall be a hazardous location where the bottom exposed edge of the glazing is less than 60 inches above the floor or walking surface and it meets either of the following conditions: (1) Where the glazing is within 24 inches of either side of the door in the plane of the door in a closed position. (2) Where the glazing is on a wall less than 180 degrees from the plane of the door in a closed position and within 24 inches of the hinge side of an in-swinging door.

*Exceptions:*

1. *Decorative glazing.*
2. *When there is an intervening wall or other permanent barrier between the door and the glazing.*
3. *Where access through the door is to a closet or storage area 3-ft or less in depth. The glazing in this application shall comply with Section R308.4.3.*
4. *Glazing that is adjacent to the fixed panel of patio doors.*

R308.4.3. Glazing in an individual fixed or operable panel that meets all the following conditions:

1. The exposed area of an individual pane is larger than 9 square feet; and
2. The bottom edge of the glazing is less than 18 inches above the floor; and
3. The top edge of the glazing is more than 36 inches above the floor; and
4. One or more walking surfaces are within 36 inches, measured horizontally and in a straight line, of the glazing.

*Exceptions:*

1. *Decorative glazing.*
2. *Where glazing is adjacent to a walking surface and a horizontal rail is installed 34 to 38 inches above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot without contacting the glass and have a cross-sectional height of not less than 1½ inches.*
3. *Outboard panes in insulating glass units and other multiple glazed panels when the bottom edge of the*

*glass is 25 feet or more above grade, a roof, walking surfaces or other horizontal [within 45 degrees of horizontal] surface adjacent to the glass exterior.*

R308.4.4. Glazing in guards and railings, including structural baluster panels and nonstructural in-fill panels, regardless of area or height above a walking surface shall be considered a hazardous location. Glass used as a handrail assembly, or a *guard* section shall be firmly supported on all edges. Where one or more sides of any pane of glass are not firmly supported, detailed construction documents, detailed shop drawings, and analysis or test data assuring safe performance for the specific installation prepared by a registered design. (ref IBC2403)

R308.4.4.1 Structural glass baluster panels. Guards with structural glass baluster panels shall be installed with an attached top rail or handrail. The top rail or handrail shall be supported by not less than three glass baluster panels or shall be otherwise supported to remain in place should one glass baluster panel fail.

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

R308.4.5. Glazing in walls, enclosures, or fences containing or adjacent to hot tubs, spas, whirlpools, saunas, steam rooms, bathtubs, showers and indoor or outdoor swimming pools where the bottom exposed edge of the glazing is less than 60 inches measured vertically above any standing or walking surface shall be a hazardous location. This shall apply to single glazing and each pane in multiple glazing. *Exception: Glazing that is more than 60 inches measured horizontally, from the water's edge of a bathtub, hot tub, spa, whirlpool, or swimming pool or from the edge of a shower, sauna or steam room.*

R308.4.6. Glazing adjacent to stairs and ramps. Glazing where the bottom exposed edge of the glazing is less than 36 inches above the plane of the adjacent walking surface of stairways, landings between flights of stairs and ramps shall be a hazardous location.

*Exceptions:*

1. *Where glazing is adjacent to a walking surface and a horizontal rail is installed at 34 to 38 inches above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot without contacting the glass and have a cross-sectional height of not less than 1½ inches.*
2. *Glazing 36-inches or more measured horizontally from the walking surface.*

R308.4.7. Glazing adjacent to the bottom stair landing. Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than 36 inches above the landing and within a 60-inch horizontal arc less than 180 degrees from the bottom tread nosing shall be a hazardous location.

*Exceptions:*

1. *Where the glazing is protected by a guard complying with Section R312 and the plane of the glass is more than 18 inches from the guard.*

**5. WINDOW OPENINGS:** IRC 312.1.1 & 312.2 FALL PROTECTION: Guards shall be provided for those portions of open-sided walking surfaces including mezzanines, lofts in accordance with Section 333, stairs, ramps, and landing, that are located more than 30 inches measured vertically to the floor or grade below at any point within 36 inches to the edge of the open site. Insect screening shall not be considered as guard. The top of the sill of an operable window opening is located less than 24 inches above the finished floor and greater than 72 inches above the finished grade or other surface below on the exterior of the building, the operable window shall comply with one of the following:

1. Operable windows openings will not allow a 4-inch diameter sphere to pass through the opening when the opening is in its largest opened position.
2. Operable windows that are provided with window fall prevention devices that comply with ASTM F-2090.

Emergency Escape and Rescue Openings. Where operable windows serve as emergency escape and rescue opening, a window opening control device or fall prevention device, after operation to release the control device allowing the window to fully open, shall not reduce the net clear opening area of the window unit to less than the area required by Section R310.2.1 and R310.2.2.

**IRC R303 NATURAL LIGHT & VENTILATION:**

Habitable rooms shall have an aggregate glazing area of not less than 8 percent of the floor area of such rooms.

*Exceptions: The glazed areas need not be provided in rooms where artificial light is provided that can produce an average illumination of 6 footcandles (65 lux) over the area of the room at a height of 30 inches above the floor level.*

Adjoining rooms for the purpose of determining light requirements, any room shall be considered as a portion of an adjoining room when at least one-half of the area of the common wall is open and unobstructed and provide an opening of not less than one-tenth of the floor area of the interior room but not less than 25 square feet. *Exception: Opening required for light shall be permitted to open into a sunroom with thermal isolation or a patio cover, provided there is an openable area between the adjoining room and the sunroom or patio cover of not less than one-tenth of the floor area of the interior room but not less than 20 square feet.*

**6. EXHAUST FANS:** IRC Section M1501, M1504, Exhaust fans are required in each kitchen, bathroom, water closet room, indoor swimming pool, spa, and other rooms where water vapor or cooking odor is produced. The air removed by every mechanical exhaust system shall be discharged outdoors at a point specified in IMC Section 1504.3. The exhaust shall discharge: 1. Not less than 3 feet from property lines. 2. Not less than 3 feet from gravity air intake openings, operable windows, and doors. 3. Not less than 10 feet from mechanical air intake openings except where either of the following apply: 3.1. The exhaust opening is located not less than 3 feet above the air intake opening. 3.2. The exhaust opening is part of a factory-built intake/exhaust combination termination fitting installed in accordance with the manufacturer's instructions, and the exhaust air is drawn from a living space. 4. Openings shall comply with Sections R303.5.2 and R303.6

**7. CLOTHES DRYERS:** IRC Section M1502, G2439, & IMC Section 504. Clothes dryers shall be exhausted in accordance with the manufacturer's instructions. Dryer exhaust systems shall be independent of all other systems and shall convey the moisture to the outside. *Exception: Listed and labeled condensing (ductless) clothes dryers.* Ducts shall terminate outside of the building. Dryer exhaust duct terminations shall be in accordance with the dryer manufacturer's installation instructions. If the manufacturer's instruction does not specify a termination location, the exhaust duct shall terminate not less than 3 feet in any direction from openings into buildings, including openings in ventilated soffits. Exhaust duct termination shall be equipped with a backdraft damper. Screens shall not be installed at the duct termination. The duct termination shall not be diminished in size and shall provide an area of not less than 12.5 square inches. Exhaust ducts, not less than 4-inch diameter, shall have a smooth interior finish and shall be constructed of metal not less than 0.0157 inch in thickness. The insert end of the duct shall extend into the adjoining duct fitting in the direction of airflow. Exhaust ducts joints shall be sealed and shall be mechanically fastened in accordance with M1601.4.1. Ducts shall not be joined with screws or similar fasteners that protrude more than 1/8 inch into the inside of the duct. Where dryer exhaust ducts are enclosed in wall or ceiling cavities, such cavities shall allow the installation of the duct without deformation. **Ducts must be supported at intervals not to exceed 12-ft and shall be secured in place.** Transition ducts shall be a single length and are listed and labeled in accordance with UL2158A. Duct shall not be greater than 8 feet in length and shall not be concealed within construction. Booster fans are prohibited. The maximum length of a clothes dryer exhaust duct shall be determined by one of the methods in Sections M1502.4.6.1 through M1502.4.6.3 or shall not exceed 35 feet from the transition duct from the dryer to the outlet terminal. When fittings are used the maximum length of the duct shall be reduced in accordance with Table M1502.4.6.1. The maximum length of the exhaust duct does not include the transition duct.

**8. DOMESTIC COOKING EXHAUST EQUIPMENT:**

IRC Section M1501, M1503, M1504, M1505, M1901 & M1306. Where Domestic cooking exhaust equipment is provided, it shall comply with one of the following:

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

**M1503.2.1 OPEN-TOP BROILER EXHAUST:** Domestic open-top broiler units shall be provided with a metal exhaust hood, having a minimum thickness of 0.0157 inch (No. 28 gage). Such hoods shall be installed with a clearance of not less than 1/4 inch between the hood and the underside of

combustible material or cabinets. A clearance of not less than 24 inches shall be maintained between the cooking surface and the combustible material or cabinets. The hood width shall not be less than the width of the broiler unit and shall extend over the entire unit. *EXCEPTIONS: 1. Broiler units that incorporate an integral exhaust system, and that are listed and labeled for use without an exhaust hood, shall not be required to have an exhaust hood. 2. Broiler units permanently installed outside the building envelope and having the cooking surface at least 5 feet below a 1-hour fire resistance rated ceiling shall not be required to have an exhaust hood.*

**M1503.3 EXHAUST DISCHARGE:** Domestic cooking exhaust equipment shall discharge to the outdoors through a duct. The duct shall have a smooth interior surface, shall be airtight, shall be equipped with a backdraft damper and shall be independent of all other exhaust systems. Ducts serving domestic cooking exhaust equipment shall not terminate in an attic or crawl space or areas inside the building. *EXCEPTION: Where installed in accordance with the manufacturer's instructions, and where continuous local exhaust is provided in an enclosed kitchen in accordance with Table M1505.4.4.1, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.*

**M1503.4 DUCT MATERIAL:**

Ducts serving domestic cooking exhaust equipment shall be constructed of galvanized steel, stainless steel, or copper.

*Exception: Ducts for domestic kitchen cooking appliances equipped with down-draft exhaust systems shall be permitted to be constructed of schedule 40 PVC pipe and fittings provided that the installation complies with all the following:*

1. *The duct is installed under a concrete slab poured on grade.*
2. *The underfloor trench in which the duct is installed is completely backfilled with sand or gravel.*
3. *The PVC duct extends not more than 1 inch above the indoor concrete floor surface.*
4. *The PVC duct extends not more than 1 inch above grade outside of the building.*
5. *The PVC ducts are solvent cement.*

**M1503.5 & M1505.4.4.1 KITCHEN EXHAUST RATES:**

Where domestic kitchen cooking appliances are equipped with ducted range hoods or down-draft exhaust systems, the fans shall be sized in accordance with Section M1505.4.1: kitchens shall include a local exhaust system. Such local exhaust systems shall have the capacity to exhaust the minimum airflow rate in accordance with Table M1505.4.4.1. Fans required by this section shall be provided with controls that enable manual override or automatic occupancy sensor, humidity sensor, timer controls, or pollutant sensor controls. An "on/off" switch shall meet this requirement for manual controls. Manual fan controls shall be readily accessible in the room served by the fan.

<b>Table M1505.4.4.1 Minimum Local Exhaust Rates</b>		
	Intermittent	Continuous
Open Kitchen	In accordance with Section M1505.4.4.3	Not permitted
Enclosed Kitchen <i>A kitchen whose permanent openings to interior adjacent spaces do not exceed a total of 60 square feet</i>	In accordance with Section M1505.4.4.3	5 ACH based on kitchen Volume

M1505.4.4.3\_Kitchen range hoods for domestic cooking appliances shall meet or exceed either the minimum airflow or the minimum capture efficiency in accordance with Table M1505.4.4.3. Capture efficiency ratings shall be determined in accordance with ASTM E3087. *EXCEPTION: Other intermittent kitchen exhaust fans, including downdraft, shall meet or exceed 300 cfm airflow.*

<b>Table M1505.4.4.3 Kitchen Range Hood Airflow Rates (cfm) and ASTM E3087 Capture Efficiency (CE) Ratings According to Kitchen Range Fuel Type</b>	
Hood over electric Range	Hood Over Combustion Range
60% of CE or 160 CFM	80% of CE or 250 CFM

Exhaust systems capable of exhausting more than 400 CFM shall be provided with make-up air at a rate approximately equal to the exhaust air rate. Such makeup air system shall be equipped with not less than one damper; each damper shall be a gravity damper or an electrically operated that automatically opens when the exhaust system operates. Dampers shall be accessible for inspection, service, repair, and replacement without removing permanent construction or any other ducts not connected to the damper being inspected, serviced, repaired, or replaced. Freestanding or built-in ranges shall have a vertical clearance above the cooking top of not less than 30 inches to unprotected *combustible material*. Reduced clearances are permitted in accordance with the *listing and labeling* of the range hoods or ovens with integral exhaust. *Appliances* shall be installed with clearances from unprotected *combustible materials* as indicated on the *appliance label* and in the manufacturer's installation instructions. Clearances to combustibles shall include such considerations as door swing, drawer pull, overhead projections or shelving and window swing, coverings, and drapes.

**9. WATER CLOSET:** IRC Section R307, UPC Section 402.

Fixtures shall be set level and in proper alignment with reference to adjacent walls. No water closet or bidet shall be set closer than fifteen (15) inches from its center to any side wall or obstruction nor closer than thirty (30) inches center to center to any similar fixture. The clear space in front of any water closet or bidet shall be not less than twenty-four (24) inches. No urinal shall be set closer than twelve (12) inches from its center to any side wall or partition nor closer than twenty-four (24) inches center to center. *EXCEPTIONS: 1. The clear space in front of a water closet, lavatory, or bidet in dwelling units and sleeping units shall be not less than 21 inches (533 mm). 2. The installation of paper dispensers or accessibility grab bars shall not be considered obstructions. The water closet shall be in a clear space not less than 30 inches in width. The clear space in front shall not be less than 24-inches. Water closet seats shall be of smooth, non-absorbent material (UPC 411.3). The effective flush volume of all water closets shall not exceed 1.28 gallons (4.8 L) per flush when tested in accordance with ASME A112.19.2/CSA B45.1. EXCEPTIONS: 1. Water closets located in day care centers, intended for use by young children may have a maximum water use of 3.5 gallons per flush or 13.25 liters per flush. 2. Water closets with bed pan washers may have a maximum water use of 3.5 gallons per flush or 13.25 liters per flush. 3. Blow out bowls, as defined in*

ANSI/ASME A112.19.2M, Section 5.1.2.3 may have a maximum water use of 3.5 gallons per flush or 13.25 liters per flush (UPC 411.2) Water closets installed shall meet or exceed the minimum performance criteria developed for certification of high-efficiency toilets under the WaterSense program sponsored by the U.S. Environmental Protection Agency (EPA).

**10. SHOWER and BATHTUB AREAS:** IRC Section R307, and UPC Sections 408, and 418. **See Attached Figure R307.1**

The bathtub and shower floors and walls above bathtubs and installed shower heads and in shower compartments shall be finished with a nonabsorbent surface. Such wall surface shall extend to height of not less than 6 feet above the floor. The clear space in front of the shower opening shall not be less than 24-inches. Shower compartments, regardless of shape, shall have a minimum finished interior of nine hundred (900) square inches and shall also be capable of encompassing a thirty (30) inch circle. The minimum required area and dimensions shall be measured at a height equal to the top of the threshold and at a point tangent to its centerline. The area and dimensions shall be maintained to a point of not less than seventy (70) inches above the shower drain outlet with no protrusions other than the fixture valve or valves, shower head, soap dishes, shelves, and safety grab bars or rails. Fold-down seats in accessible shower stalls shall be permitted to protrude into the thirty (30) inch circle. *EXCEPTIONS: 1. Showers that are designed to comply with ICC/ANSI A117.1. 2. The minimum required area and dimension shall not apply for a shower receptor having overall dimensions of not less than thirty (30) inches in width and sixty (60) inches in length.* Shower receptors shall have curbs not less than 2-inches and not more than 9- inches deep when measured from top of dam or threshold to top of the drain. Lining materials shall be pitched ¼ inch per foot to weep holes in the subdrain of a smooth and solidly formed subbase. Such lining material shall extend upward on the rough jambs of the shower opening to a point not less than 3 inches above the horizontal surfaces of the seat or the seating area, the top of the finished dam or threshold and shall extend outward over the top of the permanent seat, permanent seating area, or rough threshold and be turned over and fastened on the outside face of both the permanent seat, permanent seating area, or rough threshold and the jams.

**11. MASONRY FIREPLACES/CHIMNEYS:** Masonry and concrete chimneys and fireplaces shall be designed and reviewed in accordance with Chapter 10 of IRC. Masonry or concrete chimneys in Seismic Design Category D<sub>0</sub>, D<sub>1</sub> or D<sub>2</sub> shall be reinforced. Reinforcing shall conform to the requirements set forth in Table R1001.1 and Section R606. R1001 Masonry or concrete chimneys in Seismic Design Category D<sub>0</sub>, D<sub>1</sub> or D<sub>2</sub> shall be anchored at each floor, ceiling or roof line more than 6 feet above *grade*, except where constructed completely within the exterior walls. Anchorage shall conform to the follow requirements of Section R1001.4.1: Two <sup>3</sup>/<sub>16</sub>-inch by 1-inch straps shall be embedded not less than 12 inches into the chimney. Straps shall be hooked around the outer bars and extend 6 inches beyond the bend. Each strap shall be fastened to not less than four floor ceiling or floor joists or rafters with two <sup>1</sup>/<sub>2</sub>-inch

bolts. Spaces between chimneys and floors and ceilings through which chimneys pass shall be fireblocked with *noncombustible material* securely fastened in place. The fireblocking of spaces between chimneys and wood joists, beams or headers shall be self-supporting or be placed on strips of metal or metal lath laid across the spaces between *combustible material* and the chimney. Chimneys shall be provided with crickets where 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. Chimney flashing shall be applied according to the asphalt shingle manufacturer printed instructions.

**12. TIGHT-FITTING DOORS (FIREPLACE):** R1006.6 (WAC). Solid fuel burning appliances and fireplaces. Solid fuel burning appliances and fireplaces shall be provided with tight fitting metal or ceramic glass doors, and: 1. A source from outside the structure of primary combustion air, connected to the appliance as per manufacturer's specification. The air inlet shall originate at a point below the fire box. The duct shall be 4 inches or greater in diameter, not exceed 20 feet in length, and be installed as per manufacturer's instructions; or 2. The appliance and manufacturer's recommended combustion air supply, as an installed unit, shall be certified by an independent testing laboratory to have passed Test No. 11-Negative Pressure Test, Section 12.3, of ULC S627-M1984 "Space Heaters for Use with Solid Fuels," modified as follows: 2.1. Negative pressure of 8 Pascal shall be initially established with the chamber sealed and the air supply, if not directly connected to the appliance, closed off. 2.2. The air supply, if not directly connected to the appliance, shall then be opened. 2.3. The maximum allowable air exchange rate from chamber leakage and intentional air supply for the unit (appliance with combustion air supply) in the test chamber is 3.5 air changes per hour, or 28 cfm (cubic feet of air per minute), whichever is less. *EXCEPTION: Combustion air may be supplied to the room in which the solid fuel burning appliance is located in lieu of direct ducting, provided that one of the following conditions is met: 1. The solid fuel burning appliance is part of a central heating plant and installed in an unconditioned space in conformance with the International Mechanical Code; or 2. The solid fuel burning appliance is installed in existing construction directly on a concrete floor or surrounded by masonry materials as in a fireplace. The combustion air terminus shall be located as close to the solid fuel burning appliance as possible and shall be provided with a barometric damper or equivalent. The combustion air source shall be specified by the manufacturer or no less than 4 inches in diameter or the equivalent in area or as approved.*

**13. FIREPLACE HEARTH EXTENSION:** IRC Sections R1004.2, R1001.9, R1001.10 and M1414.2. Hearth extensions of approved factory-built fireplaces shall be installed in accordance with the listing of the fireplace. The hearth extension shall be readily distinguishable from the surrounding floor area. Masonry fireplace hearths and hearth extensions shall be constructed of concrete or masonry, supported by noncombustible materials. Fireplace hearths shall be at least 4" thick and hearth extensions shall be at least

2" thick. The fireplace extension shall extend at least 16" in front of, and at least 8" 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" in front of, and at least 12" beyond each side of the fireplace opening. Hearth extensions for fireplace stoves shall be installed in accordance with the listing of the manufacturer's specifications.

#### **14. FACTORY FIREPLACES INSTALLATIONS AND CLEARANCE TO COMBUSTIBLES & FIREPLACE**

**FIREBLOCKING:** IRC Sections R1004.1.1, R302.14, R1001.11, 1003.18, 1003.19, and M1306.2.1. No new or used factory-built fireplace shall be installed in Washington state unless it is certified and labeled in accordance with procedures and criteria specified in ASTM E2558 Standard Test Method for determining particulate matter emission from fires in wood burning fireplaces. To certify an entire fireplace model line, the internal assembly shall be tested to determine its particulate matter emission performance. Retesting and recertifying are required if the design and construction specifications of the fireplace model line internal assembly change. Testing for certification shall be performed by a Washington state department of ecology (DOE) approved and U.S. Environmental Protection Agency (EPA) accredited laboratory. Masonry and concrete fireplace model lines certified to Washington State Building Code Standard 31-2 prior to July 1, 2013, may retain certification provided the design and construction specifications of the fireplace model line internal assembly do not change. Combustible insulation shall be separated a minimum of 3" from heat producing appliances. *Exception: Insulation shall be separated in accordance with conditions stipulated in manufacturer's listing.* Wood beams, joists, studs, and other combustible material shall have a clearance of not less than 2 inches (51 mm) from the front faces and sides of masonry fireplaces and not less than 4 inches (102 mm) from the back faces of masonry fireplaces. The airspace shall not be filled, except to provide fireblocking in accordance with Section R1001.12.

**Exceptions:** 1. Masonry fireplaces listed and labeled for use in contact with combustibles in accordance with UL 127 and installed in accordance with the manufacturer's instructions are permitted to have combustible material in contact with their exterior surfaces. 2. Where masonry fireplaces are part of masonry or concrete walls, combustible materials shall not be in contact with the masonry or concrete walls less than 12 inches from the inside surface of the nearest firebox lining. 3. Exposed combustible trim and the edges of sheathing materials such as wood siding, flooring and gypsum board shall be permitted to abut the masonry fireplace sidewalls and hearth extension in accordance with Figure R1001.11, provided such combustible trim or sheathing is not less than 12 inches from the inside surface of the nearest firebox lining. 4. Exposed combustible mantels or trim is permitted to be placed directly on the masonry fireplace front surrounding the fireplace opening providing such combustible materials are not placed within 6 inches of a fireplace opening. Combustible material within 12 inches of the fireplace opening shall not project more than 1/8 inch for each 1-inch (25 mm) distance from such an opening.

#### **15. COMBUSTION AIR/EXTERIOR AIR SUPPLY:**

IRC R1001.7.1 (WAC), AND R1006. (WAC), M1701 and G2407, R303.5.1. Masonry fireplaces shall be equipped with a

ferrous metal damper located at least 8 inches above the top of the fireplace opening. Dampers shall be installed in the fireplace or the chimney venting the fireplace and shall be operable from the room containing the fireplace. Fireplaces shall be provided with each of the following: 1. Tightly fitting flue dampers, operated by a readily accessible manual or approved automatic control. *EXCEPTION: Fireplaces with gas logs shall be installed in accordance with the International Mechanical Code Section 901, except that the standards for liquefied petroleum gas installations shall be NFPA 58 (Liquefied Petroleum Gas Code) and NFPA 54 (National Fuel Gas Code).* 2. An outside source for combustion air ducted into the firebox. The duct shall be at least 6 square inches and shall be provided with an operable outside air duct damper. 3. Site-built fireplaces shall have tight fitting glass or metal doors, or a flue draft induction fan or as approved for minimizing back-drafting. Factory-built fireplaces shall use doors listed for the installed appliance. Factory built fireplaces shall use doors listed for the installed appliance. Direct vent appliances or equipment that does not draw combustion air from inside of the building shall be provided with combustion ventilation and dilution air in accordance with the manufacturer's specifications. Fuel gas dryers shall be provided with make-up air as directed by manufacturer specifications. Solid-fuel-burning appliances shall be provided with combustion air in accordance with the manufacturers' installation instructions. Where required, outdoor combustion air shall be provided in accordance with IRC G2407.6. The minimum dimension of air openings shall be not less than 3 inches. *Two permanent openings*, one commencing within 12 inches of the top and one commencing within 12 inches of the bottom of the enclosure, shall be provided. The openings shall communicate directly or by ducts with the outdoors or spaces that freely communicate with the outdoors. Where directly communicating with the outdoors, or where communicating with the outdoors through vertical ducts, each opening shall have a minimum free area of 1 square inch per 4,000 Btu/h (550 mm<sup>2</sup>/kW) of total input rating of all appliances in the enclosure [see Figures G2407.6.1(1) and G2407.6.1(2). Where communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of not less than 1 square inch per 2,000 Btu/h (1100 mm<sup>2</sup>/kW) of total input rating of all appliances in the enclosure see Figure G2407.6.1(3). *One permanent opening*, commencing within 12 inches of the top of the enclosure, shall be provided. The appliance shall have clearances of not less than 1 inch from the sides and back and 6 inches from the front of the appliance. The opening shall directly communicate with the outdoors or through a vertical or horizontal duct to the outdoors, or spaces that freely communicate with the outdoors (see Figure G2407.6.2) and shall have a minimum free area of 1 square inch per 3,000 Btu/h (734 mm<sup>2</sup>/kW) of the total input rating of all appliances located in the enclosure and not less than the sum of the areas of all vent connectors in the space. Outside combustion air openings shall be corrosion resistant screen or equivalent protection having not less than 1/4-inch openings and not greater than 1/2" openings. The required size of openings for combustion, ventilation and dilution air shall be based on the net free area of each opening. Where the free area through a design of louver, grille or screen is known, it shall be used in

calculating the size opening required to provide the free area specified. Where the design and free area of louvers and grilles are not known, it shall be assumed that wood louvers will have 25-percent free area and metal louvers and grilles will have 75-percent free area. Screens shall have a mesh size not smaller than 1/4 inch. Nonmotorized louvers and grilles shall be fixed in the open position. Motorized louvers shall be interlocked with the *appliance* so that they are proven to be in the fully open position prior to *main burner* ignition and during *main burner* operation. Means shall be provided to prevent the *main burner* from igniting if the louvers fail to open during *burner* start-up and to shut down the *main burner* if the louvers close during operation. Outdoor air openings for fuel-burning appliances are permitted to connect spaces such as ventilated crawl spaces or ventilated attic spaces, provided those spaces can provide unobstructed openings to the outdoors. 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. Mechanical and gravity outside air intake openings shall be located a minimum of 10' from any hazardous or noxious contaminant, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks. Where a source of contaminant is located within 10' of an intake opening, such opening shall be located a min. of 3' below the contaminant source. Exhaust from dwelling units, toilet rooms, bathrooms and kitchens shall not be considered as hazardous or noxious.

**16. APPLIANCE INSTALLATION:** IRC Chapter 13, G2406. Installation of appliances shall conform to the conditions of their listing and label and the manufacturer's instructions. A permanent factory-applied nameplate shall be affixed to appliances with information listed in accordance with M1303. **NOTE:** The standards for liquefied petroleum gas installations shall be in accordance with NFPA 58 (Liquefied Petroleum Gas Code) and the International Fuel Gas Code. **The manufacturer's operating and installation instructions shall remain attached to the appliance.** Fuel-fired appliances shall not be in sleeping rooms, bathrooms, toilet rooms, or storage closets, or in a space that opens only into such rooms or spaces. *Exception where the installation complies with one of the following:* 1. *The appliance is a direct-vent appliance installed in accordance with the conditions of the listing and the manufacturer's instructions.* 2. *Vented room heaters, wall furnaces, vented decorative appliances, vented gas fireplaces, vented gas fireplace heaters and decorative appliances for installation in vented solid fuel-burning fireplaces are installed in rooms that meet the required volume criteria of Section G2407.5.* 3. *A single wall-mounted unvented room heater is installed in a bathroom and such unvented room heater is equipped as specified in Section G2445.6 and has an input rating not greater than 6,000 Btu/h (1.76 kW). The bathroom shall meet the required volume criteria of Section G2407.5.* 4. *A single wall-mounted unvented room heater is installed in the bedroom and such unvented room heater is equipped as specified in Section G2445.6 and has an input rating not greater than 10,000 Btu/h (2.93 kW). The bedroom shall meet the required volume criteria of Section G2407.5.* 5. *The appliance is installed in a room or space that opens only into a bedroom or bathroom, and such room or space is used for no other purpose and is provided with a solid weather-stripped door equipped with an approved self-closing device. Combustion air shall be taken directly from the outdoors in accordance with Section G2407.6.* 6. *A clothes dryer is installed in a*

*residential bathroom or toilet room having a permanent opening with an area of not less than 100 square inches that communicates with a space outside of a sleeping room, bathroom, toilet room or storage closet.* Appliances shall be accessible for inspection, service, repair, and replacement without removing permanent construction, other appliances, or other piping or ducts not connected to the appliance. Appliances shall not be installed in a location subject to mechanical damage unless protected by approved barriers. Appliances designed to be in fixed positions shall be anchored or strapped to resist horizontal displacement caused by earthquake motion in an approved manner. Strapping shall be at points within the upper 1/3 and lower 1/3 of the appliance's vertical dimensions. At the lower point the strapping shall maintain a minimum distance of 4-inches above the controls. Fuel-fired furnaces and boilers installed in closets and alcoves shall be listed for such installation. Equipment installed in outdoor locations shall be either listed for outdoor installation or provided with protection from outdoor environmental factors that influence operability, durability, and safety of the equipment. Appliances installed in a compartment, alcove, basement or similar space shall be accessed by an opening or door and an unobstructed passageway measuring not less than 24-inches wide and large enough to allow removal of the largest appliance in the space, provided there is a level service space of not less than 30-inches deep and the height of the appliance, but not less than 30-inches, at the front or service side of the appliance with the door open. Attics containing appliances requiring access shall have an opening and a clear unobstructed passageway large enough to allow removal of the largest appliance, but not less than 30-inches high and 22-inches wide and not more than 20-feet long when measure from the opening to the appliance. The passageway shall have continuous solid flooring not less than 24-inches wide. A level service space at least 30-inches x 30-inches along all sides. Appliances located in under floor spaces shall have an unobstructed passageway large enough to remove the largest appliance, but not less than 30-inches high and 22-inches wide, nor more than 20-feet long, measured from the opening to the appliance. A level service space at least 30-inches x 30-inches along all sides. If the service space exceeds 12-inches below the adjoining grade, the walls on the passageway shall be lined with concrete or masonry extending 4-inches above the adjoining grade. Appliance supported from the ground shall be level and firmly supported on a concrete slab or other *approved* material extending not less than 3 inches above the adjoining ground. Such support shall be in accordance with the manufacturer's installation instructions. *Appliances* suspended from the floor shall have a clearance of not less than 6 inches from the ground. Appliances suspended from the floor shall have a clearance of not less than 3-inches from the ground in stalled in accordance with manufacturer specifications. Luminaries, controlled by a switch at the passageway opening shall be installed near the under floor and attic appliances and a receptacle outlet shall be installed at or near the appliance location.

**17. APPLIANCES LOCATED IN GARAGE:** IRC Section M1307, IBC 1607.10 Appliances located in a garage, carport, or other location subject to vehicle damage shall be protected with approved barriers. Vehicle barrier systems for passenger



cars shall be designed to resist a single load of 6,000 lbs. Applied horizontally in any direction to the barrier system and shall have anchorage or attachment capable of transmitting this load to the structure. For design of the system, the load shall be assumed to act at a minimum height of 1'6" above the floor or ramp surface on an area not to exceed 1 sq. ft. Equipment and appliances having an ignition source shall be elevated such that the source of ignition is not less than least 18" above the floor surface on which the equipment or appliance stands unless the appliance is listed as flammable vapor ignition resistant. Rooms or spaces that are not part of the living space of a dwelling unit and that communicate with the private garage through openings shall be part of the garage and appliances located in the space shall be elevated as specified above.

**18. WATER HEATERS:** UPC Chapter 5 & 608, IRC Section M1307.2, M2005 & IECC/WSEC R403.4. When water heaters or hot water storage tanks are installed in locations where leakage of the tanks or connections will cause damage, the tank or water heater shall be installed in a watertight pan of corrosion resistant material. The pan shall be at least 1.5" deep and with a 3/4" diameter drain to the exterior of the building not less than 6" and not more than 24" above the adjacent ground surface. Temperature and pressure relief valves shall be drained to the outside of the building. Drains may not be trapped. Pressure relieve drains must terminate not more than 2' nor less than 6" above the ground or the flood level of the area receiving the discharge and pointing downward. Water heaters shall be anchored or strapped to resist horizontal displacement due to earthquake motion. *Twenty-two (22) gage x 3/4" straps shall be used and be placed at points within the upper one-third (1/3) and lower one-third (1/3) of its vertical dimensions. At the lower point, a minimum distance of 4" shall be maintained above the controls.* When the water supply system is provided with a pressure regulating device or check valve a properly sized expansion tank shall be installed per manufacturer specifications. Check with your water purveyor. Water heaters used to supply both potable hot water and hot water for space heating shall be installed in accordance with the manufacturer's installation instructions. In accordance with WSEC R403.2 The manufacturer shall configure each gas, oil and electric boiler (other than a boiler equipped with a tankless domestic water heating coil) with an automatic means of adjusting the water temperature supplied by the boiler to ensure incremental change of the inferred heat load will cause an incremental change in the temperature of the water supplied by the boiler. This can be accomplished with outdoor reset, indoor reset, or water temperature sensing. Service water heater shall be equipped with automatic temperature controls and shall be set to 120oF. WSEC Section 403.5.5 Service hot water systems shall be installed within the building thermal envelope. *Exceptions: 1. Where the hot water system efficiency is greater than or equal to 2.0 UEF. 2. Tankless water heaters. 3. Gas heat pump water heaters intended for exterior installation. 4. Atmospheric vented gas water heaters.* All tank-type water heaters in unconditioned spaces, or on concrete floors in conditioned spaces, shall be placed on an insulated surface with a minimum thermal resistance of R-10, and a minimum compressive strength of 40 psi or engineered to support the

appliance. Gypsum board shall not be used as a support base under an *appliance*.

**19. LPG (PROPANE) APPLIANCES & TANKS:** IFGC 303, NFPA 58, IRC M1301, IRC Chapter G24, & IMC Section 303.7 and IFGC303.7. Appliances shall be installed in accordance with the manufacturer listing. Fuel-gas appliances shall not be in sleeping rooms, bathrooms, toilet rooms, storage closets or in a space that opens only into such rooms unless allowed in accordance with IRC G2406.2 & IMC 303.3. Appliances installed in pits or excavations shall not come in direct contact with the surrounding soil and shall be installed not less than 3 inches above the pit floor. The sides of the pit or excavation shall be held back not less than 12 inches from the appliance. Where the depth exceeds 12 inches below adjoining grade, the walls of the pit or excavation shall be lined with concrete or masonry. Such concrete or masonry shall extend not less than 4 inches above adjoining grade and shall have sufficient lateral load-bearing capacity to resist collapse. Excavation on the control side of the appliance shall extend horizontally not less than 30 inches. The appliance shall be protected from flooding in an approved manner.

**20. MANUFACTURER'S SPECS:** IRC Section M1302, M1303.1, M1307, and IMC 304.1. All appliances shall be listed and bear a permanent factory applied nameplate(s) affixed to the appliances with manufacturer's name or trademark, model number, serial number, and seal or mark of testing agency. The installer shall leave the manufacturer's installation and operating instructions attached to the appliance.

**21. VACUUM BREAKERS:** UPC Sections 603.5.7 Potable water outlets with hose attachments, other than water heater drains, boiler drains, and clothes washer connections shall be protected by a listed non-removable hose bibb backflow preventer, a non-removable hose bibb vacuum breaker, or an atmospheric vacuum breaker installed at least 6" above the highest point of usage located on the discharge side of the last valve. In climates where freezing temperatures occur, a listed self-draining frost-proof hose bibb with an integral backflow preventer or vacuum breaker shall be used.

**22. TRAP PRIMERS, DISHWASHER AIRGAP:** UPC Section 1007, 807.3, & 909.1. Floor drain or similar traps connected to the drainage system and subject to infrequent use shall be protected with a trap seal primer and shall be accessible for maintenance. No domestic **dishwashing machine** shall be directly connected to a drainage system or food waste disposer without the use of an **approved dishwasher air gap fitting** on the discharge side of the dishwashing machine. Traps for island sinks and similar equipment shall be listed air gaps and shall be installed with the flood-level marking at or above the flood level of the sink or drainboard, whichever is higher. See handout attached.

**23. GARAGE/DWELLING DOOR/OPENINGS:** IRC Section R302.5.1 Openings from a private garage directly into a room used for sleeping purposes shall not be permitted.

Other openings between the garage and residence shall be equipped with solid wood doors not less than 1<sup>3</sup>/<sub>8</sub> inches in thickness, solid or honeycomb-core steel doors not less than 1<sup>3</sup>/<sub>8</sub> inches thick, or 20-minute fire-rated doors. Doors shall be self-latching and equipped with a self-closing automatic closing device.

**24. GARAGE/DWELLING SEPARATION:** IRC Section R302.5 and R302.6. The garage shall be separated from the residence and its attic area by not less than ½” gypsum board or equivalent applied to the garage side. Garages beneath habitable rooms shall be separated from all habitable rooms above by not less than 5/8” Type X gypsum board or equivalent. Where the separation is a floor-ceiling assembly, the structure supporting the separation shall also be protected by not less than ½” gypsum board or equivalent. Garages located less than 3-feet from a dwelling unit on the same lot shall be protected with not less than ½-inch gypsum board applied to the interior side of the exterior walls that are within this area. Ducts in the garage and ducts penetrating the walls or ceilings separating the dwelling from the garage shall be constructed of a minimum 26-gage sheet metal or other approved material and shall have no openings into the garage. Penetration shall be protected by filling the opening around the penetrating item with approved material to resist the free passage of flame and products of combustion. Openings shall meet the same protection as required in R302.5.

**25. SEPARATION BETWEEN DWELLING UNITS:** IRC Section R302.3.1. Dwelling units in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a 1-hour fire-resistance rating. **NOTE:** Must be tested in accordance with ASTM E119, UL 263, or Section 703.3.2. of the IBC. Such separation shall be provided regardless of whether a *lot line* exists between the two *dwelling units* or not. Fire-resistance-rated floor/ceiling and wall assemblies shall extend to and be tight against the exterior wall, and wall assemblies shall extend from the foundation to the underside of the roof sheathing.

**Exceptions:**

1. A fire-resistance rating of ½ hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904.
2. Wall assemblies need not extend through attic spaces where the ceiling is protected by not less than 5/8-inch Type X gypsum board, an attic draft stop constructed as specified in Section R302.12.1 is provided above and along the wall assembly separating the dwellings and the structural framing supporting the ceiling is protected by not less than ½-inch gypsum board or equivalent.

**FIRE-RESISTANCE OF EXTERIOR WALLS:** IRC R302.1, Tables R302.1(1) Exterior walls with a fire separation distance less than 5-feet shall have not less 1 hour—tested in accordance with ASTM E119, UL 263 or Section 703.3 of the *International Building Code* with exposure from both sides. Openings are not permitted at less than 3-ft and limited when located between 3-ft to 5-ft openings are limited to 25% maximum wall area. Projections shall not extend to a point closer than 2-feet from the line used to determine the fire separation distance. If located between 2 ft and 5 feet a 1-hour fire rating on the underside, or heavy timber, or fire-retardant-

treated wood. **When a structure is equipped with an automatic fire-sprinkler system installed in accordance with P2904 fire-resistive ratings may be reduced in accordance with Table R302.1(2).** *Exception for projections:* a. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave overhang if fireblocking is provided from the wall top plate to the underside of the roof sheathing. b. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the rake overhang where ventilation openings are not installed in the rake overhang or in walls that are common to attic areas. Construction, projections, openings, and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2). **Exceptions:**

1. Walls, projections, openings, or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of individual dwelling units and their accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet of a lot line are permitted to have roof eave projections not exceeding 4 inches.
5. Foundation vents installed in compliance with this code are permitted.

**26. FLOOR AREA:** IRC Section R304, R306. Every dwelling unit shall have at least one habitable room with not less than 70 square feet of gross floor area. Habitable rooms shall not be less than 7-feet in any horizontal dimension. *Exception: Kitchens. Every dwelling unit shall be provided with a water closet, lavatory, bathtub or shower, kitchen area with a separate sink, be connected to an approved sewage disposal system, and shall be connected to an approved water supply with hot and cold water.*

**27. MINIMUM CEILING HEIGHTS:** IRC R305. Habitable space, hallways, and portions of basements containing these spaces shall have a ceiling height of not less than 7 feet. Bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches. *Exceptions;*

1. For rooms with sloped ceilings, the required floor area of the room shall have a ceiling height of not less than 5 feet (1524 mm) and not less than 50 percent of the required floor area shall have a ceiling height of not less than 7 feet (2134 mm).
2. The ceiling height above bathroom and toilet room fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a ceiling height of not less than 6 feet 8 inches above an area of not less than 30 inches by 30 inches at the showerhead.
3. Beams, girders, ducts or other obstructions in basements containing habitable space shall be permitted to project to within 6 feet 4 inches (1931 mm) of the finished floor.
4. Beams and girders spaced apart not less than 36 inches in clear finished width shall project not more than 78 inches from the finished floor.

**R305.1.1 Basements.** Portions of basements that do not contain habitable space, hallways shall have a ceiling height of not less than 6 feet 8 inches. *Exception: At beams, girders, ducts or other obstructions, the ceiling height shall be not less than 6 feet 4 inches from the finished floor.*

**28. ATTIC ACCESS:** IRC R807.1. Buildings with combustible ceiling or roof construction shall have an attic access opening to attic areas that have a vertical height of 30 inches or greater over an area of not less than 30 square feet. Minimum access openings shall not be less than 22" x 30" and shall be located in a hallway or other location with ready access. Where the access is in a ceiling, minimum unobstructed headroom in the attic space shall be 30 inches at some point above the access measured vertically from the bottom of ceiling framing members. The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members.

**29. EXTERIOR DOORS/EXITS:** IRC R311. No less than one egress door shall be provided to each dwelling. The egress door shall be side-hinged and with a min. clear width of 32-inches in width and not less than 78-inches in height, measured from the top of the threshold to the bottom of the stop. The exit door shall provide direct access from the habitable portions of the dwelling to the exterior without requiring travel through a garage. Egress from habitable levels including habitable attics and basements not provided with an egress door shall be by a ramp or a stairway in accordance to applicable IRC sections 311.8 or 311.7. Egress doors shall be readily open able from the side from which egress is to be made without the use of a key or special knowledge or effort. The required egress door shall provide a continuous and unobstructed path of egress travel from all portions of the dwelling without travel through a garage. **The egress door shall open directly into a public way or to a yard or court that opens to a public way.**

**30. LANDINGS AT DOORS AND STAIRWAYS & CONSTRUCTION:** IRC R311. Landings or finished floors at the required egress door shall not be more than 1-1/2" lower than the top of the threshold. *Exception: The landing on the exterior side shall not be more than 7-3/4" below the top of the threshold provided the door does not swing over the landing or floor.* There shall be a floor or landing on each side of all other exterior doors. Floor elevations for the doors shall be provided with landings no more than 7-3/4" below the top of the threshold. *Exception: A top landing is not required where a stairway of not more than two risers is located on the exterior side of the door, provided the door does not swing over the stairway.* Storm and screen doors shall be permitted to swing over exterior stairs and landings. When exterior landings or floors serving the required egress door are not at grade, they shall be provided with access to grade by means of a ramp or stairway. The width of each landing shall not be less than the door served and shall have a dimension of 36-inches measured in the direction of travel. The slope at exterior landings shall not exceed ¼ unit vertical in 12 units horizontal (2 percent). A flight of stairs shall **not** have a

vertical rise greater than 12 feet between floor levels or landings. Landings shall be the same width of the stairway served and at least 36 inches measured in the direction of travel. Exterior landings, decks, balconies, 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. Attachments shall not be accomplished by use of toenails or nails subject to withdrawal.

**31. GUARDS:** IRC Section R312. Table R301.5 Guards shall be provided for open sided walking surfaces including, stairs, ramps, landings, porches, balconies, or raised floor surfaces located more than 30 inches above grade or a floor below. Grade shall be measured 36-inches horizontally to the edge of the open side. Required guards at open-sided walking surfaces, including stairs, porches, balconies, or landings, shall be not less than 36 inches in height as measured vertically above the adjacent walking surface or the line connecting the nosing.

*Exception:*

1. *Guards on the open sides of stairs shall have a height of not less than 34 inches measured vertically from a line connecting the nosing.*

2. *Where the top of the guard serves as a handrail on the open sides of stairs, the top of the guard shall not be less than 34" and not more than 38" as measured vertically from a line connecting the nosing.*

**Required guards shall be designed such that a sphere 4" in diameter cannot pass through.**

*Exceptions:*

1) *The triangular openings at the open side of a stair, formed by the riser, tread and bottom rail of a guard are permitted to be of such size that 6-inch diameter sphere cannot pass through.*

2) *Guards on the open sides of stairs shall not have openings which allow passage of a sphere 4- 3/8" in diameter.*

Handrail assemblies and guards shall be able to resist a single concentrated load of 200 lbs., applied in any direction at any point along the top, and have attachment devices and supporting structure to transfer this loading to appropriate structural elements of the building. Intermediate rails (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 lbs. on an area equal to 1 sq. ft., including openings and space between rails. **Insert info on notching.**

**32. HANDRAILS:** IRC Section R311.7.8, R311.8.3 Handrail shall be provided on not less than one side of each flight of stairs with four or more risers. Such handrails shall be placed not less than 34" and not more than 38" above the nosing of the treads. Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser to a point directly above the lowest riser. Handrail ends shall be returned or terminate in newel posts or safety terminals. Handrails adjacent to the wall shall have a space not less than 1 ½" between the wall and the handrail. **TYPE I:** Circular handrails shall have an outside diameter of at least 1-¼" and not greater than 2". If the handrail is not circular, it shall have a perimeter dimension of at least 4" and not greater than 6 ¼" with a maximum cross-section dimension of 2 ¼". **TYPE II:** Handrails with a perimeter greater than 6 ¼" shall have a graspable finger recess area on both sides of the profile. The finger recess shall begin a distance of ¾" measured vertically from the tallest portion of the profile and achieve a

depth of at least 5/16" within 7/8" below the widest portion of the profile. This required depth shall continue for at least 3/8" to a level that is not less than 1 3/4" below the tallest portion of the profile. The minimum width of the handrail above the recess shall be 1 1/4" to a maximum of 2 3/4". Edges shall have a minimum radius of .01".

**33. STAIR WIDTH:** IRC Section R311.7.1 Stairways shall not be less than 36" in clear width at all points above the handrail height and below the required headroom height. Handrails shall not project more than 4 1/2" on either side of the stairway and the minimum clear width of the stairway at and below the handrail height, including treads and landings, shall not be less than 31 1/2" where the handrail is installed on one side, and 27" where handrails are installed on both sides. The width of spiral stairways shall be in accordance with Section R311.7.10.1.

**34. STAIR TREADS & RISERS AND RAMP SLOPE:** IRC Section R311.7.5 & R311.8.1 The riser height shall be not more than 7-3/4 inches. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8". The minimum tread depth shall be 10". The tread depth within any flight of stairs shall not exceed the smallest by more than 3/8". A nosing not less than 3/4" but not more than 1 1/4" shall be provided on stairways with solid risers. Open risers are permitted, provided that the openings located more than 30 inches, as measured vertically, to the floor or grade below, does not permit the passage of a 4" diameter sphere. Ramps shall have a maximum slope of 1 unit vertical in 12 units horizontal. *Exception: Nosing is not required where the tread depth is at least 11". The opening between adjacent treads is not limited to stairs with a total rise of 30" or less.*

**35. STAIR HEADROOM CLEARANCE:** IRC R311.7.2 All parts of the stairway shall not be less than 6'8" measured vertically from the sloped plane adjoining the tread nosing or from the floor surface of the landing or platform. *Exception: 1. Where the nosing of the treads on the side of a flight of the edge of a floor opening through which a stair passes, the floor opening shall not project horizontally into the required headroom more than 4 1/2 inches 2. Spiral stairways Section R311.7.10.1.*

**36. UNDER STAIR PROTECTION:** IRC Section R302.7 Enclosed space under stairs that is accessed by a door or access panel shall have walls, under-stair surface and any soffits protected on the enclosed side with 1/2-inch gypsum board.

**37. ILLUMINATION:** IRC Section R303.7. All interior and exterior stairways shall be provided with a means to illuminate the stairs, including landings and treads. Interior stairways shall be provided with an artificial light source located in the immediate vicinity of each landing of the stairway. Lighting shall be capable of luminating treads and landing to levels not less than 1 foot candle (11 lux) measured a center of treads and landings. Where lighting outlets are installed in the interior stairways, there shall be a wall switch at each floor level to control the lighting outlet where the stairway has 6 or more risers. Exterior stairways shall be provided with a light source located at the top of the landing of the stairway. Exterior

stairways providing access to a basement from the outside grade level shall be provided with an artificial light source located in the immediate vicinity of the bottom landing of the stairway. **Stairway illumination shall receive primary power from the building wiring.** The illumination of exterior stairways shall be controlled from inside the dwelling. *Exception: A switch is not required where remote, central, or automatic control of lighting is provided.*

**38. SPECIAL STAIRWAY:** IRC Section R311.4, R311.7.10, R311.7.5.2.1, Spiral stairways and bulkhead enclosure stairways shall comply with all requirements of Section 311.7. Spiral stairways are permitted, provided the minimum width at and below the handrail shall be not less than 26 inches and the walk line radius are not greater than 24 1/2 inches. Each tread having a 6-3/4 inch at the walk line. Treads shall be identical, and the rise shall be no more than 9 1/2". Headroom shall be not less than 6 feet 6 inches. Stairways serving bulkhead enclosures see IRC Section R311.7.10.2.

*Note: Washington State Amendment to IRC R311.4: Stairways, alternating tread devices, ship's ladders, or ladders within an individual dwelling unit or sleeping unit used for access to areas of 200 square feet (18.6 m2) or less, are exempt from the requirements of Sections R311.4 and R311.7, where such devices do not provide exclusive access to a kitchen or bathroom. Such areas shall not be located more than 10 feet (3048 mm) above the finished floor of the space below.*

**39. FOUNDATION FOOTING SIZE:** IRC Section R403. Assume load-bearing value of soil 1500 PSF unless proven otherwise (Soils report required). Snow load is designated by area, when snow load is between designated loads, use the higher snow load. The minimum width, W, and thickness, T, for concrete footings shall be in accordance with Tables R403.1(1) or R403.1(3) and Figure R403.1(1) or R403.1.3, as applicable, but not less than 12 inches in width and 6 inches in depth. The footing width shall be based on the load-bearing value of the soil in accordance with Table R401.4.1. Footing projections, P, shall be not less than 2 inches and shall not exceed the thickness of the footing. Footing thickness and projection for fireplaces shall be in accordance with Section R1001. The size of footings supporting piers and columns shall be based on the tributary load and allowable soil pressure in accordance with Table R401.4.1. Footings for wood foundations shall be in accordance with the details set forth in Section R403.2, and Figures R403.1(2) and R403.1(3). Footings for precast foundation shall be in accordance with the details set forth in Section R403.4, Table R403.4, and Figures R403.4(1) and R403.4(2). *Exception: Light-frame construction shall be permitted to have minimum footing size in accordance with Figures R403.1.1(2) through R403.1.1(4) in lieu of that determined by Table R403.1(1). See attached tables.* All exterior walls shall be supported on continuous footings placed on undisturbed natural soils or engineered fill. In accordance with R403.1.3.6, detached one- and two-family dwellings that are three stories, or less in height and constructed with stud bearing walls, isolated plain concrete footing supporting column, or pedestals are permitted. R402.1.2 All required interior braced wall panels shall be supported on footings at intervals not exceeding 50-ft.

**40. FOOTING REINFORCEMENT:** IRC Section R403.1.3.1, R403.1.3.2 (Concrete & Masonry stemwall) , R403.1.3.3 (turn-down footings). In *Seismic Design Categories* D<sub>0</sub>, D<sub>1</sub> and D<sub>2</sub> where a construction joint is created between a concrete footing and a concrete stem wall, not fewer than one No. 4 vertical bar shall be installed at not more than 4 feet on center. The vertical bar shall have a standard hook and extend to the bottom of the footing and shall have support and cover as specified in Section R403.1.3.5.3 and extend not less than 14 inches into the stem wall. Standard hooks shall comply with Section R608.5.4.5. Not fewer than one No. 4 horizontal bar shall be installed within 12 inches (305 mm) of the top of the stem wall and one No. 4 horizontal bar shall be located 3 to 4 inches from the bottom of the footing. Masonry stem walls shall be solid grouted. In *Seismic Design Categories* D<sub>0</sub>, D<sub>1</sub> and D<sub>2</sub>, slabs-on-ground cast monolithically with turned-down footings shall have not fewer than one No. 4 bar at the top and the bottom of the footing or one No. 5 bar or two No. 4 bars in the middle third of the footing depth. Where the slab is not cast monolithically with the footing, No. 3 or larger vertical dowels with standard hooks on each end shall be installed at not more than 4 feet on center in accordance with Figure R403.1.3, Detail 2. Standard hooks shall comply with Section R608.5.4.5. Steel reinforcement in concrete cast against the earth shall have a minimum cover of 3 inches. Exterior footings shall be placed not less than 12 inches (305 mm) below the undisturbed ground surface. Where applicable, the depth of footings shall also conform to Section R403.1.4.1 The vertical bar shall be tied in place at inspection. As a minimum standard. **See attached handouts.**

**41. FOUNDATION WALL SIZE:** IRC R404, Concrete foundation walls shall be selected and constructed in accordance with the provisions of Section R404.1.3 In buildings assigned to Seismic Design Category D<sub>0</sub>, D<sub>1</sub> or D<sub>2</sub>, as established in Table R301.2, concrete foundation walls that support light-frame walls shall comply with this section, and concrete foundation walls that support above-grade concrete walls shall comply with ACI 318, ACI 332 or PCA 100 (see Section R404.1.3). In addition to the horizontal reinforcement required by Table R404.1.2(1), plain concrete walls supporting light-frame walls shall comply with the following:

1. Wall height shall not exceed 8 feet (2438 mm).
2. Unbalanced backfill height shall not exceed 4 feet.
3. Minimum thickness for plain concrete foundation walls shall be 7.5 inches except that 6 inches is permitted where the maximum wall height is 4 feet 6 inches.

Foundation walls less than 7.5 inches in thickness, supporting more than 4 feet of unbalanced backfill or exceeding 8 feet in height shall be provided with horizontal reinforcement in accordance with Table R404.1.2(1), and vertical reinforcement in accordance with Table R404.1.2(2), R404.1.2(3), R404.1.2(4), R404.1.2(5), R404.1.2(6), R404.1.2(7) or R404.1.2(8). Where Tables R404.1.2(2) through R404.1.2(8) permit plain concrete walls, not less than No. 4 (No. 13) vertical bars at a spacing not exceeding 48 inches shall be provided.

**42. STEPPED FOUNDATIONS IN SEISMIC DESIGN D2:** IRC Section 602.11.2. Where the height of a required braced wall line that extends from the foundation to floor above varies more than 4', the braced wall panel shall be constructed in accordance with figure R602.11.2 and as follows: *See attached details.* 1) Where the lowest floor framing rests directly on a sill bolted to a foundation not less than 8' in length along a line of bracing, the line shall be considered as braced. The double plate of the cripple stud wall beyond the segment of footing that extends to the lowest framed floor shall be spliced by extending the upper top plate a minimum of 4' along the foundation. Anchor bolts shall be located a maximum of 1' and 3' from the step foundation. 2) Where cripple walls occur between the top of the foundation and the lowest floor framing, the bracing requirements for a story shall apply, *see R602.10.9 and R602.10.9.1.3* 3) Where only the bottom of the foundation is stepped and the lowest floor framing rests directly on a sill bolted to the foundations, the requirements of *R403.1.6 and R602.11.1 shall apply.*

**43. FOOTING DEPTH:** IRC Section R403.1.4, R403.1.3.4 Exterior footings shall be placed not less than 12 inches below the undisturbed ground surface. Where applicable, the depth of footings shall also conform to Section R403.1.4.1. Deck footings shall be in accordance with Section R507.3. In *Seismic Design Categories* D<sub>0</sub>, D<sub>1</sub> and D<sub>2</sub>, interior footings supporting bearing walls or *braced wall panels*, and cast monolithically with a slab on *grade*, shall extend to a depth of not less than 12 inches below the top of the slab.

**44. FOUNDATION ANCHORAGE:** IRC Section 403.1.6, R602.11. Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of *braced wall panels* at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with minimum 1/2-inch-diameter anchor bolts spaced not greater than 6 feet on center or *approved* anchors or anchor straps spaced as required to provide equivalent anchorage to 1/2-inch-diameter anchor bolts. Bolts shall extend not less than 7 inches into concrete or grouted cells of *concrete masonry units*. The bolts shall be located in the middle third of the width of the plate. A nut and washer shall be tightened on each anchor bolt. There shall be not fewer than two bolts per plate section with one bolt located not more than 12 inches or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundation that are not part of a *braced wall panel* shall be positively anchored with *approved* fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. Anchor bolts shall be permitted to be located while concrete is still plastic and before it has set. Where anchor bolts resist placement or the consolidation of concrete around anchor bolts is impeded, the concrete shall be vibrated to ensure full contact between the anchor bolts and concrete.

Exceptions:

1. Walls 24 inches (610 mm) total length or shorter connecting offset braced wall panels shall be anchored to the foundation with not fewer than one anchor bolt located in the center third of the plate section and shall be attached to adjacent braced wall panels at corners as shown in Item 9 of Table R602.3(1).

2. Connection of walls 12 inches (305 mm) total length or shorter connecting offset braced wall panels to the foundation without anchor bolts shall be permitted. The wall shall be attached to adjacent braced wall panels at corners as shown in Item 9 of Table R602.3(1).

In addition to these requirements the following requirements shall apply to wood light-frame structures in Mason County (Seismic Design D<sub>2</sub>).

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 except where approved anchor straps are used. Properly sized cut washers shall be permitted for anchor bolts in wall lines not containing braced wall panels. Plate washers, not less than 0.229 inch (1/4") by 3 inches by 3 inches in size, shall be provided between the foundation sill plate and the nut except where approved anchor straps are used. The hole in the plate washer is permitted to be diagonally slotted with a width of up to 3/16 inch (5 mm) larger than the bolt diameter and a slot length not to exceed 1 3/4 inches (44 mm), provided a standard cut washer is placed between the plate washer and the nut.

2. Interior braced wall plates shall have anchor bolts spaced at not more than 6 feet (1829 mm) on center and located within 12 inches (305 mm) of the ends of each plate section where supported on a continuous foundation.

3. Interior bearing wall sole plates shall have anchor bolts spaced at not more than 6 feet (1829 mm) on center and located within 12 inches (305 mm) of the ends of each plate section where supported on a continuous foundation.

4. The maximum anchor bolt spacing shall be 4 feet for buildings over two stories in height.

5. Stepped cripple walls shall conform to Section R602.11.2.

6. Where continuous wood foundations in accordance with Section R404.2 are used, the force transfer shall have a capacity equal to or greater than the connections required by Section R602.11.1 or the braced wall panel shall be connected to the wood foundations in accordance with the braced wall panel-to-floor fastening requirements of Table R602.3.

**45. DAMP-PROOF FOUNDATION WALLS:** IRC Section R406. Except where required by section R406.2 to be waterproofed, foundation walls that retain earth and enclose interior or usable spaces located below grade shall be dampproofed from (a) the top of the footing or (b) 6 inches below the top of the basement floor, to the finished grade. R406.2: Except where required by Section R406.2 to be waterproofed, foundation walls that retain earth and enclose interior spaces and floors below grade shall be dampproofed from the finished grade to the higher of the top of the footing or 6 inches below the top of the basement floor. Masonry walls shall have not less than 3/8-inch (9.5 mm) Portland cement

paring applied to the exterior of the wall. The paring shall be dampproof in accordance with one of the following: 1. Bituminous coating. 2. Three pounds per square yard of acrylic modified cement. 3. One-eighth inch coat of surface-bonding cement complying with ASTM C887. 4. Any material permitted for waterproofing in Section R406.2.

5. Other approved methods or materials. **Exception:** Parging of unit masonry walls is not required where a material is approved for direct application to the masonry.

Concrete walls shall be dampproofed by applying any one of the listed dampproofing materials or any one of the waterproofing materials listed in Section R406.2 to the exterior of the wall.

**46. FOUNDATION DRAINAGE:** IRC Section R401.3, R405. Surface drainage shall be diverted to a storm sewer conveyance or other approved point of collection that does not create a hazard. Lots shall be graded to drain surface water away from foundation walls. The grade shall fall not fewer than 6 inches within the first 10 feet. **Exception:** Where lot lines, walls, slopes, or other physical barriers prohibit 6" of fall within 10' drains or swales shall be provided to ensure drainage away from the structure. Impervious surfaces within 10-ft of the building foundation shall be sloped a min. 2% away from the building.

Drains shall be provided around all concrete or masonry foundations that retain earth and enclose habitable spaces located below grade. Drainage tiles, gravel, or crushed stone drains, perforated pipe or other approved systems or materials shall be installed at or below the area to be protected and shall discharge by gravity or mechanical means into an approved drainage system. Gravel or crushed stone drains shall extend not less than 1-foot beyond the outside edge of the footing and 6 inches above the top of the footing and be covered with an approved filter membrane material. The top of open joints of drain tiles shall be protected with strips of building paper. Drainage tiles or perforated pipe shall be placed on not less than 2 inches of washed gravel or crushed rock not less than one sieve larger than the tile joint opening or perforation and covered with not less than 6 inches of the same material.

**47. FOOTING/PIERS ON OR ADJACENT TO SLOPES:**

IRC Section 403.1.7. The placement of buildings and structures on or adjacent to slopes steeper than 1 unit vertical in 3 units horizontal (33.3-percent slope) shall conform to Sections R403.1.7.1 through R403.1.7.4. Buildings below slopes shall be set a sufficient distance from the slope to provide protection from slope drainage, erosion, and shallow failures. Where the existing slope is steeper than one unit vertical in one unit horizontal (100% slope), the toe of the slope shall be assumed to be at the intersection of the horizontal plane drawn from the top of the foundation and a plane drawn tangent to the slope at an angle 45 degrees to the horizontal. Where a retaining wall is constructed at the toe of the slope, the height of the slope shall be measured from the top of the wall to the top of the slope. Footings on or adjacent to slopes shall be founded in material with an embedment and setback from the slope surface to provide vertical and lateral support for the footing without detrimental settlement. Except as provided for in Section R403.1.7.4 and Figure R403.1.7.1,

the following setback is deemed adequate to meet the criteria. Where the slope is steeper than one unit vertical in one unit horizontal (100% slope), the required setback shall be measured from an imaginary plane 45 degrees to the horizontal, projected upward from the toe of the slope. On graded sites, the top of an exterior foundation shall extend above the elevation of the street gutter at point of discharge or the inlet of an approved drainage device not less than 12 inches plus 2 percent. Alternate elevations are permitted subject to the approval of the building official, provided that it can be demonstrated that required drainage to the point of discharge and away from the structure is provided at all locations on the site.

#### **48. FOUNDATION SUPPORT FOR BRACED WALL PANEL-CRIPPLE WALL BRACING: IRC Definition.**

**Sections R602.9, R602.10.9.1, R602.10.11.** One story buildings in seismic design category D2 shall be supported on continuous foundations at intervals not to exceed 50- ft. **In two-story buildings ALL interior braced wall panels shall be supported by continuous foundation.** Foundation cripple walls shall be framed of studs not smaller than the studding above. When exceeding 4 feet in height, such walls shall be framed of stud having the size required for an additional story. Cripple walls supporting bearing walls or exterior walls or interior braced wall panels as required in Section R403.12 and R602.10.9.1 with a stud height less than 14 inches shall be continuously sheathed on one side with wood structural panels fastened to both the top and bottom plates in accordance with Table R602.3(1) or the cripple walls shall be constructed of solid blocking. All cripple walls footings or foundation.

*Exception: Footing supporting cripple walls used to support interior braced wall panels as required in Section R403.1.2 and R602.10.0.1 shall be continuous for the required length of the cripple wall and constructed beyond the cripple wall for minimum distance of 4 inches and maximum distance of the footing thickness. The footing extension is not required at intersections with other footings.* Cripple walls are defined as the framed wall extending from the top of the foundation to the underside of the floor framing of the story above. **Cripple walls below brace walls shall be constructed with wood structural panels with the length and method specified in Table R602.10.3(3) and R602.10.3(4).** Adhesive attachment of wall sheathing shall not be permitted in Seismic Design Categories D2.

#### **49. CHIMNEY FOUNDATION & SEISMIC**

**REINFORCING:** IRC Sections 1001, R1001.2, When an approved design is not provided, footings for masonry and concrete fireplaces and their chimneys shall be constructed of concrete or solid masonry not less than 12" thick and shall not extend 6-inches beyond the face of the fireplace or foundation wall on all sides. Footings shall be founded on natural, undisturbed earth or engineered fill below the frost depth, at least 12" below finished grade. Masonry or concrete chimneys shall be anchored at each floor, ceiling, or roof line more than 6-ft. above grade, except were constructed completely within the exterior walls. Unless designed otherwise, masonry and concrete chimneys shall be reinforced and anchored in accordance with Chapter 1001.

**50. UNDER-FLOOR VENTILATION:** WAC amendment to IRC Section R408.1 and R408.2. The under-floor space between the bottom of the floor joists and the earth under any building (except space occupied by a basement) shall be provided with ventilation openings through foundation walls or exterior walls having a net area of not less than 1 square foot for each 300 square feet of under-floor space area. In addition, a ground cover of 6 mil polyethylene or approved equal shall be laid over the ground within crawl spaces. The ground cover shall be overlapped six inches minimum at the joints and shall extend to the foundation wall. *Exception: The ground cover may be omitted in crawl spaces if the crawl space has a concrete slab floor with minimum thickness of two inches.* One ventilating opening shall be within 3-feet of each corner of the building, except one side of the building shall be permitted to have no ventilation openings. Ventilation openings shall be covered for their height and width with any of the following materials provided that the least dimension of the covering shall not exceed 1/4":

1) perforated sheet metal plates not less than .070" thick, 2) Expanded sheet metal plates not less than .047" thick, 3) Cast iron grills or grating, 4) Extruded load-bearing brick vents, 5) Hardware cloth of .035" wire or heavier, 6) Corrosion-resistant wire mesh, with the least dimension being 1/8". *See exceptions for additional options.*

#### **51. PROTECTION OF WOOD AND WOOD-BASED PRODUCTS AGAINST DECAY**

IRC Section R317.1.2 & R407.3. 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 that untreated wood used entirely below groundwater level or continuously submerged in fresh water shall not be required to be pressure-preservative treated. Protection of wood and wood-based products 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 AWWPA U1.

1. In crawl spaces or unexcavated areas located within the periphery of the building foundation, wood joists or the bottom of a wood structural floor where closer than 18 inches to exposed ground, wood girders where closer than 12 inches to exposed ground, and wood columns where closer than 8 inches to exposed ground.
2. Wood framing members, including columns, that rest directly on concrete or masonry exterior foundation walls and are less than 8 inches from the exposed ground.
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 1/2 inch 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.

8. Portions of wood structural members that form the structural supports of buildings, balconies, porches, or similar permanent building appurtenances where those members are exposed to the weather without adequate protection from a roof, eave, overhang, or other covering that would prevent moisture or water accumulation on the surface or at joints between members. **Exception:** *Sawn lumber used in buildings located in a geographical region where experience has demonstrated that climatic conditions preclude the need to use naturally durable or preservative-treated wood where the structure is exposed to the weather.*

9. Wood columns in contact with *basement* floor slabs unless supported by concrete piers or metal pedestals projecting not less than 1 inch above the concrete floor and separated from the concrete pier by an impervious moisture barrier.

Field-cut ends, notches and drilled holes of preservative-treated wood shall be treated in the field in accordance with AWPAC M.

**52. PRESSURE-PRESERVATIVE-TREATED** wood shall bear the quality mark of an approved agency in accordance with R317.2.

Lumber and plywood required to be pressure-preservative treated in accordance with Section R318.1 shall bear the quality mark of an *approved* inspection agency that maintains continuing supervision, testing and inspection over the quality of the product and that has been *approved* by an accreditation body that complies with the requirements of the American Lumber Standard Committee treated wood program.

**53. FASTENERS:** Fasteners for pressure preservative and fasteners for pressure-preservative and fire-retardant-treated wood shall be of hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. The coating weights for zinc-coated fasteners shall be in accordance with manufacturer recommendations or in accordance with ASTM A653 type G185. See also manufacturer specifications or distributor specific installation instructions or recommendations.

*Exception:* 1) 1/2" diameter or larger steel bolts (where required by location). 2) Fasteners other than nails and timber rivets shall be permitted to be mechanically deposited zinc-coated steel with coating weights in accordance with ASTM B 695, Class 55, minimum. 3) Plain carbon steel fasteners in SBX/DOT and zinc borate preservative-treated wood in an interior, dry environment shall be permitted. Sill plate need not be pressure treated if sill plate installed over an approved moisture barrier such as 30 lb. Felt or equivalent and the sill plate is 8" or more above grade.

**54. POST-BEAM CONNECTIONS/FASTENING: IRC** Section R502.9, R301.1, R602.3(1). Where post and beam or girder construction is used to support floor framing, positive connections shall be provided to ensure against uplift and lateral displacement. The construction of buildings and structures shall result in a system that provides a complete load path that meets all requirements for the transfer of all loads from their point of origin through their load resisting elements to the foundation. Columns shall be restrained to prevent lateral displacement at the bottom end. Wood columns shall not be less in nominal size than 4" x 4" or approved equivalent.

**55. SEE ITEM 52.**

**56. FLOOR FRAMING:** IRC Chapter 5, Section R502.6, R502.7, The ends of each joist, beam or girder shall have not less than 1- 1/2" bearing on wood or metal, have not less than 3" on masonry or concrete except where supported by approved joint hangers. Alternatively, the ends of joists shall be supported on a 1-inch by 4-inch ribbon strip and shall be nailed to the adjacent stud. The bearing on masonry or concrete shall be direct, or a sill plate of 2-inch-minimum nominal thickness shall be provided under the joist, beam, or girder. Joist framing from opposite sides of a beam or partition shall lap a minimum of 3" and shall be nailed together with three 10d-face nails. A wood or metal splice with strength equal to or greater than that provided by the nailed lap is permitted. Joists framing into the side of a wood girder shall be supported by approved framing anchors or on ledger strips not less than 2-inches x 2-inches. Joists shall be supported laterally at the ends and at each intermediate support by full depth solid blocking not less than 2" nominal thickness; or by attachment to a full-depth header, band, or rim joist, or to an adjoining stud; or shall be otherwise provided with lateral support to prevent rotation. *Exception:* 1) *Trusses, structural composite lumber, structural glued-laminated member, and I-Joist shall be supported laterally as required by the manufacture's recommendations.* 2) *In a D2 seismic design category lateral restraint shall be provided at each intermediate support. (Note: Mason County is a D2 seismic area)*

Joists exceeding a nominal 2" x 12" shall be supported laterally by solid blocking, diagonal bridging (wood or metal), or a continuous 1" x 3" strip nailed across the bottom of joists perpendicular to joists at intervals not exceeding 8'0". See Figure R502.2 for floor framing information and Tables 502.3.1(1), R502.3.1(2), R502.3.3(1) and R502.3.3(2) for allowable spans. Structural floor members shall not be cut, bored, or notched in excess of Section R502.8. **Notches:** in solid lumber joists, rafters and beams shall not exceed 1/6 of the depth of the member, shall not be longer than 1/3 of the depth of the member and shall not be located in the middle 1/3 of the span. Notches at the ends of the member shall not exceed 1/4 the depth of the member. The tension side of members 4 inches or greater in nominal thickness shall not be notched except at the ends of the members. The diameter of holes bored or cut into members shall not exceed 1/3 the depth of the member. Holes shall not be closer than 2 inches to the top or bottom of the member, or to any other hole located in the member. Where the member is also notched, the hole shall



not be closer than 2 inches to the notch. **Engineered wood products:** Cuts, notches and holes bored in trusses, structural composite lumber, structural glue-laminated members or I-joists are prohibited except where permitted by the manufacturer's recommendations or where the effects of such alterations are specifically considered in the design of the member by a *registered design professional*. Floor framing shall be **Fastened** in accordance with Table R602.3(1) Fastening Schedule. Posts and beams used to support floor framing shall be provided with positive connections to ensure against uplift and lateral displacement. Floor assemblies, where the space below is used for storage or fuel-fired appliances shall be protected from fire in accordance with R302.13. *Exception: Wood floor assemblies using dimension lumber or structural composite lumber with a cross sectional area equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.*

**57. JOISTS UNDER BEARING PARTITIONS:** IRC Section R502.4. Joists under parallel 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" in nominal thickness spaced not more than 4' O.C.** Bearing partitions perpendicular to joists shall not be offset from supporting girders, walls, or partitions more than the joist depth unless joists are of sufficient size to carry the additional load.

**58. UNDER-FLOOR CLEARANCE / REMOVAL OF DEBRIS:** IRC Section, R408.5. The under-floor grade shall be cleaned of all vegetation and organic material. All wood forms used for placing concrete and construction materials shall be removed before the building is occupied or used for any purpose.

**59. UNDER-FLOOR ACCESS:** IRC Section R408.4, M1305.1.4. Access shall be provided to all under-floor spaces. Access openings through the **floor** shall be a minimum of 18" x 24". Openings through a **perimeter wall** shall be at least 16" x 24". When any portion of the through wall access is below grade, an areaway not less than 16" x 24" shall be provided. The bottom of the areaway shall be below the threshold of the access opening. Through wall access openings shall not be located under a door to the residence. Where appliances are located under floors a rough-framed access shall be provided with an opening or door and an unobstructed passageway not less than 22 inches wide **and** large enough to allow the removal of the largest appliance in the space. Access shall be unobstructed by pipes, ducts or similar construction.

**60. WALL FRAMING:** IRC Section R602 including R602.3.1, R602.3.2, R602.3.3, R 602.3.4, R602.6 & R602.9. The size, height and spacing of studs shall be in accordance with Table R602.3(5). *Exception: 1) Utility grade studs shall not be spaced more than 16" on center, support more than a roof and ceiling, and shall not exceed 8-feet in height for exterior and load bearing walls or 10' for interior non-bearing walls. 2) Where snow*

*loads are less than or equal to 25 pounds per square foot, and the ultimate wind speed is less than or equal to 130 mph, 2x6 studs supporting a roof load with not more than 6 feet of tributary length shall have a maximum height of 18 feet where spaced at 16 inches on center, or 20 feet where spaced at 12 inches on center. Stud shall be a minimum No. 2 grade lumber. 3) Exterior load-bearing studs not exceeding 12 feet (3658 mm) in height provided in accordance with Table R602.3(6). The minimum number of full-height studs adjacent to openings shall be in accordance with Section R602.7.5. The building shall be located in Exposure B, the roof live load shall not exceed 20 psf (0.96 kPa), and the ground snow load shall not exceed 30 psf (1.4 kPa). Studs and plates shall be No. 2 grade lumber or better. In accordance with Table R602.3.1. Studs shall be placed with their wide dimension perpendicular to the wall. Wood stud walls shall be capped with a double top plate installed to provide overlapping at corners and intersections with bearing partitions. End joints in top plates shall be offset not less than 24". Joints in plates need not occur over studs. Plates shall be a nominal 2" in depth and have a width at least equal to the width of studs. Where joists, trusses, or rafters are spaced more than 16" o.c. and the bearing studs are spaced 24" o.c. such members shall bear within 5" of the studs beneath. Studs shall have full bearing on a 2-inch nominal or larger plate or sill having a width at least equal to the width of the studs.*

**Drilling & notching – studs (R602.6): Notching:** Any stud in an exterior wall or bearing partition may be cut or notched to a depth not exceeding 25% of the stud width. Studs in non-bearing partitions may be notched to a depth not to exceed 40% of a single stud width. **Drilling:** Any stud may be bored or drilled, provided that the diameter of the resulting hole is not more than 60% of the stud width, the edge of the hole is no closer than 5/8 of an inch to the edge of the stud, and the hole is not located in the same section as a cut or notch. Studs located in exterior walls or bearing partitions drilled over 40% and up to 60% shall be doubled with no more than 2-successive doubled studs bored (See Figure R602.6.(1) and R602.6(2). *Exception: Use of approved stud shoes is permitted when they are installed in accordance with the manufacturer's recommendations and R602.6 for additional details.* **Drilling and notching of top plate:** Where piping or ductwork is placed in or partly in an exterior wall or interior load bearing wall, necessitating cutting, drilling or notching of the top plate by more than 50% of its width, a galvanized metal tie of not less than .054-inch thick and 1½ inches wide shall be fastened across the plate at each side of the opening with not less than 8-10d nails at each side having a min. length of 1½" each side or equivalent. The metal tie must extend a min. of 6" past the opening. (See figure R602.6.1). **Foundation cripple walls (WAC R602.9)** shall be framed of studs no less in size than the studding above. When exceeding 4'0 feet in height, such walls shall be framed of studs having the size required for an additional story. Cripple walls supporting bearing walls or exterior walls or interior braced wall panels as required in Section R403.1.2 and R602.10.9.1 with a stud height less than 14 inches shall be continuously sheathed on at least one side with a wood structural panel that is fastened to both the top and bottom plates in accordance with Table R602.3(1) or the cripple walls shall be constructed of solid blocking. All cripple walls shall be supported on continuous foundations. *Exception: Footings supporting cripple walls used to support*

interior braced wall panels as required in Sections R403.1.2 and R602.10.9.1 shall be continuous for the required length of the cripple wall and constructed beyond the cripple wall for a min. distance of 4 inches and a maximum distance of the footing thickness. The footings extension is not required at intersections with other footings.

**61. WALL BRACING:** IRC 602.10. **Mason County is located in Seismic Design Category (SDC) D2.** All braced walls and cripple wall bracing in Seismic Design Category D2 shall be constructed in accordance with IRC Tables R602.10.1.3(1), (2), (3) & (4) and Sections R602.10 and R602.11.

- Minimum number of braced wall panels. Braced wall lines with a length of 16 feet or less shall have not less than two braced wall panels of any length or one braced wall panel equal to 48 inches or more. Braced wall lines greater than 16 feet shall have not less than two braced wall panels.
- Standard braced wall panels require nailing patterns of 6" o.c. along all panel edges and 12" in the field. All sheathing joints must be over studs (vertically) or solid block of min. 1 ½ inches thickness, at joints (horizontally).
- R602.10.2.2.1 Braced wall panels shall be located at each end of a braced wall line.

Exceptions:

1. Braced wall panels constructed of Method WSP or BV-WSP and continuous sheathing methods as specified in Section R602.10.4 shall be permitted to begin not more than 10 feet from each end of a braced wall line provided that each end complies with one of the following:

1.1. A minimum 24-inch-wide panel for Methods WSP, CS-WSP, CS-G and CS-PF is applied to each side of the building corner as shown in End Condition 4 of Figure R602.10.7.

1.2. The end of each braced wall panel closest to the end of the braced wall line shall have an 1,800-pound (8 kN) hold-down device fastened to the stud at the edge of the braced wall panel closest to the corner and to the foundation or framing below as shown in End Condition 5 of Figure R602.10.7.

2. Braced wall panels constructed of Method PFH or ABW, or of Method BVWSP where a hold-down is provided in accordance with Table R602.10.6.5.4, shall be permitted to begin not more than 10 feet from each end of a braced wall line.

- Spacing of interior braced wall lines shall not exceed 25' apart. An increase up to 35' apart for a single room within the structure is not to exceed 900 sq. ft., is permitted provided the braced wall length is adjusted in accordance with IRC Table R602.10.3(4). (Ref Table R602.10.1.3)
- Each braced wall line shall be located such that no more than two-thirds of the required braced wall panel length is located to one side of the braced wall line. Braced wall panels shall be permitted to be offset up to 4 feet from the designated braced wall line. Braced wall panels parallel to a braced wall line shall be offset not more than 4 feet from the designated braced wall line location as shown in Figure R602.10.1.1.

- In one-story buildings, braced wall panels shall be supported on continuous foundations at intervals not exceeding 50'. In two-story buildings all interior braced wall panels shall be supported on continuous foundations.

- Brace wall panels shall be fastened to required foundations in accordance with R602.10.8.1 & R602.10.8.2. See Figure R602.10.8(1), Figure R602.10.8(2), R602.10.8.2(1), R602.8.2.(2) & Figure R602.10.8(3). See Attached

- Continuous sheathing methods require structural panel sheathing to be used on all sheathable surfaces on one side of a braced wall line including areas above and below openings and gable end walls and shall meet the requirements of Section R602.10.7.

- Cripple walls Foundation cripple walls shall be framed of studs not smaller 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 supporting bearing walls or exterior walls or interior braced wall panels as required in Sections R403.1.2 and R602.10.9.1 with a stud height less than 14 inches shall be continuously sheathed on one side with wood structural panels fastened to both the top and bottom plates in accordance with Table R602.3(1), or the cripple walls shall be constructed of solid blocking. All cripple walls shall be supported on continuous footings or foundations.

Exception: Footings supporting cripple walls used to support interior braced wall panels as required in Sections R403.1.2 and R602.10.9.1 shall be continuous for the required length of the cripple wall and constructed beyond the cripple wall for a minimum distance of 4 inches and a maximum distance of the footing thickness. The footings extension is not required at intersections with other footings.

- Where "stepped foundations" occur, See IRC **R602.11.2** for additional requirements such as plate strapping, cripple wall height limitations, etc.

- Adhesive attachment is not permitted.

- 1<sup>st</sup> floor braced panels supported by double joists, continuous blocking, or floor beams. (R602.10.8.)

## **62. OPENINGS IN EXTERIOR & INTERIOR WALLS (HEADERS):** IRC Section R602.7, R502.5 & R502.6.

Headers shall be provided over each opening in exterior-bearing walls. Headers shall be of two pieces of nominal 2-inch framing lumber set on edge as permitted in tables R602.7(1) and R602.7(2) and nailed together in accordance with Table R602.3(1) or of solid lumber of equivalent size. Exterior headers not listed in the tables shall be designed to support the loads specified in Table R301.5. The ends of each joist, beam or girder shall not have less than 1½ inches of bearing wood or metal, have not less than 3 inches of bearing on masonry or concrete or be supported by approved joist hangers. A single flat 2"x4" member shall be permitted as a header in interior or exterior nonbearing walls for openings up to 8-ft in width if the vertical distance to the parallel nailing surface above is not more than 24-inches. Headers shall be supported on each end with one or more jack studs or with

approved framing anchors in accordance with Table R602.7(1) or R602.7(2). The full-height stud adjacent to each end of the header shall be end-nailed to each end of the header in accordance with Table R602.3(1). The minimum number of full-height studs at each end of a header shall be in accordance with Table R602.7.5.

### **63. FIREBLOCKING & DRAFTSTOPPING:** IRC R302.11, R302.12, R1001.12, R1003.19.

**FIREBLOCKING** shall be installed to cut off both horizontal and vertical concealed draft openings and to form an effective fire barrier between stories, and between a top story and the roof space. Fire-blocking shall be provided in wood-frame construction in the following locations: **1)** In concealed spaces of stud walls and partitions, including furred spaces and parallel rows of studs or staggered studs, as follows: a) Vertically at the ceiling and floor levels. b) Horizontally at intervals not exceeding 10 feet. **2)** At all interconnections between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings, and cove ceilings. **3)** In concealed spaces at stair stringers at the top and bottom of the run. Enclosed spaces under stairs shall comply with Section R302.7. **4)** At openings around vents, pipes and ducts, cables and wires at ceiling and floor level, with an approved material to resist the free passage of flame and products of combustion. The material filling this annular space shall not be required to meet the ASTM E136 requirements. **5)** For the fire-blocking of chimneys and fireplaces, see Section R1003.19. **6)** Fire-blocking of cornices of a two-family dwelling is required at the line of dwelling unit separation. Fire blocking materials shall consist of the following material. *Except as provided in Section R302.11, Item 4,*

1. Two-inch nominal lumber.
2. Two thicknesses of 1-inch nominal lumber with broken lap joints.
3. One thickness of 23/32-inch wood structural panels with joints backed by 23/32-inch wood structural panels.
4. One thickness of 3/4-inch particleboard with joints backed by 3/4-inch particleboard.
5. One-half-inch gypsum board.
6. One-quarter inch cement-based millboard.
7. Batts or blankets of mineral wool or glass fiber or other approved materials installed in such a manner as to be securely retained in place.
8. Cellulose insulation installed as tested in accordance with ASTM E119 or UL 263, for the specific application.

Batts or blankets of mineral or glass fiber or other approved nonrigid materials shall be permitted for compliance with the 10-foot horizontal fireblocking in walls constructed using parallel rows of studs or staggered studs. Unfaced fiberglass batt insulation used as fireblocking shall fill the entire cross section of the wall cavity to a height of not less than 16 inches measured vertically. Where piping, conduit or similar obstructions are encountered, the insulation shall be packed tightly around the obstruction. Loose-fill insulation material shall not be used as a fireblock unless specifically tested in the form and manner intended for use to demonstrate its ability to remain in place and to retard the spread of fire and hot gases.

The integrity of fireblocks shall be maintained.

**DRAFTSTOPPING R302.12:** In combustible construction where 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 (92.9 m<sup>2</sup>). 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.

Draftstopping materials shall be not less than 1/2-inch (12.7 mm) gypsum board, 3/8-inch (9.5 mm) wood structural panels or other approved materials adequately supported. Draftstopping shall be installed parallel to the floor framing members unless otherwise approved by the building official. The integrity of the draftstops shall be maintained.

**FIRE PROTECTION OF FLOORS:** Floor assemblies that are not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member. Penetrations or openings for ducts, vents, electrical outlets, lighting, devices, luminaires, wires, speakers, drainage, piping and similar openings or penetrations shall be permitted. *Exceptions:*

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Appendix AWU, NFPA 13D, or other approved equivalent sprinkler system.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies shall be permitted to be unprotected where complying with the following:
  - 3.1. The aggregate area of the unprotected portions does not exceed 80 square feet (7.4 m<sup>2</sup>) per story.
  - 3.2. Fireblocking in accordance with Section R302.11.1 is installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber with a cross sectional area equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.

**CHIMNEY FIREBLOCKING:** All spaces between chimneys and floors and ceilings through which chimneys pass shall be fire-blocked with noncombustible material securely fastened in place. The fire-blocking of spaces between chimneys and wood joists, beams, or headers shall be self-supporting or be placed on strips of metal or metal lath laid across the spaces between combustible material and the chimney.

**64. EXTERIOR COVERING & ATTACHMENTS:** IRC Section R701.2, 703.1-703.11. Exterior walls shall provide the building with a weather-resistant exterior wall envelope.

Products sensitive to adverse weather shall not be installed until adequate weather protection for the installation is provided. The exterior sheathing shall be dry before applying exterior cover. *Exception: Log walls designed and constructed in accordance with the provisions of ICC 400.* The exterior wall envelope shall include flashing as described in Section R703.8. The exterior wall envelope shall be designed and constructed in a manner that prevents accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior veneer, as specified R703.2, and a means draining water that enters the assembly to the exterior. Protection against condensation in the exterior wall assembly shall be provided in accordance with Section R702.7. The requirement for a means of drainage shall not be construed to mean an air space cavity under the exterior cladding for an exterior wall clad with panel or lapped siding made of plywood, engineered wood, hardboard, or fiber cement. A water-resistive barrier as required by Section R703.2 will be required on exterior walls. Protection against condensation in the exterior wall assembly shall be provided in accordance with section R702.7 of this code and the Washington State Energy Code (WSEC) as described in item #95. Exterior wall coverings and roof overhangs shall be securely fastened with aluminum, galvanized, stainless steel or rust-preventative coated nails or staples in accordance with Table R703.3(1) or with other approved corrosion-resistance fasteners in accordance with the wall coverings manufacturer's installation instructions. In accordance with Table R703.3(1) wood siding may not be less than 3/8" thick; to ensure proper fastening for type used see Table R703.3(1). Approved corrosion-resistant fasteners shall be provided in the exterior wall envelope in such a manner as to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Minimum fastener length and penetration shall have the greater of the minimum length specified in Table R703.3(1) or as required to provide a minimum penetration into framing as follows: 1. Fasteners for horizontal aluminum siding, steel siding, particleboard panel siding, wood structural panel siding in accordance with ANSI/APA-PRP 210, fiber-cement panel siding installed over foam plastic sheathing shall penetrate not less than 1 1/2 inches into framing or shall be in accordance with the manufacturer's installation instructions. 2) Fasteners for hardboard panel and lap siding shall penetrate not less than 1 1/2 inches into framing. 3) Fasteners for vinyl siding and insulated vinyl siding installed over wood structural panel sheathing shall penetrate not less than 1 1/4 inches into sheathing and framing combined. Vinyl siding and insulated vinyl siding shall be permitted to be installed with fasteners penetrating or through wood or wood structural sheathing of minimum thickness as specified by the manufacturer's instruction or test report, with or penetration into the framing See Section R703.3.3 for more detail. For information related to masonry and anchored stone wall coverings.

**65. WEATHER RESISTANT SHEATHING PAPER and FLASHING:** IRC Section R703.2 The exterior wall envelope shall be designed and constructed in a manner that prevents the accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior veneer as required by Section R703.2 and a means of draining to the exterior

water that enters the assembly to the exterior. Protection against condensation in the exterior wall assembly shall be provided in accordance with Section R702.7 of this code.

- Exceptions:** 1. A weather-resistant exterior wall envelope shall not be required over concrete, or masonry walls designed in accordance with Chapter 6 and flashed in accordance with Section R703.4 or R703.8.
2. Compliance with the requirements for a means of drainage, and the requirements of Sections R703.2 and R703.4, shall not be required for an exterior wall envelope that has been demonstrated to resist wind-driven rain through testing of the exterior wall envelope, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E331 under the following conditions:
- 2.1. Exterior wall envelope test assemblies shall include at least one opening, one control joint, one wall/eave interface and one wall sill. All tested openings and penetrations shall be representative of the intended end-use configuration.
  - 2.2. Exterior wall envelope test assemblies shall be at least 4 feet by 8 feet (1219 mm by 2438 mm) in size.
  - 2.3. Exterior wall assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (299 Pa).
  - 2.4. Exterior wall envelope assemblies shall be subjected to the minimum test exposure for a minimum of 2 hours.
3. The requirement for a means of drainage shall not be construed to mean an air space cavity under the exterior cladding for an exterior wall clad with panel or lapped siding made of plywood, engineered wood, hardboard, or fiber cement. A water-resistive barrier as required by Section R703.2 will be required on exterior walls.

The exterior wall envelope design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the exterior wall envelope, joints at the perimeter of opening penetration or intersections of terminations with dissimilar materials.

**WATER-RESISTIVE BARRIER.** R703.2 Not fewer than one layer of water-resistive barrier shall be applied over studs or sheathing of all exterior walls with flashing as indicated in Section R703.4, in such a manner as to provide a continuous water-resistive barrier behind the exterior wall veneer. The water-resistive barrier material 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 R703.1. Water-resistive barrier materials shall comply with one of the following:

1. No. 15 felt complying with ASTM D226, Type 1.
2. ASTM 2556, Type 1 or 2.
3. ASTM E331 in accordance with Section R703.1.1.
4. Other approved materials in accordance with the manufacturer's installation instructions.

No. 15 asphalt felt and water-resistive barriers complying with ASTM E2556 shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches, and where joints occur, shall be lapped not less than 6 inches.

**WALL COVERING ATTACHMENT.** Section R703.3 The nominal thickness and attachment of exterior wall coverings shall be in accordance with Table R703.3(1), the wall covering material requirements of this section, and the wall covering manufacturer's installation instructions. Cladding attachment over foam sheathing shall comply with the additional

requirements and limitations of Sections R703.15 through R703.17. Nominal material thicknesses in Table R703.3(1) are based on a maximum stud spacing of 16 inches on center. Where specified by the siding manufacturer's instructions and supported by a test report or other documentation, attachment to studs with greater spacing is permitted. Fasteners for exterior wall coverings attached to wood framing shall be in accordance with Section R703.3.3 and Table R703.3(1). Exterior wall coverings shall be attached to cold-formed steel light frame construction in accordance with the cladding manufacturer's installation instructions, the requirements of Table R703.3(1) using screw fasteners substituted for the nails specified in accordance with Table R703.3(2), or an *approved* design. **Fastening** of exterior wall coverings and roof overhang soffits shall be securely fastened with aluminum, galvanized, stainless steel or rust-preventative coated nails or staples in accordance with Table R703.3(1) or with other *approved* corrosion-resistant fasteners in accordance with the wall covering manufacturer's installation instructions. Nails and staples shall comply with ASTM F1667. Nails shall be T-head, modified round head, or round head with smooth or deformed shanks. Staples shall have a minimum crown width of  $\frac{7}{16}$  inch outside diameter and be manufactured of minimum 16-gage wire. Where fiberboard, gypsum, or foam plastic sheathing backing is used, nails or staples shall be driven into the studs. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with either the siding manufacturer's installation instructions or Table R703.3.3. Fasteners shall have the greater of the minimum length specified in Table R703.3(1) or as required to provide a minimum penetration into framing as follows:

1. Fasteners for horizontal aluminum siding, steel siding, particleboard panel siding, wood structural panel siding in accordance with ANSI/APA-PRP 210, fiber-cement panel siding and fiber-cement lap siding installed over foam plastic sheathing shall penetrate not less than  $1\frac{1}{2}$  inches into framing or shall be in accordance with the manufacturer's installation instructions.
2. Fasteners for hardboard panel and lap siding shall penetrate not less than  $1\frac{1}{2}$  inches into framing.
3. Fasteners for vinyl siding and insulated vinyl siding installed over wood or wood structural panel sheathing shall penetrate not less than  $1\frac{1}{4}$  inches into sheathing and framing combined. Vinyl siding and insulated vinyl siding shall be permitted to be installed with fasteners penetrating into or through wood or wood structural sheathing of minimum thickness as specified by the manufacturer's instructions or test report, with or without penetration into the framing. Where the fastener penetrates fully through the sheathing, the end of the fastener shall extend not less than  $\frac{1}{4}$  inch beyond the opposite face of the sheathing. Fasteners for vinyl siding and insulated vinyl siding installed over foam plastic sheathing shall be in accordance with Section R703.11.2. Fasteners for vinyl siding and insulated vinyl siding installed over fiberboard or gypsum sheathing shall penetrate not less than  $1\frac{1}{4}$  inches into framing.

4. Fasteners for vertical or horizontal wood siding shall penetrate not less than  $1\frac{1}{2}$  inches into studs, studs and wood sheathing combined, or blocking.

5. Fasteners for siding material installed over foam plastic sheathing shall have sufficient length to accommodate foam plastic sheathing thickness and to penetrate framing or sheathing and framing combined, as specified in Items 1 through 4.

**FLASHING (R703.4):** Approved corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. Fluid-applied membranes used as flashing in exterior walls shall comply with AAMA 714. The flashing shall extend to the surface of the exterior wall finish. Approved corrosion resistant flashings shall be installed at the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall be installed in accordance with Section R703.4.1.
2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.
7. At built-in gutters.

**Flashing installation at exterior window and door openings.** R703.4.1 Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to a *water-resistive barrier* complying with Section 703.2 for subsequent drainage. Air sealing shall be installed around all window and door openings on the interior side of the rough opening gap. Mechanically attached flexible flashings shall comply with AAMA 712. Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:

1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, *pan flashing* shall be installed at the sill of exterior window and door openings. *Pan flashing* shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using *pan flashing* shall incorporate flashing or protection at the head and sides.
2. In accordance with the flashing design or method of a *registered design professional*.
3. In accordance with other *approved* methods.

**66. STONE AND MASONRY VENEER, GENERAL:** IRC Section R703.8. Anchored stone and masonry veneer shall be installed in accordance with this chapter, Table R703.3(1) and Figures R703.8(1) and R703.8(2). These

veneers installed over a backing of wood or cold-formed steel shall be limited to the first *story above grade plane* and shall not exceed 5 inches in thickness. See Section R602.10 for wall bracing requirements for masonry veneer for wood-framed construction and Section R603.9.5 for wall bracing requirements for masonry veneer for cold-formed steel construction. *Exception: For detached one- or two-family dwellings in Seismic Design Categories D<sub>0</sub>, D<sub>1</sub> and D<sub>2</sub>, exterior stone or masonry veneer, as specified in Table R703.8(2), with a backing of wood framing shall be permitted to the height specified in Table R703.8(2) above a noncombustible foundation.* Wall bracing and hold downs at exterior and interior braced wall lines shall be in accordance with section R602.10 and R602.11. In accordance with Footnote *a* of Table R703.8(2), cripple walls shall not be permitted due to D2 seismic design category. Required interior braced wall lines shall be supported on continuous foundations. Anchored veneer shall be supported on footings, foundations, or other noncombustible support. Wall ties shall be corrosion resistant.

**67. SIDING/EARTH SEPARATION:** IRC Section R317.1-#5. Wood siding, sheathing and wall framing on the exterior of the building used within 6" of ground or less than 2 inches measured vertically from concrete steps, porch slabs, patio slabs and similar horizontal surfaces exposed to the weather; shall be natural durable wood or wood that is preservative treated in accordance that specified in item #56 of this checklist. Wood or other products shall conform to the most restrictive of either manufacturer specifications or code requirements.

**68. DECKS/EXTERIOR STAIRS:** IRC R507, R317.1.2 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 that untreated wood used entirely below groundwater level or continuously submerged in fresh water shall not be required to be pressure-preservative treated. In addition, naturally durable wood or pressure preservative treated wood shall be used in those portions of wood members that form the structural supports of buildings, balconies, porches, or similar permanent building appurtenances when those members are exposed to the weather without adequate protection from a roof, eave, overhang, or other covering that would prevent moisture or water accumulation on the surface or at joints between members. Field applied treatment is not an approved method. Treatment must be applied by manufacturer, see item #56 of this checklist. Wood-framed decks shall be in accordance with this section. Decks shall be designed for the *live load* required in Section R301.5 or the ground snow load indicated in Table R301.2, whichever is greater. For decks using materials and conditions not prescribed in this section, refer to Section R301. **Fasteners:** metal fasteners and connectors used for all decks shall be in accordance with Section R317.3 and Table R507.2.3 **Flashing:** Flashing shall be corrosion-resistant metal of nominal thickness not less than 0.019 inch or approved nonmetallic material that is compatible with the substrate of the structure and the decking materials. **Footings:** Decks shall be supported on concrete

footings or other approved structural systems designed to accommodate all loads in accordance with Section R301. Deck footings shall be sized to carry the imposed loads from the deck structure to the ground as shown in Figure R507.3. *Exceptions: 1. Footings shall not be required for free-standing decks consisting of joists directly supported on grade over their entire length. 2. Footings shall not be required for free-standing decks that meet ALL of the following criteria: 2.1. The joists bear directly on precast concrete pier blocks at grade without support by beams or posts. 2.2. The area of the deck does not exceed 200 square feet. 2.3. The walking surface is not more than 20 inches above grade at any point within 36 inches measured horizontally from the edge. The minimum size of concrete footings shall be in accordance with Table R507.3.1, based on the tributary area and allowable soil-bearing pressure in accordance with Table R401.4.1. Deck footings shall be placed not less than 12 inches (305 mm) below the undisturbed ground surface. **Deck Posts:** For single-level decks, wood post size shall be in accordance with Table R507.4. Where posts bear on concrete footings in accordance with Section R403 and Figure R507.3, lateral restraint shall be provided by manufactured connectors or a minimum post embedment of 12 inches in surrounding soils or concrete piers. Other footing systems shall be permitted. *Exception: Where expansive, compressible, shifting or other questionable soils are present, surrounding soils shall not be relied on for lateral support.* **Deck Beams:** Maximum allowable spans for wood deck beams, as shown in Figure R507.5, shall be in accordance with Table R507.5. Beam plies shall be fastened together with two rows of 10d (3-inch × 0.128-inch) nails minimum at 16 inches on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the actual beam span. Deck beams of other materials shall be permitted where designed in accordance with accepted engineering practices. Deck beams shall be attached to supports in a manner capable of transferring vertical loads and resisting horizontal displacement. Deck beam connections to wood posts shall be in accordance with Figures R507.5.1(1) and R507.5.1(2). Manufactured post-to-beam connectors shall be sized for the post and beam sizes. Bolts shall have washers under the head and nut. **Deck Joist:** Maximum allowable spans for wood deck joists, as shown in Figure R507.6, shall be in accordance with Table R507.6. The maximum joist spacing shall be limited by the decking materials in accordance with Table R507.7. The ends of joists shall have not less than 1½ inches of bearing on wood or metal and not less than 3 inches of bearing on concrete or masonry over its entire width. Joists bearing on top of a multiple-ply beam or ledger shall be fastened in accordance with Table R602.3(1). Joists bearing on top of a single-ply beam or ledger shall be attached by a mechanical connector. Joist framing into the side of a beam or ledger board shall be supported by *approved* joist hangers. Joist ends and bearing locations shall be provided with lateral resistance to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with not fewer than three 10d nails or three No. 10 x 3-inch-long wood screws. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. For decks with cantilevered*

framing members, connection to exterior walls or other framing members shall be designed and constructed to resist uplift resulting from the full *live load* specified in Table R301.5 acting on the cantilevered portion of the deck. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting.

**Ledger:** Deck ledgers shall be a minimum 2-inch by 8-inch nominal, pressure-preservative-treated Southern pine, incised pressure-preservative-treated hem-fir, or *approved*, naturally durable, No. 2 grade or better lumber. Deck ledgers shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer. Band joists supporting a ledger shall be a minimum 2-inch-nominal, solid-sawn, spruce-pine-fir or better lumber or a minimum 1-inch nominal engineered wood rim boards. Band joists shall bear fully on the primary structure capable of supporting all required loads. **Lateral Load Connections:** Lateral load connections must be provided in accordance with Figure R507.9.2(1), hold-down tension devices shall be installed in not less than two locations per deck, within 24 inches of each end of the deck. Each device shall have an allowable stress design capacity of not less than 1,500 pounds. Where the lateral load connections are provided in accordance with Figure R507.9.2(2), the hold-down tension devices shall be installed in not less than four locations per deck, and each device shall have an allowable stress design capacity of not less than 750 pounds. *Exception: Decks not more than 30 inches above grade at any point may be unattached.*

**Guards:** Where *guards* are supported on deck framing, *guard* loads shall be transferred to the deck framing with a continuous load path to the deck joists. Where *guards* are connected to the interior or exterior side of a deck joist or beam, the joist or beam shall be connected to the adjacent joists to prevent rotation of the joist or beam. Connections relying only on fasteners in end grain withdrawal are not permitted. Where *guards* are mounted on top of the decking, the *guards* shall be connected to the deck framing or blocking and installed in accordance with manufacturer's instructions to transfer the *guard* loads to the adjacent joist. Where 4-inch by 4-inch wood posts support guard loads applied to the top of the guard, such posts shall not be notched at the connection to the supporting structure. Other *guards* shall be in accordance with either the manufacturer's instructions or accepted engineering principles.

**69. WOOD TRUSSES:** IRC Section R502.11, R802.10. Wood trusses shall be designed in accordance with approved engineering practice. Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the *construction documents* for the building and on the individual *truss design drawings*. In the absence of specific bracing requirements, trusses shall be braced in accordance with accepted industry practices, such as the *SBCA Building Component Safety Information (BCSI) Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses*. Truss members and components shall not be cut, notched, spliced or otherwise altered in any way without the approval of a *registered design professional*. Alterations resulting in the addition of load that exceeds the design load for the truss, shall not be permitted without verification that the truss is capable of supporting the

additional loading. Truss engineering data and installation specifications, including the type of roofing to be used, shall be available on site **at framing inspection**.

**70. RAFTERS:** IRC Section R802. A ridge board used to connect opposing rafters shall be not less than 1-inch nominal thickness and not less in depth than the cut end of the rafter. Where ceiling joist or rafter ties do not provide continuous ties across the structure as required by Section R802.5.2, the ridge shall be supported by a wall or ridge beam designed in accordance with accepted engineering practice and supported on each end by a wall or column. Rafters shall be framed opposite from each other to a ridge board, shall not be offset more than 1-1/2 inches from each other and shall be connected with a collar tie or ridge strap in accordance with Section R802.4.6 or directly opposite from each other to a gusset plate in accordance with Table R602.3(1). Rafters shall be nailed to the top wall plates in accordance with Table R602.3(1) unless the roof assembly is required to comply with the uplift requirements of Section R802.11. Hip and valley rafters shall be not less than 2 inches nominal in 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 3:12 (25-percent slope), structural members that support rafters and ceiling joists, such as ridges, hips and valleys, shall be designed as beams. Installation of purlins to reduce the span of rafters is permitted as shown in Figure R802.4.5. Purlins shall be sized not less than the required size of the rafters that they support. **Purlins** shall be continuous and shall be supported by 2-inch by 4-inch braces installed to bearing walls at a slope not less than 45 degrees from the horizontal. The braces shall be spaced not more than 4 feet on center and the unbraced length of braces shall not exceed 8 feet. Where collar ties are used to connect opposing rafters, they shall be located in the upper third of the attic space and fastened in accordance with Table R602.3(1). **Collar ties** shall be not less than 1 inch by 4 inches nominal, spaced not more than 4 feet on center. Ridge straps shall be permitted to replace collar ties. Ridge straps shall be not less than 1-1/4-inch x 20 gage and shall be nailed to the top edge of each rafter with not fewer than three 10d common nails with the closest nail not closer than 23/8 inches from the end of the rafter. **Ceiling joists** shall be continuous across the structure or securely joined where they meet over interior partitions in accordance with Section R802.5.2.1. Ceiling joists shall be fastened to the top plate in accordance with Table R602.3(1). Where ceiling joists run parallel to rafters and are located in the bottom third of the rafter height, they shall be installed in accordance with Figure R802.4.5 and fastened to rafters in accordance with Table R802.5.2(1). Where the ceiling joists are installed above the bottom third of the rafter height, the ridge shall be designed as a beam in accordance with Section R802.3. Where ceiling joists do not run parallel to rafters, rafters shall be tied across the structure with a rafter tie in accordance with Section R802.5.2.2, or the ridge shall be designed as a beam in accordance with Section R802.3. Where ceiling joists are not connected to the rafters at the top wall plate, joists connected higher in the attic shall be installed as rafter ties, or rafter ties shall be installed to provide a

continuous tie. Rafter ties shall be min. 2"x4", installed in accordance with connection requirements in Table R802.5.2(1) at maximum spacing of 24" on center. Ends of ceiling joists shall be lapped not less than 3 inches or butted overbearing partitions or beams and toenailed to the bearing member. Where ceiling joists are used to provide the continuous tie across the building, lapped joists shall be nailed together in accordance with Table R802.5.2(1) and butted joists shall be tied together with a connection of equivalent capacity. Laps in joists that do not provide the continuous tie across the building shall be permitted to be nailed in accordance with Table R602.3(1). 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 or concrete. The bearing on masonry or concrete shall be direct, or a sill plate of 2-inch minimum nominal thickness shall be provided under the rafter or ceiling joist. The sill plate shall provide a minimum nominal bearing area of 48 square inches. Where the roof pitch is greater than or equal to 3 units vertical in 12 units horizontal (25-percent slope), and ceiling joists or rafter ties are connected to rafters to provide a continuous tension tie in accordance with Section R802.5.2, vertical bearing of the top of the rafter against the ridge board shall satisfy this bearing requirement.

**71. RAFTER OPENINGS:** IRC Section R802.9. Openings in roof and ceiling framing shall be framed with header and trimmer joists. Where the header joist span does not exceed 4 feet, the header joist shall be permitted to be a single member the same size as the ceiling joist or rafter. Single trimmer joists shall be permitted to be used to carry a single header joist that is located within 3 feet of the trimmer joist bearing. Where the header joist span exceeds 4 feet, the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the ceiling joists or rafter framing into the header. Approved hangers shall be used for the header joist to trimmer joist connections where the header joist span exceeds 6 feet. Tail joists over 12 feet long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches.

## **72. CEILING JOISTS LATERAL SUPPORT**

**BRIDGING:** IRC Section R802.8, R802.8.1. 6. **Lateral Support-** Roof framing members 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. For roof rafters with ceiling joists attached in accordance with Table R602.3(1), the depth-to-thickness ratio for the total assembly shall be determined using the combined thickness of the rafter plus the attached ceiling joist. Exception: Roof trusses shall be braced in accordance with Section R802.10.3. **Bridging-**Rafters and ceiling joists having a depth-to-thickness ratio exceeding 6 to 1 based on nominal dimensions shall be supported laterally by solid blocking, diagonal bridging (wood or metal) or a continuous 1-inch by 3-inch wood strip nailed across the rafters or ceiling joists at intervals not exceeding 8 feet.

**74. ROOF DRAINAGE:-** UPC 1101.12.1. Roof areas of a building shall be drained by roof drains or gutters. Gutters and downspouts are to be installed on structures to conform to the

provisions of Mason County Code, Title 14 chapter 14.48 (Stormwater Management), and IRC R401.3. If a stormwater plan is not required, or an alternative method is proposed, measures must be put in place to protect the structure from excessive splash, divert the water away from the foundation per IRC R401.3, and protect the parcel (and adjacent parcels) from erosion. IRC Section R903.4. Unless roofs are sloped to drain over roof edges, roof drains shall be installed at each low point of the roof. Where required for roof drainage, scuppers shall be placed level with the roof surface in a wall or parapet. Overflow drains shall discharge to an approved location and shall not be connected to roof drain lines.

**73. ROOF MATERIALS:** IRC Section R904 & R905. Roof covering materials shall be delivered in packages bearing the manufacturer's identifying marks and *approved* testing agency *labels* required. Bulk shipments of materials shall be accompanied by the same information issued in the form of a certificate or on a bill of lading by the manufacturer. Roof coverings shall be applied and installed in accordance with Section R905 and the manufacturer's installation instructions. In accordance with Table R905.2.4.1 Asphalt shingles classified using ASTM D 3161 with shingle classification of A, D, or F are acceptable for use in Mason County and other areas where wind zones less than 110 mph. *Underlayment* for asphalt shingles, clay and concrete tile, *metal roof shingles*, mineral-surfaced roll roofing, slate and slate-type shingles, wood shingles, wood shakes, *metal roof panels* and *photovoltaic shingles* shall conform to the applicable standards listed in this chapter. *Underlayment* materials required to comply with ASTM D226, D1970, D4869 and D6757 shall bear a *label* indicating compliance to the standard designation and, if applicable, type classification indicated in Table R905.1.1(1). *Underlayment* shall be applied in accordance with Table R905.1.1(2). *Underlayment* shall be attached in accordance with Table R905.1.1(3).

**74. ATTIC VENTILATION:** IRC Section R806. Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow. Ventilation openings shall have a least dimension of 1/16 inch minimum and 1/4 inch maximum. Ventilation openings having a least dimension larger than 1/4 inch shall be provided with corrosion-resistant wire cloth screening, hardware cloth, perforated vinyl or similar material with openings having a least dimension of 1/16 inch minimum and 1/4 inch maximum. Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air and shall be protected to prevent the entry of birds, rodents, snakes, and other similar creatures. The minimum net free ventilating area shall be 1/150 of the area of the vented space. *Exception: The minimum net free ventilation area shall be 1/300 of the vented space provided both of the following conditions are met:*  
1. In Climate Zones 6, 7 and 8, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.  
2. Not less than 40 percent and not more than 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the attic or rafter space. Upper ventilators shall be



located not more than 3 feet below the ridge or highest point of the space, measured vertically. The balance of the required ventilation provided shall be located in the bottom one-third of the attic space. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation more than 3 feet below the ridge or highest point of the space shall be permitted.

Where eave or cornice vents are installed, insulation shall not block the free flow of air. A minimum of 1" space shall be provided between the insulation and the roof sheathing at the location of the vent. Unvented attic assemblies may be permitted provided all the conditions of Section R806.5 are met **AND** such installation allows warranty to be maintained by the roofing manufacturer.

**75. CHIMNEY HEIGHT/CHIMNEY CRICKETS:** IRC, R1003.9, R1003.20, R1005, R905.2.8.3. Chimneys shall extend not less than 2 feet higher than any portion of a building within 10 feet but shall not be less than 3 feet above the highest point where the chimney passes through the roof. Masonry chimneys shall be provided with crickets when the dimension parallel to the ridgeline is greater than 30" and does not intersect the ridgeline. The cricket and chimney shall be flashed, and counter flashed in the same manner as normal roof-chimney intersection. Crickets shall be constructed in compliance with Figure R1003.20 and Table R1003.20. Factory-built chimneys shall be listed and labeled and shall be installed and terminated in accordance with the manufacturer's installation instructions. A cricket or saddle shall be installed on the ridge side of any chimney or penetration of roof more than 30-inches wide as measured perpendicular to the slope. Cricket or saddle coverings shall be sheet metal or of the same material as the roof covering.

**76. PREMISE IDENTIFICATION:** IRC Section R319, IFC Section 505.1, and Mason County Code Title 14.28. Buildings shall be provided with approved address identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property. Address identification characters shall contrast with their background. Address numbers shall be Arabic numbers or alphabetical letters. Numbers shall not be spelled out. Each character shall be not less than 4 inches in height with a stroke width of not less than 1/2 inch. Where required by the fire code official, address identification shall be provided in additional approved locations to facilitate emergency response. Where access is by means of a private road and the building address cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the structure. Address identification shall be maintained. Address signage must have backed with material of aluminum or other weather resistant material with a green or red coating. Must have white reflectorized lettering for contrasting color on the background. Lettering may be horizontal or vertical. Must be mounted on a post or other approved object at the intersection of the driveway and public road serving the parcel and be visible from both directions. When there is long -shared driveway, easement or any situation that could create confusion in finding an entrance, address, numbers must be posed together at the main access point and at each turn and/or driveway entrance providing direction to the parcel with arrows if necessary.

**77. APPROVED PLANS:** IRC Sections R106.3.1, R106.4. When the building official issues a permit, the construction documents shall be approved in writing or by stamp. One set of the construction documents reviewed shall be retained by the building official. The other set shall be returned to the applicant physically or electronically. Plans shall be kept at the site of work and shall be open to inspection by the building official or the duly authorized representative. The work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents.

**78. HEATING:** IRC Section R303.10 & WA State Amendment to R303.10. A dwelling unit shall be provided with heating facilities capable of maintaining a minimum room temperature of 68° F at a point 3' above the floor and 2' from exterior walls in all habitable rooms at the design temperature. The installation of one or more portable heaters shall not be used to achieve compliance with this section. Primary heating sources in all new and substantially remodeled buildings shall not be dependent upon wood stoves. No new or used solid fuel-burning device shall be installed in new or existing buildings unless such device is U.S. EPA certified and conforms with RCW 70A.15.1005, 70A.15.3500, 70A.15.3510, and 70A.15.3530. *Exception: Antique wood cook stoves and wood heaters manufactured prior to 1940.*

**79. SKYLIGHTS:** IRC Section R308.6.2. The following types of glazing may be used: 1) Laminated glass with a minimum .015" polyvinyl butyl interlayer for glass panes 16 sq. ft. or less in area located such that the highest point of the glass is not more than 12' above a walking surface or other accessible area; for higher or larger sizes, the minimum interlayer thickness shall be .030". 2) Fully tempered glass. 3) Heat-strengthened glass. 4) Wired glass. 5) Approved rigid plastics. **Installed skylights shall comply with Washington State Energy Code requirements.**

**80. INTERIOR FINISHES:** IRC Sections R302.9, R316 and R702.5 Wood veneer paneling and hardboard paneling shall be placed on wood or cold-formed steel framing spaced not more than 16 inches on center. Wood veneer and hardboard paneling less than 1/4-inch nominal thickness shall not have less than a 3/8-inch gypsum board or gypsum panel product backer. Wood veneer paneling not less than 1/4-inch nominal thickness shall conform to ANSI/HPVA HP-1. Hardboard paneling shall conform to CPA/ANSI A135.5. All structural panel components within the conditioned space such as plywood, particle board, wafer board and oriented strand board shall be identified as "EXPOSURE 1," "EXTERIOR" or "HUD-APPROVED." When using **foam plastic insulation**, unless otherwise allowed in Section R316.5, foam plastic shall be separated from the interior of a building by an approved thermal barrier of not less than 1/2-inch gypsum wallboard, 23/32-inch wood structural panel or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

## **81. GYPSUM WALLBOARD & GYPSUM**

**WALLBOARD FASTENING:** IRC Section R702.3, and Table R702.3.5. All wood framing supporting gypsum board shall not be less than 2-inches nominal thickness in the least dimension except that furring strips, not less than 1"x 2" may be used over solid backing or framing spaced not more than 24-inches O.C. When gypsum is used as a base or backer for adhesive application of ceramic tile or other required nonabsorbent material shall conform with ASTM 1396, C1178 or C1278. Use of water-resistant gypsum backing board shall be permitted to be used on ceilings. Water resistant gypsum wallboard shall not be installed over a class I or II vapor retarder, in a shower or tub compartment. Cut or exposed edges, including those at wall intersections, shall be sealed as recommended by the manufacturer. *Limitations: Water-resistant gypsum backing board shall not be used where there will be direct exposure to water, or in areas subject to continuous high humidity.* Screws for attaching gypsum board to wood framing shall be type W or Type S in accordance with ASTM C 1002 and shall penetrate the wood not less than 5/8". 3/8" min. Thickness of gypsum board or gypsum panel product.

- Fastening (**nails**): 7" o.c. max. on ceiling & 8" o.c. max on walls when framing is 16" o.c.
- Fastening (**screws**): 12" o.c. max ceiling & 16" o.c. max on walls when framing is 16" o.c.
- Size of Nail: 13 gage, 1 1/4" long, 19/64" head; 0.098" diameter, 1 1/4" long, ring shank; or 4d cooler nail, 0.080" diameter, 1 3/8" long, 7/32" head.:
- See Table R702.3.5 for more information.

## **82. STORY/STORY ABOVE GRADE:** IRC Section R202.

Any story having its finished floor surface entirely above grade plane or in which the finished surface of the floor next above is either of the following: 1) Is more than 6' above grade plane. 2) Is more than 12' above the finished ground level at any point?

## **83. HEIGHT OF BUILDING/GRADE PLANE:** IRC

Section R202. **Grade Plane:** A reference plane representing the average of the finished ground level adjoining the building at all exterior walls. Where the finished ground level slopes away from the exterior walls, the reference plane shall be established by the lowest points within the area between the building and the *lot line* or, where the *lot line* is more than 6 feet from the building between the structure and a point 6 feet from the building. **Height-Building:** The vertical distance from *grade plane* to the average height of the highest roof surface. **Story Height:** The vertical distance from top to top of two successive tiers of beams or finished floor surfaces; and, for the topmost story, from the top of the floor finished to the top of the ceiling joists or, where there is not a ceiling, to the top of the roof rafters.

## **84. RETAINING WALLS:** IRC Section R105.2, R404.4.

Retaining walls that are not laterally supported at the top and that retain in excess of 48 inches of unbalanced fill or retaining walls exceeding 24 inches in height that resist lateral loads in addition to soil, shall be designed in accordance with accepted engineering practice to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Retaining walls shall be designed for a safety factor of 1.5 against lateral sliding and overturning. This section shall not apply to foundation walls supporting buildings. *Retaining walls that are not over 4' in height measured from the bottom of the footing to the top of the wall not supporting a surcharge, are exempt from permits.* Retaining Wall Surcharge; loading on a retaining wall is a vertical load imposed on the retained soil that may impose a lateral force against the retaining wall in addition to the lateral earth pressure of the retained soil. Any added weight above a retaining wall is called a surcharge. Patios, swimming pools and driveways are common residential surcharges.

## **85. SLAB ON GRADE FOUNDATION INSULATION:**

IECC/WSEC R303, R402.2.8, R402.2.9, R402.2.9.1 & Table R402.1.1. The minimum thermal resistance (R-value) of the insulation around the perimeter of unheated or heated slab-on-grade floors shall be as specified in Table R402.1.3. The insulation (R-10) shall be placed on the outside of the foundation or on the inside of the foundation wall. The insulation shall extend downward from the top of the slab for a minimum 48 inches in accordance with table R402.1.3 or to the top of the footing, whichever is less, or downward to at least the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table. A two-inch by two-inch (maximum) pressure treated nailer may be placed at the finished floor elevation for attachment of interior finish materials. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches of soil. **Heated slab-on-grade floors.** The entire area of a heated slab-on-grade floor shall be thermally isolated from the soil with a minimum of R-10 insulation. The insulation shall be an approved product for its intended use. If a soil gas control system is present below the heated slab on-grade floor, which results in increased convective flow below the heated slab-on-grade floor, the heated slab-on-grade floor shall be thermally isolated from the sub-slab gravel layer. R-10 heated slab-on-grade floor insulation is required for all compliance paths.

## **86. UNDER-FLOOR INSULATION:** IECC/WSEC R303,

R402.2.7. Table R402.1.3 Floor cavity insulation in accordance with WSEC Table R402.1.3 shall be R-30. Insulation shall comply with one of the following: 1. Insulation shall be installed to maintain permanent contact with the underside of the subfloor decking in accordance with manufacturer instructions to maintain required R-value or readily fill the available cavity space. Insulation supports shall be installed so spacing is no more than 24- inches on center. Foundation vents shall be placed so that the top of the vent is below the lower surface of the floor insulation. 2. Floor framing cavity insulation shall be permitted to be in contact with the top side of sheathing separating the cavity and the unconditioned space below. Insulation shall extend from the

bottom to the top of all perimeter floor framing members and the framing members shall be air sealed. 2021 Washington State Energy Code RE-25 3. A combination of cavity and continuous insulation shall be installed so that the cavity insulation is in contact with the top side of the continuous insulation that is installed on the underside of the floor framing separating the cavity and the unconditioned space below. The combined R-value of the cavity and continuous insulation shall equal the required R-value for floors. Insulation shall extend from the bottom to the top of all perimeter floor framing members and the framing members shall be air sealed. *Exceptions: 1. When foundation vents are not placed so that the top of the vent is below the lower surface of the floor insulation, a permanently attached baffle shall be installed at an angle of 30° from horizontal, to divert air flow below the lower surface of the floor insulation. 2. Substantial contact with the surface being insulated is not required in enclosed floor/ceiling assemblies containing ducts where full R-value insulation is installed between the duct and the exterior surface.*

**87. WALL INSULATION:** IECC/WSEC R303, R402.2.8 & Table R402.1.3. Wall assemblies in the building thermal envelope shall comply with the vapor retarder requirements of Section R702.7 of the International Residential Code or Section 1404.3 of the International Building Code, as applicable. Above grade exterior walls shall be insulated to not less than the nominal R-value specified in Table R402.1.3. Unless approved by other approved approaches in accordance with the WSEC. The typical R-value for wall insulation shall be minimum, R-20 w/R-5 continuous or R-13 w/ R-10 continuous. All exterior wall insulation shall fill the entire framed cavity. Faced batts shall be face-stapled to avoid compression (*not inset-stapled*). An R-value identification mark shall be applied by the manufacturer to each piece of building thermal envelope insulation 12 inches or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and R-value of insulation installed in each element of the building thermal envelope. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled R-value, installed density, coverage area and number of bags installed shall be listed on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered, and R-value of installed thickness shall be listed on the certification. For insulated siding, the R-value shall be labeled on the product's package and shall be listed on the certification. The insulation installer shall sign, date, and post the certification in a conspicuous location on the job site.

**88. ATTIC INSULATION:** IRC R806, IECC/WSEC R303.1, R402.2.1 & Table R402.4.1.1. In accordance with Section R402.1.3 requires a R-60 in the ceiling or attic, installing R-49 over 100 percent of the ceiling area requiring insulation shall satisfy the requirement for R-60 wherever the full height of uncompressed R-49 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the insulation and fenestration criteria in Section R402.1.2 and the Total UA alternative in Section R402.1.5. R402.2.1.1 Loose insulation in attic spaces-Open-blown or poured loose fill insulation may be used in attic spaces where the slope of the ceiling is not more

than 3 feet in 12 and there is at least 30 inches of clear distance from the top of the bottom chord of the truss or ceiling joist to the underside of the sheathing at the roof ridge. The thickness of blown-in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches on markers that are installed at least one for every 300 square feet throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers a minimum of 1 inch in height. Each marker shall face the attic access opening. Spray polyurethane foam thickness and installed R-value shall be listed on certification provided by the insulation installer. Where eave or cornice vents are installed, blocking, bridging and insulation shall not block the free flow of air. Not less than a 1-inch space shall be provided between the insulation and the roof sheathing and at the location of the vent. Ventilators shall be installed in accordance with the manufacturer's instructions. Installation of ventilators in roof systems shall be in accordance with the requirements of Section R903. Installation of ventilators in wall systems shall be in accordance with the requirements of Section R703.1. Eave vents shall be provided with baffles to deflect incoming air above the surface of the insulation. The baffles shall be rigid material, resistant to wind driven moisture. The vertical joints shall be staggered when two or more layers of rigid board insulation are used. The minimum ventilation requirements in IRC Section R806.2. *See item #76.*

**89. VAULTED CEILING INSULATION:** WSEC R402.2, Tables R402.1.1 and R402.4.1.1. Vaulted ceiling insulation shall be installed where an enclosed joist or rafter space is formed by ceilings applied directly to the underside of roof joists or rafters. This requirement applies where both the distance between the top of the ceiling and the underside of the roof sheathing is less than 12-inches and there is a minimum 1-inch vented air space above the insulation. Where a single rafter or joist-vaulted ceiling is 13-inches or more the space shall be insulated as a ceiling, typically R-38. Unless approved for other than prescriptive approach the typical R-Value for non-trussed, vaulted ceiling insulation shall be R-38. Faced batts shall be face-stapled (*not inset-stapled*).

**90. ACCESS HATCHES AND DOORS:** WSEC R402.2.4 Access hatches and doors. Access hatches and doors from conditioned spaces to unconditioned spaces such as attics and crawl spaces shall be insulated to the same R-value required by table R402.1.3 for the wall or ceiling in which they are installed. Exception: Vertical doors providing access from conditioned spaces to unconditioned spaces that comply with the fenestration requirements of Table R402.1.3. R402.2.4.1 Access hatches and door insulation installation and retention. Vertical or horizontal access hatches and doors from conditioned spaces to unconditioned spaces such as attics and crawl spaces shall be weather-stripped. Access that prevents damaging or compressing the insulation shall be provided to all equipment. Where loose fill insulation is installed, a wood framed or equivalent baffle or retainer, or dam shall be installed to prevent the loose-fill insulation from spilling into the living spaces, from higher to lower sections of the attic and from attics covering conditioned spaces to unconditioned spaces. The baffle or retainer shall provide a permanent means

of maintaining the installed R-value of the loose fill insulation.

### **91. DUCT INSULATION/DUCT LEAKAGE:**

IECC/WSEC R403.3.1., R403.3.3. IRC chapter M16, & IMC Chapter 6. Supply and return ducts located outside conditioned space shall be insulated to an R-value of not less than R-8 for ducts 3 inches in diameter and larger and not less than R-6 for ducts smaller than 3 inches in diameter. Ducts buried beneath a building shall be insulated as required per this section or have an equivalent thermal distribution efficiency. Ducts within a concrete slab or in the ground shall be insulated to R-10 with insulation designed to be used below grade. Underground ducts utilizing the thermal distribution efficiency method shall be listed and labeled to indicate the R-value equivalency. **Ducts are located in conditioned space.** For ducts to be considered as being located inside a conditioned space, such ducts shall comply with one of the following: 1. All duct systems shall be located completely within the continuous air barrier and within the building thermal envelope. 2. All heating, cooling and ventilation system components shall be installed inside the conditioned space including, but not limited to, forced air ducts, hydronic piping, hydronic floor heating loops, convectors, and radiators. Combustion equipment shall be direct vent or sealed combustion. 3. For forced air ducts, a maximum of 10 linear feet of return ducts and 5 linear feet of supply ducts is permitted to be located outside the conditioned space, provided they are insulated to a minimum of R-8. 3.1. Metallic ducts located outside the conditioned space must have both transverse and longitudinal joints sealed with mastic. 3.2. If flex ducts are used, they cannot contain splices. Flex duct connections must be made with nylon straps and installed using a plastic strapping tensioning tool. 4. Ductwork in floor cavities located over unconditioned space shall comply with all of the following: 4.1. A continuous air barrier installed between unconditioned space and the duct. RE-32 2021 Washington State Energy Code 4.2. Insulation installed in accordance with Section R402.2.7. 4.3. A minimum R-19 insulation installed in the cavity width separating the duct from unconditioned space. 5. Ductwork located within exterior walls of the building thermal envelope shall comply with the following: 5.1. A continuous air barrier installed between unconditioned space and the duct. 5.2. Minimum R-10 insulation installed in the cavity width separating the duct from the outside sheathing. 5.3. The remainder of the cavity insulation shall be fully insulated to the drywall side. **Ducts buried within ceiling insulation.** Where supply and return air ducts are partially or completely buried in ceiling insulation, such ducts shall comply with all of the following: 1. The supply and return ducts shall have an insulation R-value not less than R-8. 2. At all points along each duct, the sum of the ceiling insulation R-value against and above the top of the duct, and against and below the bottom of the duct, shall be not less than R-19, excluding the R-value of the duct insulation. Exception: Sections of the supply duct that are less than 3 feet from the supply outlet shall not be required to comply with these requirements. **WSEC R403.3.5 Duct Tightness Testing:** Ducts shall be leak tested in accordance with WSU RS-33, using the maximum duct leakage rates specified. *Exception: A duct air leakage test shall not be required*

*for ducts serving ventilation systems that are not integrated with ducts serving heating or cooling systems. A written report of the results shall be signed by the party conducting the test and provided to the code official. R403.3.6. **Duct leakage:** The total leakage of the ducts, measured in accordance with Section R403.3.3, shall be as follows: 1. Rough-in test: Total leakage shall be less than or equal to 4.0 cfm per 100 square feet of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3.0 cfm per 100 square feet of conditioned floor area. 2021 Washington State Energy Code RE-33 \* 2. Postconstruction test: Leakage to outdoors shall be less than or equal to 4 cfm per 100 square feet of conditioned floor area or total leakage shall be less than or equal to 4 cfm per 100 square feet of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. 3. Test for ducts within thermal envelope: Where all ducts and air handlers are located entirely within the building thermal envelope, total leakage shall be less than or equal to 8.0 cubic feet per minute per 100 square feet of conditioned floor area. For forced air ducts, a maximum of 10 linear feet of return ducts and 5 linear feet of supply ducts may be located outside the conditioned space. All metallic ducts located outside the conditioned space must have both transverse and longitudinal joints sealed with mastic. If flex ducts are used, they cannot contain splices. Flex duct connections must be made with nylon straps and installed using a plastic strapping tensioning tool. Ducts located in crawl spaces do not qualify for this exception. **Duct leakage test results shall be posted on the permanent certificate posted in accordance with R401.3.***

### **92. PIPE INSULATION:** WSEC R403.4 & 403.5.3.

Mechanical system piping capable of carrying fluids above 105°F (41°C) or below 55°F (13°C) shall be insulated to a minimum of R-6. *Exception: Up to 200 feet of hydronic system piping installed within the conditioned space may be insulated with a minimum of 1/2-inch insulation with a k value of 0.28.* R403.4.1 Protection of piping insulation. Piping insulation, including termination ends, exposed to weather shall be protected from damage, including that caused by sunlight, moisture, physical damage, and wind, and shall provide shielding from solar radiation that can cause degradation of the material. Protection shall be removable for the exposed length or no less than six inches from the equipment for maintenance. Adhesive tape shall not be permitted. Insulation for service hot water pipe, both within and outside the conditioned space, shall have a minimum thermal resistance (R-value) of R-3. *Exception: Pipe insulation is permitted to be discontinuous where it passes through studs, joists or other structural members and where the insulated pipes pass other piping, conduit or vents, provided the insulation is installed tight to each obstruction.*

### **93. VAPOR RETARDER/MOISTURE CONTROL:** IRC

R702.7 & R702.7.1 Vapor retarder materials shall be classified in accordance with Table R702.7(1). A vapor retarder shall be provided on the interior side of frame walls of

the class indicated in Table R702.7(2), including compliance with Table R702.7(3) or R702.7(4) where applicable. An approved design using accepted engineering practice for hygrothermal analysis shall be permitted as an alternative. The climate zone shall be determined in accordance with Section N1101.7. *Exceptions: 1. Basement walls. 2. Below-grade portion of any wall. 3. Construction where accumulation, condensation or freezing of moisture will not damage the materials. 4. A vapor retarder shall not be required in Climate Zones 1, 2 and 3.*

R702.7.1 Spray foam plastic insulation for moisture control with **Class II and III vapor retarders**. For purposes of compliance with Tables R702.7(3) and R702.7(4), spray foam with a maximum permeance of 1.5 perms at the installed thickness applied to the interior side of wood structural panels, fiberboard, insulating sheathing or gypsum shall be deemed to meet the continuous insulation moisture control requirement in accordance with one of the following conditions:

1. The spray foam R-value is equal to or greater than the specified continuous insulation R-value.
2. The combined R-value of the spray foam and continuous insulation is equal to or greater than the specified continuous insulation R-value.

**Table R702.7(1)-Vapor Retarder Materials and Classes.**

CLASS	ACCEPTABLE MATERIALS
I	Sheet polyethylene, nonperforated aluminum foil or other approved materials with a perm rating less than or equal to 0.1.
II	Kraft-faced fiberglass batts, vapor retarder paint or other approved materials applied in accordance with the manufacturer's installation instructions for a perm rating greater than 0.1 and less than or equal to 1.0.
III	Latex paint, enamel paint or other approved materials applied in accordance with the manufacturer's installation instructions for a perm rating greater than 1.0 and less than or equal to 10.0.

**Table R702.7(2) Vapor Retarder Options:**

Marine 4, 5, 6, 7, 8	Permitted <sup>b</sup>	Permitted <sup>c</sup>	See Table R702.7(3)

- a. Class I and II vapor retarders with vapor permeance greater than 1 perm when measured by ASTM E96 water method (Procedure B) shall be allowed on the interior side of any frame wall in all climate zones.
- b. Use of a Class I interior vapor retarder in frame walls with a Class I vapor retarder on the exterior side shall require an approved design.
- c. Where a Class II vapor retarder is used in combination with foam plastic insulating sheathing installed as continuous insulation on the exterior side of frame walls, the continuous insulation shall comply with Table R702.7(4) and the Class II vapor retarder shall have a vapor permeance greater than 1 perm when measured by ASTM E96 water method (Procedure B).

**Table R702.7(3) Class III Vapor Retarder**

CLIMATE ZONE	CLASS III VAPOR RETARDERS PERMITTED FOR: <sup>a,b</sup>
Marine 4	Vented cladding over wood structural panels.
	Vented cladding over fiberboard.
	Vented cladding over gypsum.
	Continuous insulation with R-value ≥ 2.5 over 2 × 4 wall.
	Continuous insulation with R-value ≥ 3.75 over 2 × 6 wall.

- a. Vented cladding shall include vinyl, polypropylene, or horizontal aluminum siding, brick veneer with a clear airspace as specified in Table R703.8.4(1), and other approved vented claddings.
- b. The requirements in this table apply only to insulation used to control moisture in order to permit the use of Class III vapor retarders. The insulation materials used to satisfy this option also contribute to but do not supersede the thermal envelope requirements of Chapter 11.

**94. GROUND COVER IN CRAWL SPACE: IRC 406.3.2,**

A 6-mil-thick polyethylene film shall be applied over the below-grade portion of exterior foundation walls prior to backfilling. Joints in the polyethylene film shall be lapped 6 inches and sealed with adhesive. The top edge of the polyethylene film shall be bonded to the sheathing to form a seal. Film areas at grade level shall be protected from mechanical damage and exposure by a pressure-preservative

treated lumber or plywood strip attached to the wall several inches above finished grade level and extending approximately 9 inches below grade. The joint between the strip and the wall shall be caulked full length prior to fastening the strip to the wall. Where approved, other coverings appropriate to the architectural treatment shall be permitted to be used. The polyethylene film shall extend down to the bottom of the wood footing plate but shall not overlap or extend into the gravel or crushed stone footing.

**95. WINDOWS & EXTERIOR DOORS: R402.3,**

R402.1.1. U-Factors for glazing and doors (fenestration) shall be a **.30. This min U-factor for prescriptively approved structures U-.30.** Exception, WSEC approved alternation for other than prescriptive approach, must be approved by the Building Official and shown on the approved construction plans. Any changes in the windows or doors must be approved by the Building Department prior to installation. NFRC compliance stickers shall remain on the windows until the insulation inspection has been approved by the Building Department.

**96. AIR LEAKAGE INCLUDING RECESSED**

**LIGHTING FIXTURES: IECC/WSEC R401.3, R402.4.**

The building or dwelling unit shall be tested for air leakage. Testing shall be conducted in accordance with RESNET/ICC 380, ASTM E779, or ASTM E1827. Test pressure and leakage rate shall comply with Section R402.1.3. A written report of the test results, including verified location and time stamp of the date of the test, shall be signed by the testing agency, and provided to the building owner and code official. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope. Once visual inspection has confirmed air sealing has been conducted in accordance with Table R402.4.1.1, operable windows and doors manufactured by small business are permitted to be sealed off at the frame prior to the test. Testing of single-family dwellings and townhouses shall be conducted in accordance with RESNET/ICC 380. Test pressure and leakage rate shall comply with Section R402.1.3.1. For Group R-2 occupancies, testing shall be conducted in accordance with ASTM E779, ASTM E1827, or ASTM E3158. Test pressure and leakage rate shall comply with Section R402.1.3.2. The individual performing the air leakage test shall be trained and certified by an certification body that is, at the time of permit application, an ISO 17024 accredited certification body including, but not limited to, the Air Barrier Association of America. During testing: 1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures. 2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures. 3. Interior doors, if installed at the time of the test, shall be open, access hatches to conditioned crawl spaces and conditioned attics shall be open. 4. Exterior or interior terminations for continuous ventilation systems and heat recovery ventilators shall be sealed. 2021 Washington State Energy Code RE-27 5. Heating and cooling systems, if installed at the time of the test, shall be turned off. 6. Supply and return registers, if installed at the time of the

test, shall be fully open. *Exception: Additions less than 500 square feet of conditioned floor area.* The maximum air leakage rate for any dwelling unit under any compliance path shall not exceed 4.0 air changes per hour. Testing shall be conducted with a blower door test at a test pressure of 0.2 inches w.g. (50 Pa).

*Exception: Additions tested with the existing home having a combined maximum air leakage rate of 7 air changes per hour. To qualify for this exception, the date of construction of the existing dwelling must be prior to the 2009 Washington State Energy Code.*

**Air leakage of fenestration.** Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cfm per square foot and swinging doors no more than 0.5 cfm per square foot, when tested according to NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and listed and labeled by the manufacturer. *Exceptions: 1. Field-fabricated fenestration products (windows, skylights, and doors). 2. Custom exterior fenestration products manufactured by a small business provided they meet the applicable provisions of Chapter 24 of the International Building Code. Once visual inspection has confirmed the presence of a gasket, operable windows and doors manufactured by small business shall be permitted to be sealed off at the frame prior to the test.*

**Recessed lighting.** Recessed luminaires installed in the building thermal envelope shall be Type IC-rated and certified under ASTM E283 as having an air leakage rate not more than 2.0 cfm when tested at a 1.57 psf pressure differential and shall have a label attached showing compliance with this test method. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

**Electrical and communication outlet boxes (air-sealed boxes).** Electrical and communication outlet boxes installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces. Electrical and communication outlet boxes shall be tested in accordance with NEMA OS 4, Requirements for Air-Sealed Boxes for Electrical and Communication Applications and shall have an air leakage rate of not greater than 2.0 cubic feet per minute at a pressure differential of 1.57 psf. Electrical and communication outlet boxes shall be marked “NEMA OS 4” or “OS 4” in accordance with NEMA OS 4. Electrical and communication outlet boxes shall be installed per the manufacturer’s instructions and with any supplied components required to achieve compliance with NEMA OS 4.

**97. EXHAUST FANS;** R303.5, M1505.4.4.1: Bathrooms, toilet rooms, and kitchens shall include a local exhaust system. Such local exhaust systems shall have the capacity to exhaust the minimum airflow rate in accordance with Table M1505.4.4.1. Fans required by this section shall be provided with controls that enable manual override or automatic occupancy sensor, humidity sensor, timer controls, or pollutant sensor controls. An “on/off” switch shall meet this requirement for manual controls. Manual fan controls shall be readily accessible in the room served by the fan.

**MINIMUM SOURCE SPECIFIC VENTILATION CAPACITY REQUIREMENTS - TABLE M1505.4.4.1**

AREA TO BE EXHAUSTED	EXHAUST RATES	
	Intermittent	Continuous
Open kitchens	Hood Over Electric Range	Not Permitted
Enclosed kitchen <i>A kitchen whose permanent openings to interior adjacent spaces do not exceed a total of 60 square feet</i>	60% CE or 160 cfm  Hood Over Combustion Range	5 ACH based on kitchen volume
Bathrooms-toilet rooms	Mechanical exhaust capacity of  50 cfm <i>intermittent</i> or 20 cfm <i>continuous</i> .	

**NOTE:** All exhaust fans providing local exhaust shall have a minimum fan flow rating of not less than 50 cfm at .25 water gauge for bathrooms, laundries, or similar rooms and 100 cfm at .25 water gauge for kitchens. Ventilation ducts shall terminate outside the building. Ventilation ducts located in unconditioned spaces shall be insulated to a minimum of R-4.

**98. WHOLE HOUSE VENTILATION SYSTEM**

**Continuous or Intermittent:** IRC R303.4, M1505.4., WSEC 403.6.1. Each dwelling unit shall be equipped with a ventilation system. The whole-house mechanical ventilation systems shall be designed in accordance with Sections M1505.4.1 through M1505.4.4. The whole-house ventilation system shall consist of one or more supply fans, one or more exhaust fans, or an ERV/HRV with integral fans, associated ducts and controls. Whole-house mechanical ventilation system supply and exhaust fans shall meet the requirements of Sections M1505.4.1.2, M1505.4.1.3, M1505.4.1.4, and M1505.4.1.5. Local exhaust fans are permitted to serve as part of the whole-house ventilation system when provided with the proper controls in accordance with Section M1505.4.2. The systems shall be designed and installed to exhaust and/or supply the minimum outdoor airflow rates required by Section M1505.4.3 as modified by whole-house ventilation system coefficients in Section M1505.4.3.1 where applicable. The whole-house ventilation system shall operate continuously at the minimum ventilation rate required by Section M1505.4.2 unless configured with intermittent off controls in accordance with Section M1505.4.3.2. **Whole-house system component requirements.** Whole-house ventilation supply and exhaust fans specified in this section shall have a minimum efficacy as prescribed in the *Washington State Energy Code*. Design and installation of the system or equipment shall be carried out in accordance with manufacturers’ installation instructions. Whole-house ventilation fans shall be rated for sound at no less than the minimum airflow rate required by Section M1505.4.3.1. Ventilation fans shall be rated for sound at a maximum of 1.0 sone. This sound rating shall be at a minimum of 0.1 in. w.c. (25 Pa) static pressure in accordance with HVI procedures specified in Sections M1505.4.1.2 and M1505.4.1.3. **Exception:** HVAC air handlers, ERV/HRV units, and remote mounted fans need not meet the sound requirements. To be considered for this exception, a remote mounted fan must be mounted outside the habitable spaces, bathrooms, toilets, and hallways, and there must be at least 4 feet (1.3 m) of ductwork between the fan and the intake grille. The whole-house supply fan shall provide ducted outdoor ventilation air to each habitable space within the residential unit. **Exception:** Interior joining spaces provided with a 30-cfm whole-house transfer fan or a permanent opening with an area of not less than 8 percent of the floor area of

the interior adjoining space but not less than 25 square feet do not require ducted outdoor ventilation air to be supplied directly to the space. Whole-house transfer fans shall meet the sone rating of Section M1505.4.1.1 and shall have whole-house ventilation controls that comply with Section M1505.4.2.

**WSEC Section R403.6.1 Whole-house mechanical ventilation system fan efficacy.** Mechanical ventilation system fans shall meet the efficacy requirements of Table R403.6.1 at one or more rating points. Fans shall be tested in accordance with HVI 916 and listed. The airflow shall be reported in the product listing or on the label. Fan efficacy shall be reported in the product listing or shall be derived from the input power and airflow values reported in the product listing on the label. Fan efficacy for fully ducted HRV, ERV, balanced, and in-line fans shall be determined at a static pressure of not less than 0.2-inch w.c. (49.85 Pa). Fan efficacy for ducted range hoods, bathroom and utility room fans shall be determined at a static pressure of not less than 0.1-inch w.c. (24.91 Pa).

**TABLE R403.6.1  
WHOLE-DWELLING MECHANICAL VENTILATION  
SYSTEM FAN EFFICACY <sup>a</sup>**

SYSTEM TYPE	AIR FLOW RATE (CFM'S)	MINIMUM EFFICACY (CFM/WATT)
HRV, ERV or balanced	any	1.2 cfm/watt
Range Hoods	any	2.8 cfm/watt
In-line supply or exhaust fan	any	3.8 cfm/watt
Other exhaust fan	<90	2.8 cfm/watt
	≥90	3.5 cfm/watt

For SI: 1 cfm = 28.3 L/min.

a. Design outdoor or exhaust airflow rate/watts of fan used.

**99. DUCTS:** IRC M1601.1 & WSEC R403.3.1 Duct systems serving heating, cooling and ventilation equipment shall be installed in accordance with the provisions of R1601 and ACCA Manual D, the appliance manufacturer's installation instructions or other approved methods. Ducts located outside conditioned space Supply and return ducts located outside conditioned space shall be insulated to an R-value of not less than R-8 for ducts 3 inches in diameter and larger and not less than R-6 for ducts smaller than 3 inches in diameter. Ducts buried beneath a building shall be insulated as required per this section or have an equivalent thermal distribution efficiency. Ducts within a concrete slab or in the ground shall be insulated to R-10 with insulation designed to be used below grade. Underground ducts utilizing the thermal distribution efficiency method shall be listed and labeled to indicate the R-value equivalency.

Fan tested CFM @.25 WG	Flex Min. Diameter	Max. Length in Feet	Smooth wall Min. Diameter
50	3-inch	X	5
50	4-inch	56	114
50	5-inch	90	No Limit
50	6-inch	No Limit	No Limit
50	7-inch	No Limit	No Limit
50	8-inch & above	No Limit	No Limit
80	3-inch	X	X
80	4-inch	4	31
80	5-inch	81	152
80	6-inch	No Limit	No Limit
80	7-inch	No Limit	No Limit
80	8-inch & above	No Limit	No Limit
100	3-inch	X	X
100	4-inch	X	10
100	5-inch	42	91
100	6-inch	158	No Limit
100	7-inch	No Limit	No Limit
100	8-inch & above	No Limit	No Limit
125	3-inch	X	X
125	4-inch	X	X
125	5-inch	16	51
125	6-inch	91	168
125	7-inch	No Limit	No Limit
125	8-inch & above	No Limit	No Limit
150	3-inch	X	X
150	4-inch	X	X
150	5-inch	2	28
150	6-inch	55	112
150	7-inch	161	No Limit
150	8-inch & above	No Limit	No Limit
200	3-inch	X	X
200	4-inch	X	X
200	5-inch	X	4
200	6-inch	18	53
200	7-inch	78	148
200	8-inch & above	189	No Limit
250	3-inch	X	X
250	4-inch	X	X
250	5-inch	X	X
250	6-inch	1	25
250	7-inch	40	88
250	8-inch & above	111	198
300	3-inch	X	X
300	4-inch	X	X
300	5-inch	X	X
300	6-inch	X	9
300	7-inch	19	54
300	8-inch & above	69	133

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

TABLE M1505.4.4.2 PRESCRIPTIVE EXHAUST DUCT SIZING			
FAN TESTED CFM AT 0.25 INCHES W.G.	MINIMUM FLEX DIAMETER	MAXIMUM LENGTH IN FEET	MINIMUM SMOOTH DIAMETER
50	4 inches	25	4 inches
50	5 inches	90	5 inches
50	6 inches	No Limit	6 inches
80	4 inches <sup>b</sup>	NA	4 inches
80	5 inches	15	5 inches
80	6 inches	90	6 inches
100	5 inches <sup>b</sup>	NA	5 inches
100	6 inches	45	6 inches
125	6 inches	15	6 inches
125	7 inches	70	7 inches

1. a. For each additional elbow, subtract 10 feet from length.  
2. b. Flex ducts of this diameter are not permitted with fans of this size.

**R403.3.2 Ducts located in conditioned space.** For ducts to be considered as being located inside a conditioned space, such ducts shall comply with one of the following:

1. All duct systems shall be located completely within the continuous air barrier and within the building thermal envelope.
2. All heating, cooling and ventilation system components shall be installed inside the conditioned space including, but not limited to, forced air ducts, hydronic piping, hydronic floor heating loops, convectors and radiators. Combustion equipment shall be direct vent or sealed combustion.
3. For forced air ducts, a maximum of 10 linear feet of return ducts and 5 linear feet of supply ducts is permitted to be located outside the conditioned space, provided they are insulated to a minimum of R-8.
  - 3.1. Metallic ducts located outside the conditioned space must have both transverse and longitudinal joints sealed with mastic.
  - 3.2. If flex ducts are used, they cannot contain splices. Flex duct connections must be made with nylon straps and installed using a plastic strapping tensioning tool.
4. Ductwork in floor cavities located over unconditioned space shall comply with all of the following:
  - 4.1.A continuous air barrier installed between unconditioned space and the duct.
  - 4.2. Insulation installed in accordance with Section R402.2.7.
  - 4.3.A minimum R-19 insulation installed in the cavity width separating the duct from unconditioned space.
5. Ductwork located within exterior walls of the building thermal envelope shall comply with the following:
  - 5.1.A continuous air barrier installed between unconditioned space and the duct.
  - 5.2. Minimum R-10 insulation installed in the cavity width separating the duct from the outside sheathing.
  - 5.3. The remainder of the cavity insulation shall be fully insulated to the drywall side.

**R403.3.3 Ducts buried within ceiling insulation.** Where supply and return air ducts are partially or completely buried in ceiling insulation, such ducts shall comply with all of the following:

1. The supply and return ducts shall have an insulation R-value not less than R-8.
2. At all points along each duct, the sum of the ceiling insulation R-value against and above the top of the duct, and against and below the bottom of the duct, shall be not less than R-19, excluding the R-value of the duct insulation.

Exception: Sections of the supply duct that are less than 3 feet from the supply outlet shall not be required to comply with these requirements.

**R403.3.3.1 Effective R-value of deeply buried ducts.** Where using the Total Building Performance compliance option in Section R405, sections of ducts that are: installed in accordance with Section R403.3.3; located directly on, or within 5.5 inches of the ceiling; surrounded with blown-in attic insulation having an R-value of R-30 or greater and located such that the top of the duct is not less than 3.5 inches below the top of the insulation, shall be considered as having an effective duct insulation R-value of R-25.

**R403.3.4 Sealing.** Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the International Mechanical Code or International Residential Code, as applicable.

*Exceptions:*

1. *Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.*
2. *For ducts having a static pressure classification of less than 2 inches of water column (500 Pa), additional closure systems shall not be required for continuously welded joints and seams, and locking-type joints and seams of other than the snap-lock and button-lock types.*

**M1601.4.8 Duct separation.** Ducts shall not be less than 4 inches separation from earth except where they meet the requirements of Section M1601.1.2.

**R302.5 .2 Ducts in the garage.** Duct in the garage and ducts penetrating the walls or ceilings separating the dwelling from the garage shall be constructed of a minimum No. 26 gage sheet steel or other approved material and shall not have openings into the garage.

**R303.5 Opening location.** Outdoor intake and exhaust openings shall be located in accordance with Sections R303.5.1 and R303.5.2.

All Ventilation ducts shall terminate outside the building and be equipped with a back-draft damper.

**100.MECHANICAL VENTILATION SYSTEM:** IRC M1505. Each dwelling unit and guest room shall be provided with a whole house mechanical ventilation system designed in accordance with M1505.4 through M1505.4.4 or in accordance with specifications allowed in the IMC. The minimum whole-house ventilation rate from Section 1505.4.3 shall be adjusted by the system coefficient in Table M1505.4.3(2) based on the system type not meeting the definition of a balanced whole-house ventilation system and/or not meeting the definition of a distributed whole-house ventilation system.

TABLE M1505.4.3(2) SYSTEM COEFFICIENT (CSYSTEM)		
Balanced	1.0	1.25
Unbalanced	1.25	1.5

Run-time % in each 4-hour segment	50%	66%	75%	66%	100%
Factor	2	1.5	1.3	1.5	1.0



DWELLING UNIT FLOOR AREA (square feet)	Number of Bedrooms				
	0-1	2	3	4	5 or more
	Airflow in CFM				
< 500	30	30	35	45	50
501-1,000	30	35	40	50	55
1,001-1500	30	40	45	55	60
1,501- 2,000	35	45	50	60	65
2,001 - 2,500	40	50	55	65	70
2,501 - 3,000	45	55	60	70	75
3,001 – 3,500	50	60	65	75	80
3,501- 4,000	55	65	70	80	85
4,001- 4,500	60	70	75	85	90
4,501- 5,000	65	75	80	90	95

**R403.6.2 Testing.** Mechanical ventilation systems shall be tested and verified to provide the minimum ventilation flow rates required by Section R403.6. Testing shall be performed according to the ventilation equipment manufacturer's instructions, or by using a flow hood or box, flow grid, or other airflow measuring device at the mechanical ventilation fan's inlet terminals or grilles, outlet terminals or grilles, or in the connected ventilation ducts. Where required by the code official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. Exception: Kitchen range hoods that are ducted to the outside with 6-inch (152 mm) or larger duct and not more than one 90-degree (1.57 rad) elbow or equivalent in the duct run

**M1505.4.2 System controls.**

The whole-house mechanical ventilation system shall be provided with controls comply with the following:

- 1.The whole-house ventilation system shall be controlled with manual switches, timers or other means that provide for automatic operation of the ventilation system that are readily accessible by the occupant.
- 2.Whole-house mechanical ventilation system shall be provided with controls that enable manual override off of the system by the occupant during periods of poor outdoor air quality. Controls shall include permanent text or a symbol indicating their function. Recommended control permanent labeling to include text similar to the following: “Leave on unless outdoor air quality is very poor.” Manual controls shall be readily accessible by the occupant.
- 3.Whole-house ventilation systems shall be configured to operate continuously except where intermittent off controls and sizing are provided in accordance with Section M1505.4.3.2.

**101. WHOLE-HOUSE VENTILATION SYSTEM USING EXHAUST FANS:** IRC M1505.4.1.2 Exhaust fans.

Exhaust fans required shall be ducted directly to the outside. Exhaust air outlets shall be designed to limit the pressure difference to the outside and equipped with backdraft dampers or motorized dampers in accordance with the *Washington*

*State Energy Code.* Exhaust fans shall be tested and rated in accordance with the airflow and sound rating procedures of the Home Ventilating Institute (HVI 915, *HVI Loudness Testing and Rating Procedure*, HVI 916, *HVI Airflow Test Procedure*, and HVI 920, *HVI Product Performance Certification Procedure*, as applicable). Exhaust fans required in this section may be used to provide local ventilation. Bathroom exhaust fans that are designed for intermittent exhaust airflow rates higher than the continuous exhaust airflow rates in Table M1505.4.3.2 shall be provided with occupancy sensors or humidity sensors to automatically override the fan to the high speed airflow rate. The exhaust fans shall be tested and the testing results shall be submitted and posted in accordance with Section M1505.4.1.6. Air exhaust openings shall terminate as follows:

1. Not less than 3 feet from property lines.
2. Not less than 3 feet from gravity air intake openings, operable windows, and doors.
3. Not less than 10 feet from mechanical air intake openings except where either of the following apply:
  - 3.1. The exhaust opening is located not less than 3 feet above the air intake opening.
  - 3.2. The exhaust opening is part of a factory-built intake/exhaust combination termination fitting installed in accordance with the manufacturer’s instructions, and the exhaust air is drawn from a living space.
4. Openings shall comply with Sections R303.5.2 and R303.6.

All exhaust ducts shall terminate outside the building. Terminal elements shall have at least the equivalent net free area of the duct work. Air exhaust and intake openings that terminate outdoors shall be protected with corrosion-resistant screens, louvers or grilles having an opening size of not less than 1/4 inch and a maximum opening size of 1/2 inch, in any dimension. Openings shall be protected against local weather conditions. Outdoor air exhaust and intake openings shall meet the provisions for exterior wall opening protectives in accordance with the code.

**M1505.4.1.7 Duct Test Certificate.** A permanent certificate shall be completed by the mechanical contractor, test and balance contractor or other approved party and posted on a wall in the space where the furnace is located, a utility room, or an approved location inside the building. When located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label, or other required labels. The certificate shall list the flow rate determined from the delivered airflow of the whole-house mechanical *ventilation* system as installed and the type of mechanical *whole-house ventilation system* used to comply with Section M1505.4.3.1. See Item 109

**102. INTERMITTENT WHOLE HOUSE VENTILATION INTEGRATED WITH A FORCED-AIR SYSTEM. (Make-up air through the furnace):**

M1505.4.1.5 Furnace integrated supply. Systems using space heating and/or cooling air handler fans for outdoor air supply distribution are not permitted. *Exception: Air handler fans shall have multi-speed or variable speed supply airflow control capability with a low-speed operation not greater than 25 percent of the rated supply airflow capacity during ventilation only operation. Outdoor*

air intake openings must meet the provisions of Sections R303.5 and R303.6 and must include a motorized damper that is activated by the whole-house ventilation system controller. The motorized damper must be controlled to maintain the outdoor airflow intake airflow within 10 percent of the whole-house mechanical exhaust airflow rate. The flow rate for the outdoor air intake must be tested and verified at the minimum ventilation fan speed and the maximum heating or cooling fan speed. The results of the test shall be submitted and posted in accordance with Section M1505.4.1.7.

### **103. INTERMITTENT WHOLE HOUSE VENTILATION USING A SUPPLY FAN.**

M1505.4.1.3 Supply fans. Supply fans used in meeting the requirements of this section shall supply outdoor air from intake openings in accordance with *International Mechanical Code* Sections 401.4 and 401.5. When designed for intermittent off operation, supply systems shall be equipped with motorized dampers in accordance with the *Washington State Energy Code*. Supply fans shall be tested and rated in accordance with the airflow and sound rating procedures of the Home Ventilating Institute (HVI 915, *HVI Loudness Testing and Rating Procedure*, HVI 916, *HVI Airflow Test Procedure*, and HVI 920, *HVI Product Performance Certification Procedure*, as applicable). Where outdoor air is provided by supply fan systems the outdoor air shall be filtered. The filter shall be accessible for regular maintenance and replacement. The filter shall have a Minimum Efficiency Rating Value (MERV) of at least 8.

### **104. WHOLE HOUSE VENTILATION USING HEAT RECOVERY VENTILATION:**

Heat Recovery ventilation systems shall be sized and installed in accordance with manufacturer's instructions and in accordance to WAC 403.4.6. The minimum flow rating shall not be less than that specified by the code.

### **105. LIGHTING:** IECC/WSEC R404.

**R404.1 Lighting equipment.** All permanently installed lighting fixtures, excluding kitchen appliance lighting fixtures, shall contain only high-efficacy lighting sources.

**R404.1.1 Exterior lighting.** Connected exterior lighting for residential buildings shall comply with Section C405.5. Exceptions: Solar-powered lamps not connected to any electrical service.

**R404.1.2 Fuel gas lighting equipment.** Fuel gas lighting systems shall not have continuously burning pilot lights.

**R404.2 Interior lighting controls.** Permanently installed interior lighting fixtures shall be controlled with either a dimmer, an occupant sensor control or other control that is installed or built into the fixture. *Exception: Lighting controls shall not be required for the following: 1. Bathrooms. 2. Hallways. 3. Lighting designed for safety or security.*

**R404.3 Exterior lighting controls.** Where the total permanently installed exterior lighting power is greater than 30 watts, the permanently installed exterior lighting shall comply with the following: 1. Lighting shall be controlled by a manual on and off switch which permits automatic shut-off actions. *Exception: Lighting serving multiple dwelling units.* 2. Lighting shall be automatically shut off when daylight is present and satisfies the lighting needs. 3. Controls that override automatic shut-off actions shall not be allowed unless

the override automatically returns automatic control to its normal operation within 24 hours

**106. AIR LEAKAGE TESTING.** WSEC R402.4.1.2 The building or dwelling unit shall be tested for air leakage. Testing shall be conducted in accordance with RESNET/ICC 380, ASTM E779, or ASTM E1827. Test pressure and leakage rate shall comply with Section R402.1.3. A written report of the test results, including verified location and time stamp of the date of the test, shall be signed by the testing agency and provided to the building owner and code official. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope. Once visual inspection has confirmed air sealing has been conducted in accordance with Table R402.4.1.1, operable windows and doors manufactured by small business are permitted to be sealed off at the frame prior to the test. Testing of single-family dwellings and townhouses shall be conducted in accordance with RESNET/ICC 380. Test pressure and leakage rate shall comply with Section R402.1.3.1.

**107. CERTIFICATE.** WSEC R401.3 A permanent certificate shall be completed by the builder or other approved party and posted on a wall in the space where the furnace is located, a utility room, or an approved location inside the building. When located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label, or other required labels. The certificate shall indicate the following:

1. The predominant R-values of insulation installed in or on ceiling/roof, walls, foundation (slab, below grade wall, and/or floor) and ducts outside conditioned spaces.
2. U-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration. Where there is more than one value for each component, the certificate shall indicate the area weighted average value.
3. The results from any required duct system and building envelope air leakage testing done on the building.
4. The results from the whole-house mechanical ventilation system flow rate test.
5. The types, sizes and efficiencies of heating, cooling, whole-house mechanical ventilation, and service water heating appliances. Where a gas-fired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. Efficiency shall not be listed for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters.
6. Where on-site photovoltaic panel systems have been installed, the array capacity, inverter efficiency, panel tilt, orientation and estimated annual electrical generation shall be noted on the certificate.
7. The code edition under which the structure was permitted, and the compliance path used.

The code official may require that documentation for any required test results include an electronic record of the time, date and location of the test. A date-stamped smart phone photo or air leakage testing software may be used to satisfy this requirement.

**108. FIRE ACCESS:** Mason County Code Chapter 14.17  
*Standards for Fire Apparatus Access Roads.*

All roads, driveways, or other means of access serving structures, facilities, buildings, or portions of buildings hereafter constructed, altered, moved into or within the jurisdiction and developed under permit from Mason County shall meet the requirements of this chapter. Inability to meet these requirements may result in additional fire prevention measures (I. E. fire sprinklers) being required.

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2021 CODE RESOURCES

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International Residential Code



Washington State Energy Code



International Mechanical Code



