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2024 SMC Proposed Seattle and Washington State Changes

Chapter 1 Administration

115.4 Failure to comply: Not Adopting State Change. Keeping code official because Seattle's Chapter 1 is structured differently than the generic ICC chapter.

110.7 Civil Penalties, 110.10 Alternative criminal penalty, 110.11 Additional relief—Not adopting state changes.

Chapter 2 Definitions

[W]~~**(BALANCED VENTILATION SYSTEM.**~~ A ventilation system that simultaneously supplies outdoor air to and exhausts air from a space, where the mechanical supply airflow rate and the mechanical exhaust airflow rate are each within 10 percent of the average of the two airflow rates.)~~)~~ Not adopted.

[W] DISTRIBUTED WHOLE HOUSE VENTILATION SYSTEM. A whole house ventilation system shall be considered distributed when it supplies outdoor air directly (not transfer air) to each dwelling or sleeping unit *habitable space* other than adjoining spaces used for eating or cooking, and where it supplies *outdoor air* directly, or indirectly through an unobstructed fixed opening sized in accordance with Section 402.3, to adjoining spaces used for eating or cooking.

[W] EFFECTIVE DISPERSAL VOLUME. The volume of a space or connected spaces in which leaked refrigerant will disperse.

[W] EFFECTIVE DISPERSAL VOLUME CHARGE (EDVC). The maximum refrigerant charge permitted for an effective dispersal volume.

[W] MACHINERY ROOM. ~~((An enclosed space that is required by Chapter 11 to contain refrigeration equipment and to comply with Sections 1105 and 1106.))~~ A designated space meeting the requirements of 1105 and 1106 that contains one or more refrigerating systems or portions thereof.

[W] NOT DISTRIBUTED WHOLE HOUSE VENTILATION SYSTEM. A whole house ventilation system shall be not be considered a whole house distributed ventilation system when either the supply system or the exhaust system is not distributed. Supply systems are not distributed when a *habitable space* is supplied with outdoor air to ventilate an *interior adjacent room* or an interior adjoining space. Exhaust systems are not distributed when all bathrooms and kitchens are not exhausted by the whole house ventilation system. If either the supply system or the exhaust system is not distributed, then the ventilation quality adjustment system coefficient adjustment is required in accordance with Section C403.4.3.

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

[W] INTERIOR ADJACENT ROOM. An enclosed room, *qualifying as habitable space*, without exterior windows or openings to the outdoors located within a dwelling or sleeping unit that does not have interior unobstructed openings required for an *interior adjoining space*.

[W] INTERIOR ADJOINING SPACE. A *habitable space* without openings to the outdoors that is naturally ventilated from another *habitable space* by unobstructed fixed openings size in accordance with Section 402.3.

Chapter 3 General Regulations

306.5 Equipment and appliances on roofs or elevated structures. Adopting 2024 IMC base code language (matches 2024 WSMC amendment)

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Chapter 4 Ventilation

401.4 [W][S] Intake opening location. Air intake openings shall comply with all of the following:

1. Intake openings shall be located not less than 10 feet (3048 mm) from lot lines or buildings on the same lot.
2. Mechanical and gravity outdoor air intake openings shall be located not less than 10 feet (3048 mm) horizontally from any hazardous or noxious contaminant source, such as vents, streets, alleys, parking lots and loading docks, except as specified in Item 3 or Section 501.3.1. Outdoor air intake openings shall be permitted to be located less than 10 feet (3048 mm) horizontally from streets, alleys, parking garage entries, parking lots and loading docks provided that the openings are located not less than 25 feet (7620 mm) vertically above such locations. Where openings front on a street or public way, the distance shall be measured from the closest edge of the street or public way.

Exceptions:

1. Intake air openings providing less than 500 cfm of outdoor air to Group R occupancies are permitted to be located less than 10 feet (3048 mm) horizontally from parking lots provided that the openings are not less than 15 feet (4572 mm) vertically above the parking lot.
2. Intake air openings providing less than 500 cfm of outdoor air to Group R occupancies are permitted to be located less than 10 feet (3048 mm) horizontally from parking lots provided that the openings are not less than 15 feet (4572 mm) vertically above the clear height for vehicles in the parking garage.
3. Enclosed parking garage and repair garage intakes are permitted to be located less than 10 feet horizontally of the street, alley, parking lots and loading docks.
3. Intake openings shall be located not less than 3 feet (914 mm) below contaminant sources where such sources are located within 10 feet (3048 mm) of the opening. Separation is not required between intake air openings and (~~((living space exhaust))~~) environmental air other than domestic (~~((kitchen))~~) cooking exhaust openings of an individual *dwelling unit* or *sleeping unit* where a factory-built intake/exhaust combination termination fitting is used to separate the air streams in accordance with the (~~((fan))~~) appliance manufacturer's instructions. For these combined terminations, the exhaust air concentration within the intake airflow shall not exceed 10 percent as established by the manufacturer, in accordance with ASHRAE 62.2 Section 6.6, Exception 4.

Exceptions:

1. A minimum of three feet (914 mm) separation shall be maintained between other environmental air exhaust outlets and other dwelling or sleeping unit factory-built intake/exhaust combination termination fittings.
2. No separation is required between an energy recovery ventilation unit that provides exclusively whole house ventilation and serves only one dwelling unit or sleeping unit, and an operable opening of that same dwelling unit or sleeping unit.
4. Intake openings on structures in flood hazard areas shall be at or above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment.

[S] 5. Intake openings shall not be located:

- 5.1 In a crawl space;
- 5.2 Less than one foot (305 mm) above a roof, adjacent grade, or other surface directly below the intake; or
- 5.3 Under a deck having a surface height less than three feet above grade or other surface directly below the intake.

[S] 401.4.1 Separation of air intake openings. Air intake openings, as defined in Section 401.4, shall open to the outdoors and shall be located no closer to exhaust air outlets, property line, vents, streets, alleys, parking lots, and other building elements than the minimum separation distance specified in Section 401.4. The distance is defined as the shortest "stretched string" distance measured from the closest point of the air intake opening to the closest point of the exhaust air outlet opening, vent, property line, street, alley, parking lot, or other building element along a trajectory as if a string were stretched between them.

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Air intake openings are permitted to be located within a building opening as defined by Section 705.9 of the International Building Code. Where the air intake opening is located within a building opening the separation distance for the air intake opening shall be measured from the vertical plane at the edge of the horizontal projection of the roof or floor.

Note: Refer to Seattle Building Code Section 705.9 and Figures I705.9a and I705.9b for an illustrated example of a building opening in an exterior wall. Refer to ASHRAE 62.1 Normative Appendix B for further information on measuring the stretched string distance for the separation of exhaust air outlets and outdoor air intakes.

[W]403.3 Outdoor air and local exhaust airflow rates. Group R((-2, R-3 and R-4)) *occupancies* ((three stories and less in height above grade plane)) shall be provided with outdoor air and local exhaust in accordance with Section ((403.3.2))403.4. All ((Ø))other buildings intended to be occupied shall be provided with outdoor air and local exhaust in accordance with Section 403.3.1.

[W] Table 403.3.1.1 Minimum Ventilation Rates, footnote b.

- b. Mechanical exhaust required and the recirculation of air from such spaces is prohibited. ((Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1, Item 3)))

[W]403.3.1.3 System operation. The minimum flow rate of outdoor air that the ventilation system must be capable of supplying during its operation shall be permitted to be based on the rate per person indicated in Table 403.3.1.1 and the actual number of occupants present. Where demand-controlled ventilation is employed to adjust the outdoor airflow rate based on the actual number of occupants present, the minimum quantity of outdoor air shall not fall below that determined from the area outdoor airflow rate column of Table 403.3.1.1 during periods when the *building* is expected to be occupied. For zones in the occupied standby mode, breathing zone outdoor airflow shall be permitted to be reduced to zero for the occupancy categories indicated "OS" in Table 6-1 of ASHRAE 62.1, provided that airflow is restored to V_{bz} whenever occupancy is detected.

W]403.3.2 Group R-2, R-3 and R-4 occupancies. ((The design of local exhaust systems and ventilation systems for outdoor air in Group R-2, R-3 and R-4 occupancies shall comply with Sections 403.3.2.1 through 403.3.2.5)). This section is not adopted. See Section 403.4.

~~((403.3.2.1 Outdoor air for dwelling units. An outdoor air ventilation system consisting of a mechanical exhaust system, supply system or combination thereof shall be installed for each dwelling unit. Local exhaust or supply systems, including outdoor air ducts connected to the return side of an air handler, are permitted to serve as such a system. The outdoor air ventilation system shall be designed to provide the required rate of outdoor air continuously during the period that the building is occupied. The minimum continuous outdoor airflow rate shall be determined in accordance with Equation 4-9.~~

~~**Equation 4-9** $QOA = 0.03A_{floor} + 7.5N_{br} + 1$~~

~~where:~~

~~QOA = outdoor airflow rate, cfm~~

~~A_{floor} = conditioned floor area, ft²~~

~~N_{br} = number of bedrooms; not to be less than one~~

~~**Exceptions:**~~

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1. The outdoor air ventilation system is not required to operate continuously where the system has controls that enable operation for not less than 1 hour of each 4-hour period. The average outdoor airflow rate over the 4-hour period shall be not less than that prescribed by Equation 4-9.

2. The minimum mechanical ventilation rate determined in accordance with Equation 4-9 shall be reduced by 30 percent provided that both of the following conditions apply:

2.1. A ducted system supplies *ventilation air* directly to each bedroom and to one or more of the following rooms:

2.1.1. Living room.

2.1.2. Dining room.

2.1.3. Kitchen.

2.2. The whole-house ventilation system is a *balanced ventilation system*.) This section is not adopted.

~~((403.3.2.2 Outdoor air for other spaces. Corridors and other common areas within the conditioned space shall be provided with outdoor air at a rate of not less than 0.06 cfm per square foot [0.0003 m³/(s × m²)] of floor area.))~~ This section is not adopted.

~~((403.3.2.3 Local exhaust. Local exhaust systems shall be provided in kitchens, bathrooms and toilet rooms and shall have the capacity to exhaust the minimum airflow rate determined in accordance with Table 403.3.2.3.))~~ This section is not adopted.

~~((TABLE 403.3.2.3 MINIMUM REQUIRED LOCAL EXHAUST RATES FOR GROUP R-2, R-3 AND R-4 OCCUPANCIES THREE STORIES AND LESS))~~ Not adopted.

~~403.3.2.4 System controls. Where provided within a dwelling unit, controls for outdoor air ventilation systems shall include text or a symbol indicating the system's function.))~~ TABLE 403.3.2.3 is not adopted.

~~[W]((403.3.2.5 Ventilating equipment. Fans providing exhaust or outdoor air shall be listed and labeled to provide the minimum required air flow in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.))~~ This section is not adopted.

[W] 403.4 Group R whole house mechanical ventilation system. Each dwelling unit or sleeping unit shall be equipped with a whole house mechanical ventilation system that complies with Sections 403.4.1 through 403.4.6.

Each dwelling unit or sleeping unit shall be equipped with local exhaust complying with Section 403.4.7. All occupied spaces, including public corridors, other than the Group R dwelling units and/or sleeping units, that support these Group R occupancies shall meet the ventilation requirement of natural ventilation requirements of Section 402 or the mechanical ventilation requirements of Sections 403.1 through 403.3.

Exception: Alternate *balanced whole house ventilation* systems and local exhaust systems subject to the Washington State Energy Code, Residential Building Provisions serving Group R dwelling units designed and commissioned in accordance with ASHRAE Standard 62.2 are permitted.

[W] 403.4.1 System design. The whole house ventilation system shall consist of one or more supply fans, and one or more exhaust fans, or an ERV/HRV with fans providing both supply and exhaust; and the associated ducts and controls. Local exhaust fans shall be permitted to serve as part of the whole house ventilation system when provided with the proper controls in accordance with Section 403.4.5. The systems shall be designed and installed to supply and exhaust the minimum outdoor airflow rates in accordance with Section 403.4.2 as corrected by the balanced and/or distributed whole house ventilation system coefficients in accordance with Section 403.4.3 where applicable.

[W][S] 403.4.4.1 Whole house ventilation in Group R-2 occupancies. Residential dwelling and sleeping units in Group R-2 occupancies shall have a distributed whole-house ventilation system that is also a balanced whole house ventilation system in accordance with Section 403.4.6.3. The

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system shall include a heat or energy recovery ventilator with a sensible heat recovery effectiveness as prescribed in Section C403.3.6 or when selected as an option of R406 of the *Seattle Energy Code*. The system shall operate continuously at not less than the minimum ventilation rate determined in accordance with Section 403.4, unless configured with intermittent off controls in accordance with Section 403.4.6.5 and to one or more of the following rooms: Living room, dining room, or kitchen.

Exception:

1. Interior adjoining spaces used for living or sleeping that are ventilated from another habitable space are not required to have outdoor air ducted directly to the interior adjoining space. For this case, the systems shall not be considered a distributed whole-house ventilation system(s) and shall use the "not distributed" quality adjustment system coefficient in accordance with Section 403.4.3.
2. Interior adjacent rooms that are ventilated from another habitable space are not required to have outdoor air ducted directly to the interior adjacent room. For this case, ((These)) the system shall not be considered a distributed whole-house ventilation systems and shall use the "not distributed" quality adjustment system coefficient in accordance with Section 403.4.3. The interior adjacent room shall be provided with a transfer fan with a minimum airflow rate of 30 cfm or with relief air inlet with a minimum airflow of 20 cfm that is connected to the exhaust relief air inlet of an ERV/HRV whole-house ventilation system. Transfer fans that ventilate interior adjacent rooms shall meet the same rating in Section 403.4.6 and shall have whole-house ventilation controls in accordance with Section 403.4.5

[W]403.4.4.2 Whole house ventilation for other than Group R-2 occupancies. Residential dwelling and sleeping units in other than Group R-2 occupancies, including I-1 condition 2 occupancies, shall have a distributed whole house mechanical ventilation system with supply and exhaust fans in accordance with Section 403.4.6.1, 403.4.6.2, 403.4.6.3, or 403.4.6.4. The system shall operate continuously at not less than the minimum ventilation rate determined in accordance with Section 403.4.2 unless configured with intermittent off controls in accordance with Section 403.4.6.5.

Exceptions:

1. Interior adjoining spaces used for living or sleeping that are ventilated from another habitable space are not required to have outdoor air ducted directly to the interior adjoining space. For in this case, the system shall not be considered a distributed whole house ventilation system and shall use the "not distributed" quality adjustment system coefficient in accordance with Section 403.4.3.
2. Interior adjacent rooms that are ventilated from another habitable space are not required to have outdoor air ducted directly to the interior adjoining room. For this case, the system shall not be considered a distributed whole house ventilation systems and shall use the "not distributed" quality adjustment system coefficient in accordance with Section 403.4.3. The interior adjacent room shall be provided with a transfer fan with a minimum airflow rate of 30 cfm or with relief air inlet with a minimum airflow of 20 cfm that is connected to the exhaust/relief air inlet of an ERV/HRV whole house ventilation system. Transfer fans that ventilate interior adjacent rooms shall meet the same rating in Section 403.4.6 and shall have whole house ventilation controls in accordance with Section 403.4.5.

[W] 403.4.6.1 Exhaust fans. Exhaust fans required shall be ducted directly to the outside in accordance with Section 501.3. Exhaust air outlets shall be designed to limit the pressure difference to the outside to limiting the outlet free area maximum velocity to 500 feet per minute and equipped with backdraft dampers or motorized dampers in accordance with *Washington State Energy Code*. Exhaust fans shall be HVI-approved laboratory tested and rated in accordance with HVI 915, HVI 916, and HVI 920. Exhaust fans required in this section may be used to provide local ventilation. Exhaust fans serving spaces other than kitchens that are designed for intermittent exhaust airflow rates in Table 403.4.7 shall be provided with occupancy sensors or humidity sensors, timer controls, or

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pollutant sensor controls to automatically override the fan to the high speed airflow rate. The exhaust fans shall be field tested and verified the testing results shall be submitted and posted in accordance with Section 403.4.6.7.

Exceptions:

1. Central exhaust fans serving multiple residential units do not need to comply with the HVI laboratory testing requirements.
2. Inlet free area maximum velocity may exceed 500 feet per minute when a factory-built combined exhaust/intake termination fitting is used.
3. Ventilation exhaust fans integral to a unitary heat pump appliance do not need to comply with the HVI testing requirements.

[W]403.4.6.2 Supply fans. Supply fans used in meeting the requirements of this section shall supply outdoor air from intake openings in accordance with Sections 401.4 and 401.5. Intake air openings shall be designed to limit the pressure difference to the outside to limiting the inlet free area maximum velocity to 500 feet per minute and when designed for intermittent off operation shall be equipped with motorized dampers in accordance with the Washington State Energy Code. Supply fans shall be HVI-approved laboratory tested and rated in accordance with HVI 915, HVI 916, and HVI 920. Where outdoor air is provided to each habitable dwelling unit or sleeping unit by supply fan systems the outdoor air shall be filtered. The filter shall be provided with access for regular maintenance and replacement. The filter shall have a Minimum Efficiency Rating Value (MERV) of at least 8.

Exceptions:

1. Central supply fans serving multiple residential units do not need to comply with the HVI laboratory testing requirements.
2. Ventilation supply fans integral to a unitary heat pump appliance do not need to comply with the HVI testing requirements.

[W]403.4.6.3 Balanced whole house ventilation system. A balanced whole house ventilation system shall include both supply and exhaust fans. The supply and exhaust fans shall have airflow that is within 10 percent of each other. The field tested and balanced total mechanical exhaust airflow rate is within 10 percent or 5 cfm, whichever is greater, of the total mechanical supply airflow rate. The air flow rate test results shall be submitted and posted in accordance with Section 403.4.6.6. The exhaust fan shall meet the requirements of Section 403.4.6.1. The supply fan shall meet the requirements of Section 403.4.6.2. For R-2 dwelling and sleeping units, the system is required to have balanced whole house ventilation but is not required to have distributed whole house ventilation where the not distributed system coefficient from Table 403.4.2 is utilized to correct the whole house mechanical ventilation rate. The system shall be designed and balanced to meet the pressure equalization requirements of Section 501.4. Local exhaust systems that are not a component of the whole-house mechanical ventilation system are exempt from the balanced airflow calculation.

[W]403.4.6.4 Furnace integrated supply. Systems using space condition heating and/or cooling air handler fans for outdoor air supply air distribution are not permitted.

Exception: Air handler fans shall be permitted that have multi-speed or variable speed supply airflow control capability with a low speed operation not greater than 25 percent of the rated supply air flow capacity during ventilation only operation. Outdoor air intake openings must meet the provisions of Sections 401.4 and 401.5 and must include a motorized damper that is activated by the whole house ventilation system controller. Intake air openings shall be designed to limit the pressure difference to the outside to limiting the inlet free area maximum velocity to 500 feet per minute. 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 supply air handler shall provide supply air to each habitable space in the residential unit. The whole house ventilation system shall include exhaust fans in accordance with Section 403.4.6.1 to meet the pressure equalization requirements of Section 501.4. The air flow rate for the outdoor air intake must

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be field 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 403.4.6.7.

[W]403.4.6.5 Intermittent off operation. Whole house mechanical ventilation systems shall be provided with advanced controls that are configured to operate the system with intermittent off operation and shall operate for a least two hours in each four-hour segment. The whole house ventilation airflow rate determined in accordance with Section 403.4.2 as corrected by Section 403.4.3 shall be multiplied by the factor determined in accordance with Table 403.4.6.5.

[W]403.4.6.6 Testing Whole house mechanical ventilation systems shall be tested, balanced and field verified to provide an airflow rate not less than the minimum required by Sections 403.4.2 and 403.4.3. Testing shall be performed according to the ventilation equipment manufacturer's instructions, or by using a flow hood, flow grid, or other airflow measuring device at the mechanical ventilation fan's inlet terminals, outlet terminals or grilles or in the connected ventilation ducts. Where required by the building 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 building official and shall be posted in the residential unit in accordance with Section 403.4.6.7.

TABLE 403.4.7
Minimum Exhaust Rates

Area to be exhausted	Intermittent Exhaust Rate	Continuous Exhaust Rate
Open kitchens	In accordance with Section 403.4.7.3	Not permitted
Enclosed kitchens	In accordance with Section 403.7.3	5ACH based on kitchen volume
Bathrooms-Toilet rooms	50 cfm	25 cfm

[W][S] 403.4.7.2 Local exhaust fans. Exhaust fans and systems shall meet the following criteria:

1. Exhaust fans shall be HVI-approved laboratory tested and rated in accordance with HVI 915, HVI 916, and HVI 920 or equivalent.
2. The system shall be designed and installed in accordance with manufacturers' instructions to deliver at least the exhaust airflow required by Table 403.4.7. The airflows required refer to the delivered airflow of the system as installed and field verified in accordance with Section 403.4.7.2.1.

Exception: Where a range hood or down draft exhaust fan is used to satisfy the local ventilation requirements for kitchens, the range hood or down draft exhaust shall not be less than 100 cfm at 0.10 in. w.g.

3. Intermittent local exhaust fans serving kitchens shall be rated for sound at a maximum of 3 sones at one or more airflow settings not less than 100 cfm at a static pressure not less than that determined at working speed as specified in HVI 916 Section 7.2.
4. Continuous local exhaust fans serving kitchens shall be rated for sound at a maximum of 1 sone at one or more airflow settings not less than 100 cfm at a static pressure not less than that determined at working speed as specified in HVI 916 Section 7.2.

Exception: Remote mounted fans need not meet sound requirements. To be considered for this exception, a remote mounted fan shall be mounted outside the kitchen, and there shall be at least 4 feet (1 m) of ductwork between the fan and the intake grille.

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[W]403.4.7.2.1 Duct length. The length of local exhaust ducts shall comply with not less than one of the following.

1. Duct length shall not be limited where the airflow rate of the installed ventilating equipment is field verified by the installer or approved third party to be not less than that required by Table 403.4.7. Field verification shall be performed using an integrated diagnostic tool, flow hood, flow grid, or other airflow measuring device.

2. Duct length shall not exceed 25 feet, provided that the following conditions are met:

2.1 There are no more than three elbows.

2.2 The rated airflow used to comply with Table 403.4.7 is determined at not less than 0.25 in. w.c.

2.3 The equivalent diameter of the duct is not less than that determined using Table 403.4.7.2 at the rated airflow used to comply with Table 403.4.7.

2.4 Where flex duct is used, it shall be fully extended. and any flex duct bends shall have a bend radius to duct diameter ratio of not less than 1.0.

3. Where a kitchen range hood's rated nominal installed airflow, determined in accordance with HVI 920, is used to comply with Table 403.4.7.3, a duct length of 10 feet shall be permitted, provided that there are not more than two elbows and that the equivalent diameter of the duct is not less than the equivalent diameter of the rating.

[W]TABLE 403.4.7.2

PRESCRIPTIVE EXHAUST DUCT SIZING

Fan Airflow Rating, CFM, at static pressure $\geq$ 0.25 in. w.c.	≤ 50	≤ 80	≤ 100	≤ 125	≤ 150	≤ 175	≤ 200	≤ 250	≤ 350	≤ 400	≤ 450	≤ 700	≤ 800
Duct Type													
Rigid duct	4 ^d	5	5	6	6	7	7	8	9	10	10	12	12
Flex duct	4	5	6	6	7	7	8	8	9	10	NP	NP	NP

Minimum Equivalent Diameter, in. ^{a,b,c,e,f,g}

$$D_e = \sqrt{4(ab)/\pi}$$

a. For circular ducts, the equivalent diameter, D_e , is equal to the duct diameter. For rectangular ducts with cross-sectional dimensions a and b, $D_e = \sqrt{4(ab)/\pi}$.

b. NP = application of the prescriptive table is not permitted for this scenario.

c. For this scenario, use of elbows is not permitted.

d. For this scenario, 4 in. oval duct shall be permitted, provided the minor axis of the oval is not less than 3 in. (75 mm).

e. 3.25" x 10" rectangular duct shall be permitted as a substitute for circular duct diameters up to 6".

f. 3.25" x 14" rectangular duct shall be permitted as a substitute for circular duct diameters up to 7".

g. 4.5" x 18" rectangular duct shall be permitted as a substitute for circular duct diameters up to 10".

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[W] 403.4.7.3 Local intermittent kitchen exhaust system. Local intermittent kitchen range hoods for domestic cooking appliances shall meet or exceed either the minimum airflow or the minimum capture efficiency in accordance with Table 403.4.7.3. 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.

[W] TABLE 403.4.7.3 Kitchen Range Hood Airflow Rates (CFM) and ASTM E3087 Capture Efficiency (CE) Ratings

[W]According to Kitchen Range Fuel Type

Hood Over Electric Range	Hood Over combination Rane
65 percent CE or 160 cfm	80 percent CE or 250 cfm

[W] 403.4.7.3.1 Field verification and diagnostic testing for local intermittent kitchen exhaust system. The local exhaust system for kitchens shall be installed to comply with local mechanical exhaust requirements specified in Table 403.4.7.3. The local exhaust systems for kitchens shall either be field tested and verified in accordance with the following procedures:

1. Where an airflow rate is used to comply with Section 403.4.7.3, and the airflow rate is field verified in accordance with Item 1 of Section 403.4.7.2.1, the field test shall also comply with the following requirements.
 - 1.1 Testing shall occur with the whole house ventilation system operating and with all dwelling unit or sleeping unit entry doors closed.
 - 1.2 Testing for a kitchen exhaust systems that require mechanical makeup air in accordance with Section 505.4 shall include verifying that the mechanical makeup air opening is open and verifying that the mechanical makeup air system is controlled to automatically start.
 - 1.3 Testing for a kitchen exhaust systems that does not require mechanical makeup air in accordance with Section 505.4 and that is exempt from pressure equalization per Section 501.4 shall be conducted with operable openings manually opened unless design exhaust airflow can be achieved with all operable openings closed.
 - 1.4 Where required by the building 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 building official.
2. Field verification shall utilize certified rating data from HVI Publication 911, AHAM-Certified Range Hood Directory or another directory of certified product performance ratings approved by the code official for determining compliance. The field verification procedure shall consist of visual inspection of the local intermittent kitchen exhaust system to verify and record the following information:
 - 2.1 The manufacturer name and model number.
 - 2.2 The model is listed in the HVI, AHAM, or equivalent directory.
 - 2.3 The rated airflow value or capture efficiency value, as applicable, listed in the HVI, AHAM or equivalent directory.
 - 2.4 The sound rating value listed in the HVI, AHAM or equivalent directory.
 - 2.5 If the value for the rated airflow or capture efficiency given in the directory is greater than or equal to the requirements specified in Section 403.4.7 and if the value for the sone rating given in the directory is less than or equal to the sone rating requirements specified in Section 403.4.7.2, then the local intermittent kitchen exhaust system complies, otherwise the local intermittent kitchen exhaust system does not comply.

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[W][S]407.1 General. Mechanical ventilation for health care facilities licensed by Washington state shall be designed and installed in accordance with this code and the following provisions of the Washington Administrative Code (WAC):

1. Mechanical ventilation in ambulatory care facilities shall comply with chapter 246-330 WAC.
2. Mechanical ventilation for acute care hospitals shall comply with chapter 246-320 WAC.
3. Mechanical ventilation for nursing homes shall comply with chapter 388-97 WAC.

Mechanical ventilation for unlicensed ambulatory care facilities ((and Group I-2 occupancies)) shall be designed and installed in accordance with this code, ANSI/ASHRAE/ASHE Standard 170 and NFPA 99.

Chapter 5 Exhaust Systems

[S][W]501.3.1 Location of exhaust outlets. The termination point of exhaust outlets and ducts discharging to the outdoors shall be located with the following minimum distances:

1. For ducts conveying explosive or flammable vapors, fumes or dusts: 30 feet (9144 mm) from property lines; 10 feet (3048 mm) from operable openings into ((buildings))the building; 6 feet (1829 mm) from exterior walls and roofs; 30 feet (9144 mm) from combustible walls and operable openings into ((buildings that))the building which are in the direction of the exhaust discharge; 10 feet (3048 mm) above adjoining grade.

Interpretation: Item 1 includes carpentry shop exhaust, industrial chemical lab, paint shop and sandblasting exhaust systems. For clearances and encroachments in the public right-of-way, see Section 304.13.

2. For other product-conveying outlets: 10 feet (3048 mm) from the property lines; 3 feet (914 mm) from exterior walls and roofs; 10 feet (3048 mm) from operable openings into buildings; 10 feet (3048 mm) above adjoining grade.

Interpretation: Item 2 includes central vacuum systems, dry cleaner, photo lab, school chemical lab, nail salon, dryer exhaust over 250 degrees source capture system exhaust and combustion engine exhaust.

3. For((all)) environmental air exhaust other than enclosed parking garage and transformer vault exhaust: 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable openings, except where the exhaust opening is located not less than 1 foot (305 mm) above the gravity air intake opening into buildings for all occupancies other than Group U; and 10 feet (3048 mm) from mechanical air intakes. Such exhaust shall not be considered hazardous or noxious. Separation is not required between intake air openings and living space exhaust air openings of an individual dwelling unit or sleeping unit where a factory-built intake/exhaust combination termination fitting is used to separate the air streams in accordance with the ((fan)) manufacturer's instructions.

Interpretation: For the purposes of this section, "lot line" includes any property line separating one lot from another lot, but does not include any property line separating a lot from a public street or alley right-of-way.

Exceptions:

1. The separation between an air intake and exhaust outlet on a single listed package HVAC unit.
2. Exhaust from environmental air systems other than garages may be discharged into an open parking garage.
3. Except for Group I occupancies, where ventilation system design circumstances require building HVAC air to be relieved, such as during economizer operation, such air may be relieved into an open or enclosed parking garage within the same building.
4. Exhaust outlets serving structures in flood hazard areas shall be installed at or above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment.
5. For enclosed parking garage exhaust system outlets and transformer vault exhaust system outlets: 10 feet (3048 mm) from property lines which separate one lot from another; 10 feet (3048 mm) from operable openings into buildings; 3 feet (914 mm) horizontally from, 10 feet (3048 mm) above or 10 feet (3048 mm) below adjoining finished sidewalk.

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6. For transformer vault exhaust system outlets, subject to the requirements of NFPA 70 Section 450.45, shall be located less than ten feet (3048 mm) from:

6.1 fire escapes;

6.2 required means of egress at the exterior of the building;

6.3 Elements of exit discharge, exterior combustible materials,

6.4 Openings that are not protected in accordance with Section 705.8 of the International Building Code;

6.5 Property lines which separate one lot from another other than a public way;

6.7 Operable openings into buildings; 10 feet (3048 mm) above walkways.

6.8 Above or below any walking surface.

Exhaust outlets shall be located on the exterior of the building.

Note: See Seattle City Light Standard 751 Section 9 Ventilation and Seattle Building Code Section 430 for additional requirements.

7. For elevator machinery rooms in enclosed or open parking garages: Exhaust outlets may discharge air directly into the parking garage.

8((5)). For specific systems, see the following sections:

8.1((5-1)). Clothes dryer exhaust, Section 504.4. 4.2.8.2.

8.2((5-2)) Kitchen hoods and other kitchen exhaust equipment, Sections 506.3.13, 506.4 and 506.5. 4.3.8.3.

8.3 ((5-3)) Dust, stock and refuse conveying systems, Section 510.2. 4.4.8.4.

8.4 ((5-4)) Subslab soil exhaust systems, Section 511.4. 4.5.8.5.

8.5 ((5-5)) Smoke control systems, Section 512.10.3. 4.6.8.6.

8.6 ((5-6)) Refrigerant discharge for [relief devices](#), Section 1105.7. 4.7.8.7.

8.7 ((5-7)) Machinery room discharge, Section 1105.6.1.

8.8 Natural ventilation and mechanical exhaust discharge A2L and B2L refrigerant piping shafts, Sections 1105.7 and 1109.3.2.

8.9 Mechanical exhaust discharge for A2, B2, A3, and B3 refrigerant piping shafts, Sections 1105.7 and 1109.4.2.

[S] 501.3.2 Separation of exhaust air outlets. Exhaust air outlets and ducts discharging to the outdoors, as defined in Section 501.3, shall be located no closer to air intake openings, operable openings, unprotected openings, property lines, or other building elements than the minimum separation distance specified in Section 501.3.1. The distance is defined as the shortest "stretched string" distance measured from the closest point of the outlet opening to the closest point of the air intake openings, operable opening, unprotected opening, property line, walking surface or other building element along a trajectory as if a string were stretched between them.

Exhaust air outlets shall be located on the exterior of the building and shall not discharge within a building opening as defined by Section 705.9 of the International Building Code.

Exception: Where air outlets are permitted by section 501.3 to recirculate air within the building or are permitted to discharge air to an attic, open parking garage, or enclosed parking garage they are not required to be located on the exterior of the building.

Note: Refer to Seattle Building Code Section 705.9 and Figures I-705.9a and I-705.9b for an illustrated example of a building opening in an exterior wall. Refer to ASHRAE 62.1 Normative Appendix B for further information on measuring the stretched string distance for the separation of exhaust air outlets and outdoor air intakes.

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501.3.3 ((501.3.2)) Exhaust opening protection...Renummer

[W][S] 505.3 Domestic ((E))exhaust ducts. Ducts serving domestic cooking exhaust *equipment* shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls, shall be airtight, ~~((and))~~ shall be equipped with a backdraft damper, and shall be independent of all other exhaust systems. Installations in Group I-1 and I-2 *occupancies* shall be in accordance with the *International Building Code* and Section 904.14 of the *International Fire Code* and Section 505.7 or 505.8.

Domestic kitchen exhaust ducts may terminate with other domestic dryer exhaust and residential local exhaust ducts at a common location where each duct has an independent back-draft damper.

Listed and labeled exhaust booster fans shall be permitted when installed in accordance with the manufacturer's installation instructions.

Exceptions:

1. Where installed in accordance with the manufacturer's instructions and ((where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4)) continuous local exhaust is provided in an enclosed kitchen in accordance with Table 403.4.7, listed and labeled ductless range hoods shall not be required to discharge to the outdoors where installed over an electric range domestic cooking appliance. The local exhaust from the residential dwelling unit or sleeping unit kitchen area may be combined with other exhaust ductwork where the exhaust register/grille in the kitchen is a minimum of 6 feet (1.8 M) from the domestic range cooktop. The exhaust register/grille shall be provided with a minimum MERV 3 filter or mesh filter (washable) for trapping grease.

Interpretation: Chapter 4 requires separate local exhaust systems in kitchens, including where ductless range hoods (also known as recirculating hoods) are used. Ductless range hoods are permitted in dwelling units where exhaust systems in the kitchen meet the requirements for local exhaust. In no case is natural ventilation, such as an operable window, allowed to substitute for the required kitchen local exhaust system.

2. Ducts for domestic kitchen cooking *appliances* equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe and fittings provided that the installation complies with all of the following:

- 2.1. The duct shall be installed under a concrete slab poured on grade.
- 2.2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.
- 2.3. The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface.
- 2.4. The PVC duct shall extend not more than 1 inch (25 mm) above grade outside of the *building*.
- 2.5. The PVC ducts shall be solvent cemented.

3. Spaces undergoing a change in occupancy that were previously permitted under an occupancy other than Group R and that are being converted to Group R Dwelling or Sleeping Unit are permitted to use ductless range hoods in open kitchens. Ductless range hoods shall be installed in accordance with the manufacturer's instructions and continuous local exhaust shall be provided in the open kitchens with a minimum local exhaust rate capacity of 50 cfm, listed and labeled ductless range hoods shall not be required to discharge to the outdoors where installed over an electric range appliance cooking appliance. The local exhaust from the residential dwelling unit or sleeping unit kitchen area may be combined with other exhaust ductwork where the exhaust register/grille in the kitchen is a minimum of 6 feet (1.8 M) from the domestic range cooktop. The exhaust register/grille shall be provided with a

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[W] 507.2 Type I hoods. Type I hoods shall be installed where cooking *appliances* produce grease or smoke as a result of the cooking process. Type I hoods shall be installed over *medium-duty, heavy-duty and extra-heavy-duty cooking appliances*.

Exception: A Type 1 hood shall not be required in a Group R-2 type occupancy with not more than 16 residents.

[W]512.12.2 Wiring. In addition to meeting requirements of NFPA 70, all wiring, regardless of voltage used for circuits supplying detection and control functions shall be ~~((fully enclosed within continuous raceways))~~ protected using one of the following methods:

1. Fully enclosed within continuous raceways.

2. Cables used for survivability of required critical circuits shall be listed in accordance with UL 2196 and shall have a fire-resistance rating of not less than one hour.

3. Electrical circuit protective systems shall have a fire-resistance rating of not less than one hour. Electrical circuit protective systems shall be installed in accordance with their listing requirements.

4. Construction having a fire-resistance rating of not less than one hour.

5. The cable is encased in a minimum of 2 inches (51 mm) of concrete.

Chapter 6 Duct Systems

[W]601.5 Return air openings. Return air openings for heating, ventilation and air-conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet (3048 mm) measured in any direction from an open combustion chamber or draft hood of another *appliance* located in the same room or space.
2. Return air for heating or air-conditioning systems shall not be taken from a hazardous or insanitary location or a refrigeration room as defined in this code.
3. The amount of return air taken from any room or space shall be not greater than the flow rate of supply air delivered to such room or space.
4. Return and transfer openings shall be sized in accordance with the *appliance* or *equipment* manufacturer's installation instructions, ACCA Manual D or the design of the *registered design professional*.
5. Return air taken from one *dwelling unit* shall not be discharged into another *dwelling unit*.
6. Taking return air from a crawl space shall not be accomplished through a direct connection to the return side of a forced air furnace. Transfer openings in the crawl space enclosure shall not be prohibited.
7. Return air for heating or air-conditioning systems shall not be taken from a bathroom, toilet room, kitchen, garage, boiler room, furnace room or unconditioned attic.
8. Return air from a closet shall serve only the closet and shall not require a dedicated closet supply duct.
9. Return air taken from a closet smaller than 30 square feet (2.8 m²) shall require the closet door be undercut not less than 1½ inches (38 mm) or have either a louvered door or an air transfer grille, each with a net free area of not less than 30 square inches (1935 mm²).
10. Return air for heating or air-conditioning systems shall not be taken from indoor swimming pool enclosures and associated deck areas.

Chapter 11 Refrigeration

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[W][S] **1101.1.1 Refrigerants other than ammonia.** Refrigeration systems using a refrigerant other than ammonia shall comply with this chapter, ~~((ASHRAE 15, and))~~ the International Fire Code, the Seattle Boiler and Pressure Vessel Code, and either ASHRAE 15 or ASHRAE 15.2, as applicable. Refrigeration systems containing carbon dioxide as the refrigerant shall also comply with IAR CO2 or be part of listed and labeled equipment.

[W] **1101.2 Factory-built equipment and appliances.** Listed and labeled self-contained, factory-built equipment and appliances shall be tested in accordance with the applicable standards specified in Table 1101.2. Such equipment and appliances are deemed to meet the design, manufacture and factory test requirements of this code if installed in accordance with their listing and the manufacturer's instructions.

Exceptions:

1. Where approved for use in installation for testing or demonstration applications for a defined duration, factory-built low-probability equipment Group A3 using natural hydrocarbon refrigerants which are listed on a Northwest Energy Efficiency Alliance Qualified Product List are an acceptable alternative to the standards list in Table 1101.2. Such equipment is deemed to meet the design, manufacture, and factory test requirements of this code if installed in accordance with its listing and the manufacturer's instructions.
2. Where approved, listed and labeled factory-built low-probability equipment using Group A3 natural hydrocarbon refrigerants certified by an accredited third party to comply with IEC 60335-2-40 or EN 378:2016+A1:2020 as an alternative to UL/CSA 60335-2-40 standard listed in Table 1101.2. Such equipment is deemed to meet the design, manufacture, and factory test requirements of this code if installed in accordance with its listing, the manufacturer's instructions, and any additional conditions required for approval by the code official.

TABLE 1101.2 Factory-Built equipment and appliances. Adopt as shown in 2024 IBC.

[W] **1101.2.1 Group A2L, A2, A3 and B1 high-probability equipment.** High-probability equipment using Group A2L, A2, A3 or B1 refrigerant shall comply with UL 484, UL/CSA 60335-2-40 or UL/CSA 60335-2-89.

Exceptions:

1. Factory-built low-probability equipment Group A3 using natural hydrocarbon refrigerants which are listed on a Northwest Energy Efficiency Alliance Qualified Product List are an acceptable alternative to the standards list in Table 1101.2. Such equipment is deemed to meet the design, manufacture, and factory test requirements of this code if installed in accordance with its listing and the manufacturer's instructions.
2. Listed and labeled factory-built low-probability equipment using Group A3 natural hydrocarbon refrigerants certified by an accredited third party to comply with IEC 60335-2-40 as an alternative to the list in Table 1101.2. Such equipment is deemed to meet the design, manufacture, and factory test requirements of this code if installed in accordance with its listing and the manufacturer's instructions.

[W] **1103.1 Refrigerant classification.** Refrigerants shall be classified in accordance with ASHRAE 34 as listed in Table 1103.1. Refrigerants without a refrigerant number designation or without a safety group classification in the referenced edition of ASHRAE 34 shall be classified in accordance with the criteria in ASHRAE 34 as a single-compound refrigerant blend of two or more compounds. Such safety classifications not assigned by ASHRAE 34 shall be submitted for approval to

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the code official. Compliance with the requirements of this code is contingent upon use of approved safety classifications where not assigned by the referenced edition of ASHRAE 34.

[W] 1104.2 Machinery room. Except as provided in Sections 1104.2.1 and 1104.2.2, all components containing the refrigerant shall be located either outdoors or in a machinery room where the quantity of refrigerant in an independent circuit of a refrigeration system exceeds both of the following:

1. The amounts shown in Table 1103.1; and
2. The effective dispersal volume charge as calculated in accordance with ASHRAE 15. For refrigerant blends not listed in Table 1103.1, the same requirement shall apply for that component. These requirements shall also apply where the combined amount of the blend components exceeds a limit of 69,100 parts per million (ppm) by volume. Machinery rooms required by this section and containing only Group A1 or B1 refrigerants shall be constructed and maintained in accordance with Section 1105. Machinery rooms required by this section and containing any Group A2, B2, A3, or B3 flammable refrigerants shall be constructed and maintained in accordance with Sections 1105 and 1106. Machinery rooms required by this section and containing any Group A2L or B2L flammable refrigerants and containing no Group A2, B2, A3, or B3 flammable refrigerants shall be constructed and maintained in accordance with Section 1105 and Sections 1106.4.1 through 1106.4.3.

Exceptions:

1. Machinery rooms are not required for listed equipment and appliances containing not more than 6.6 pounds (3 kg) of refrigerant, regardless of the refrigerant's safety classification, where installed in accordance with the equipment's or appliance's listing and the equipment or appliance manufacturer's installation instructions.
2. Piping in compliance with Section 1107 is allowed in other locations to connect components installed in a machinery room with those installed outdoors.

[W]1104.3.2 Group A2, A3, B2 and B3 refrigerants. ~~((Group A2 and B2 refrigerants shall not be used in high-probability systems.))~~

Refrigeration systems containing Group A2, A3, B2 and B3 refrigerants shall ~~((not))~~ only be used ~~((except))~~ where ~~((approved))~~ at least one of the following is met.

~~((Exceptions: This section does not apply to:~~

- ~~1. Laboratories where the floor area per occupant is not less than 100 square feet (9.3 m²).~~
- ~~2. Listed self-contained systems having a maximum of 0.331 pounds (150 g) of Group A3 refrigerant.~~
- ~~3. Industrial occupancies.~~
- ~~4. Equipment listed for and used in residential occupancies containing a maximum of 6.6 pounds (3 kg) of Group A2 or B2 refrigerant.~~
- ~~5. Equipment listed for and used in commercial occupancies containing a maximum of 22 pounds (10 kg) of Group A2 or B2 refrigerant.))~~

1. The refrigeration system is installed in a laboratory with more than 100 ft² (9.3 m²) of space per person.
2. The refrigeration system is installed in an industrial occupancy.
3. The refrigeration system is a listed self-contained system containing no more than 0.331 lb (150 g) of Group A3 refrigerant, provided that the equipment is installed in accordance with the listing and the manufacturer's installation instructions.
4. The refrigeration system is within equipment listed to UL 60335-2-89/CSA C22.2 No. 60335-2-89 and all of the following provisions are met:

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- 4.1 The refrigeration system contains no more than $0.459 \times \text{LFL}$ (lb), where LFL is in lb/1000 ft³ ($13 \times \text{LFL}$ [kg], where LFL is in kg/m³) of Group A3 refrigerant.
- 4.2. A refrigeration system containing more than $0.141 \times \text{LFL}$ (lb) ($4 \times \text{LFL}$ [kg]) in any independent circuit is installed not less than 20 ft (6 m) from an open flame.
- 4.3. The equipment is installed in accordance with the listing and the manufacturer's installation instructions.
- 5. The refrigeration system is within equipment listed to UL 60335-2-405/CSA C22.2 No. 60335-2-406 and contains no more than $0.106 \times \text{LFL}$ (lb) ($3 \times \text{LFL}$ [kg]) of Group A3 refrigerant, and the equipment is installed in accordance with the listing and the manufacturer's installation instructions.
- 6. The refrigeration system installation is located in a *machinery room*.
- 7. The refrigeration system installation is located outdoors.
- 8. Factory built low-probability equipment located in *machinery rooms* or outdoors containing a maximum of 10.8 pounds (4.9 kg) of Group A3 refrigerant.

[W] 1103.1 Refrigerant classification. Refrigerants shall be classified in accordance with ASHRAE 34 as listed in Table 1103.1. Refrigerants without a refrigerant number designation or without a safety group classification in the referenced edition of ASHRAE 34 shall be classified in accordance with the criteria in ASHRAE 34 as a single-compound refrigerant blend of two or more compounds. Such safety classifications not assigned by ASHRAE 34 shall be submitted for approval to the code official. Compliance with the requirements of this code is contingent upon use of approved safety classifications where not assigned by the referenced edition of ASHRAE 34.

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[W] TABLE 1103.1—REFRIGERANT CLASSIFICATION, AMOUNT AND OEL

CHEMICAL REFRIGERANT	FORMULAS	CHEMICAL NAME OF BLENDS	REFRIGERANT SAFETY GROUP CLASSIFICATION	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE	(F) DEGREES OF HAZARD ^a
				RCL	RCL	RCL	LFL	LFL	LFL	OEL	
				lb/MCf	ppm	g/m ³	lb/MCf	ppm	g/m	ppm	
R-454B	ZEOTROPES	R-32/1234yf (68.9/31.1)	A2L	~~((3.1))~~ 4.6	19,000	49	~~((22.0))~~ 18.5	77,000	352.6	850	-

R-744	CO ₂	Carbon dioxide	A1	~~((4.5))~~ 3.4	~~((40,000))~~ 30,000	72	----	----	----	5,000	2-0-0 ^b

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[W] 1104.2 Machinery room. Except as provided in Sections 1104.2.1 and 1104.2.2, all components containing the refrigerant shall be located either outdoors or in a *machinery room* where the quantity of refrigerant in an independent circuit of a refrigeration system exceeds both of the following:

1. ~~((1))~~The amounts shown in Table 1103.1; and
2. The effective dispersal volume charge as calculated in accordance with ASHRAE 15.

For refrigerant blends not listed in Table 1103.1, the same requirement shall apply ~~((where the amount for any blend component exceeds that indicated in Table 1103.1))~~for that component. ~~((This))~~These requirements shall also apply where the combined amount of the blend components exceeds a limit of 69,100 parts per million (ppm) by volume. *Machinery rooms* required by this section and containing only Group A1 or B1 refrigerants shall be constructed and maintained in accordance with Section 1105 ~~((for Group A1 and B1 refrigerants and in accordance with Sections 1105 and 1106 for Group A2, B2, A3 and B3 refrigerants))~~. *Machinery rooms* required by this section and containing any Group A2, B2, A3, or B3 flammable refrigerants shall be constructed and maintained in accordance with Sections 1105 and 1106. *Machinery rooms* required by this section, containing any Group A2L or B2L flammable refrigerants and containing no Group A2, B2, A3, or B3 flammable refrigerants, shall be constructed and maintained in accordance with Section 1105 and Section 1106.4.1 through 1106.4.3.

Exceptions:

1. *Machinery rooms* are not required for *listed equipment* and *appliances* containing not more than 6.6 pounds (3 kg) of refrigerant, regardless of the refrigerant's safety classification, where installed in accordance with the *equipment's* or *appliance's* listing and the *equipment* or *appliance* manufacturer's installation instructions.
2. Piping in compliance with Section 1107 is allowed in other locations to connect components installed in a *machinery room* with those installed outdoors.

[W]1104.3.1 ~~((Air conditioning for human comfort))~~High-probability air conditioners, and dehumidifiers. High-probability air conditioners, heat pumps, and dehumidifiers shall use Group A1 or A2L refrigerant.

Exceptions:

1. Equipment listed for and used in residential occupancies containing a maximum of 6.6 pounds (3 kg) of refrigerant.
2. Equipment listed for and used in commercial occupancies containing a maximum of 22 pounds (10 kg) of refrigerant.
3. Industrial occupancies.

[W]1104.3.2 Group A2, A3, B2 and B3 refrigerants. ~~((Group A2 and B2 refrigerants shall not be used in high-probability systems.))~~ Refrigeration systems containing Group A2, A3, B2 and B3 refrigerants shall not only be used ~~((except))~~ where ~~((approved))~~ at least one of the following is met.

~~((Exceptions:~~

- ~~1. This section does not apply to Laboratories where the floor area per occupant is not less than 100 square feet (9.3 m²).~~
- ~~2. Listed self-contained systems having a maximum of 0.331 pounds (150 g) of Group A3 refrigerant.~~
- ~~3. Industrial occupancies.~~
- ~~4. Equipment listed for and used in residential occupancies containing a maximum of 6.6 pounds (3 kg) of Group A2 or B2 refrigerant.~~
- ~~5. Equipment listed for and used in commercial occupancies containing a maximum of 22 pounds (10 kg) of Group A2 or B2 refrigerant.))~~
1. The refrigeration system is installed in a laboratory with more than 100 ft² (9.3 m²) of space per person.

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2. The refrigeration system is installed in an industrial occupancy.

3. The refrigeration system is a listed self-contained system containing no more than 0.331 lb (150 g) of Group A3 refrigerant, provided that the equipment is installed in accordance with the listing and the manufacturer's installation instructions.

4. The refrigeration system is within equipment listed to UL 60335-2-89/CSA C22.2 No. 60335-2-89 and all of the following provisions are met:

4.1. The refrigeration system contains no more than $0.459 \times \text{LFL}$ (lb), where LFL is in lb/1000 ft³ ($13 \times \text{LFL}$ [kg], where LFL is in kg/m³) of Group A3 refrigerant.

4.2. A refrigeration system containing more than $0.141 \times \text{LFL}$ (lb) ($4 \times \text{LFL}$ [kg]) in any independent circuit is installed not less than 20 ft (6 m) from an open flame.

4.3. The equipment is installed in accordance with the listing and the manufacturer's installation instructions.

5. The refrigeration system is within equipment listed to UL 60335-2-405/CSA C22.2 No. 60335-2-406 and contains no more than $0.106 \times \text{LFL}$ (lb) ($3 \times \text{LFL}$ [kg]) of Group A3 refrigerant, and the equipment is installed in accordance with the listing and the manufacturer's installation instructions.

6. The refrigeration system installation is located in a machinery room.

7. The refrigeration system installation is located in machinery rooms or outdoors.

[W] 1104.3.5 Corridors and Lobbies. Refrigerating systems in a public corridor or lobby shall comply with ASHRAE 15 Section 7.5.1.2

[W][S]1105.7 Termination of relief devices and refrigerant piping shaft ventilation discharge air outlets. Pressure relief devices, fusible plugs and purge systems located within the *machinery room* and refrigerant piping shaft natural and mechanical ventilations discharge air shall terminate outside of the ((structure)) building ((at a location not less than 15 feet (4572 mm) above the adjoining grade level and not less than 20 feet (6096 mm) from any window, ventilation opening or exit.)) and shall comply with all of the following:

1. The point of vent discharge shall be at a location not less than 15 feet (4572 mm) above the adjoining grade level.

2. The point of vent discharge shall be not less than 20 feet (6096 mm) from any window, openings not protected in accordance with Seattle Building Code Section 705.9.2, ventilation opening or exit.

3. For heavier-than-air refrigerants, the point of vent discharge shall be located not less than 20 ft (6.1 m) horizontally from below-grade walkways, entrances, pits, or ramps if a release of the entire system charge into such a space would yield a concentration of refrigerant in excess of the refrigerant concentration limit (RCL). The direct discharge of a relief vent into enclosed outdoor spaces, such as a courtyard with walls on all sides, shall not be permitted if a release of the entire system charge into such a space would yield a concentration of refrigerant in excess of the Refrigerant Concentration

Level (RCL). The volume for the refrigerant concentration calculation shall be determined using the gross area of the space and a height of 8.2 ft (2.5 m), regardless of the actual height of the enclosed space.

4. The termination point of a vent discharge line shall be made in a manner that prevents discharged refrigerant from spraying directly onto personnel that might be in the vicinity.

5. The termination point of vent discharge lines shall be made in a manner that prevents foreign material or debris from entering the discharge outlet.

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6. Relief vent lines that terminate vertically upward and are subject to moisture entry shall be provided with a drip pocket having a minimum of 24 in. (0.6 m) in length and having the size of the vent discharge pipe. The drip pocket shall be installed to extend below the first change in vent pipe direction and shall be fitted with a valve or drain plug to permit removal of accumulated moisture.

Note: For additional requirements regarding termination of relief devices for flammable refrigerants, toxic and highly toxic refrigerants, treatment systems, and flaring systems, see Section 608 of the *International Fire Code*.

[W] 1106.3 Class 2 and 3 refrigerants. Where any flammable refrigerants of Groups A2, A3, B2 and B3 are used, the machinery room shall conform to the Class I, Division 2, hazardous location classification requirements of NFPA 70.

[W] 1106.4 Group A2L and B2L refrigerants. *Machinery rooms ((for))* containing any Group A2L ((and)) or B2L refrigerants and containing no refrigerants of Group A2, A3, B2, or B3 shall comply with Sections 1106.4.1 through 1106.4.3.

1106.4.1 Adopt 2024 IBC language—matches state amendment

1106.4.2 Adopt 2024 IBC language—matches state amendment

TABLE 1106.4 Group A2L and B2L Detector Activation—Adopt 2024 Table—matches state amendment

1106.4.3 Adopt 2024 IBC language—matches state amendment

[W] 1107.4 Piping materials standards. Refrigerant pipe shall conform to one or more of the standards listed in Table 1107.4. For refrigeration systems complying with ASHRAE 15.2 used in residential occupancies serving only a single dwelling or sleeping unit, refrigerant piping and tubing shall be limited to aluminum, copper, and copper alloy. The exterior of the pipe shall be protected from corrosion and degradation

[W]TABLE 1107.4 Refrigerant Pipe

Piping Material	Standard
Aluminum tube	ASTM B210, ASTM B491/B491M
Brass (copper alloy) pipe	ASTM B43
Copper linesets	ASTM B280, ASTM B1003
Copper pipe	ASTM B42, ASTM B302
Copper tube ^a	ASTM B68, ASTM B75, ASTM B88, ASTM B280, ASTM B819
Steel pipe ^b	ASTM A53, ASTM A106, <u>ASTM A333</u>
Steel tube	ASTM A254, ASTM A334
<u>Stainless Steel Pipe</u>	<u>ASTM A312/A312M</u>
<u>Stainless Steel Tube</u>	<u>ASTM A269/A269M, ASTM A632</u>

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Piping Material	Standard
a. Soft annealed copper tubing larger than 1 3/8 inch (35 mm) O.D. shall not be used for field-assembled refrigerant piping unless it is protected from mechanical damage.	
b. ASTM A53, Type F steel pipe shall only be permitted for discharge lines in pressure relief systems.	

[W] **1107.5 Pipe fittings.** Refrigerant pipe fittings shall be approved for installation with the piping materials to be installed, and shall conform to one of more of the standards *listed* in Table 1107.5 or shall be *listed* and *labeled* as complying with UL 207. For refrigeration systems complying with ASHRAE 15.2 used in residential occupancies serving only a single dwelling unit or sleeping unit, refrigerant fittings shall be limited to aluminum, copper, copper alloys, stainless steel, and steel.

[W]TABLE 1107.5 REFRIGERANT PIPE FITTINGS

FITTING MATERIAL	STANDARD
Aluminum	ASTM B361
Copper and copper alloy (brass)	ASME B16.15, ASME B16.18, ASME B16.22, ASME B16.24, ASME B16.26, ASME B16.50
Steel	ASTM A105, ASTM A181, ASTM A193, ASTM A234, ASTM A420, ASTM A707
<u>Stainless Steel</u>	<u>ASTM 403-19, ASME B16.11</u>

[W]**1108.7 Stainless steel pipe.** Joints between stainless steel pipe or fittings shall be brazed, mechanical, threaded, press-connect, or welded joints conforming to Section 1108.3.

[W] **1108.8 Stainless steel tube.** Joints between stainless steel tube or fittings shall be brazed, flared, mechanical, press-connect, or welded joints conforming to Section 1108.3.

[W]**1109.2.2 Refrigerant pipe enclosure.** Adopt 2024 base code language. State aligning with IBC.

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1109.2.5 Refrigerant pipe shafts. Refrigerant piping that penetrates ~~two or more~~ multiple floor/ceiling assemblies shall be permitted to be enclosed in a fire-resistance-rated shaft enclosure. The fire-resistance-rated shaft enclosure shall comply with Section 713 of the *International Building Code*.

Exceptions:

1. Refrigeration systems using R-718 refrigerant (water).
2. Piping in a direct refrigeration system(~~(using Group A1 refrigerant)~~) where the refrigerant quantity does not exceed the limits of Table 1103.1 for the smallest occupied space through which the piping passes.
3. Piping located on the exterior of the *building* where vented to the outdoors. Natural ventilation openings shall be distributed vertically along the enclosure to prevent containment of refrigerant piping leaks and be located a minimum of 3 feet (914 mm) from operable openings into the building. Mechanical ventilation of exterior enclosures to comply with Section 1109.3.2.
4. Continuous refrigerant pipe or tube, including joints and connections, that have been tested in accordance with the more stringent requirements of Section 1110.1 or ASHRAE 15 Section 9.13.

[W]1109.2.7 Pipe identification. Refrigerant pipe located in areas other than the room or space where the refrigerating *equipment* is located shall be identified. The pipe identification shall be located at intervals not exceeding 20 feet (6096 mm) on the refrigerant piping or pipe insulation. The minimum height of lettering of the identification label shall be 1/ 2 inch (12.7 mm). The identification shall indicate the *refrigerant designation* and safety group classification of refrigerant used in the piping system. For Group A2L and B2L refrigerants, the identification shall also include the following statement: "WARNING—Risk of Fire. Flammable Refrigerant." For Group A2, A3, B2 and B3 refrigerants, the identification shall also include the following statement: "DANGER—Risk of Fire or Explosion. Flammable Refrigerant." For any Group B refrigerant, the identification shall also include the following statement: "DANGER—Toxic Refrigerant."

Exception: For refrigeration systems complying with ASHRAE 15.2 used in residential occupancies serving only a single dwelling unit or sleeping unit, pipe identification shall not be required.

[W] 1109.3.2 Shaft ventilation. Refrigerant pipe installed within a fire resistance-rated shaft enclosure with systems using Group A2L or B2L refrigerant shall be naturally or mechanically ventilated. Refrigerant pipe shafts with one or more systems using any Group A2, A3, B2 or B3 refrigerant shall be continuously mechanically ventilated and shall include a refrigerant detector. The shaft natural ventilation exhaust outlet and mechanical ventilation discharge exhaust outlet shall comply with Section 501.3.1 and 1105.7. Naturally ventilated shafts shall have a pipe, duct or conduit not less than 4 inches (102 mm) in diameter that connects to the lowest point of the shaft and extends to the outdoors. The pipe, duct or conduit shall be level or pitched downward to the outdoors. Mechanically ventilated shafts shall have a minimum airflow velocity in accordance with Table 1109.3.2. The mechanical ventilation shall be continuously operated or activated by a refrigerant detector. Systems utilizing a refrigerant detector shall activate the mechanical ventilation at a maximum refrigerant concentration of 25 percent of the lower flammable limit of the refrigerant. The detector, or a sampling tube that draws air to the detector, shall be located in an area where refrigerant from a leak will concentrate

Exceptions:

1. The shaft shall not be required to be ventilated for double-wall refrigerant pipe where the interstitial space of the double-wall pipe is vented to the outdoors.

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2. For refrigeration systems complying with ASHRAE 15.2 used in residential occupancies serving only a single dwelling unit or sleeping unit, shaft ventilation shall not be required where the pipe or tube is continuous without fittings in the shaft.

3. The shaft shall not be required to be ventilated where all the refrigerant pipe or tube is continuous and has been in accordance with the more stringent requirements of Section 1110.1 or ASHRAE 15 Section 9.13.5.

4. The shaft shall not be ventilated for systems using only Group A2L and B2L refrigerants where there are no hot surfaces exceeding 1290°F (700°C) in the shaft and the pipe, tubes, joints, or connections have been tested in accordance with the more stringent requirements of Section 1110.1 or ASHRAE 15 Section 9.13.

[W] 1109.4.2 Shaft ventilation. Refrigerant pipe shafts with one or more systems using any Group A2, A3, B2, or B3 refrigerant shall be continuously mechanically ventilated and shall include a refrigerant detector. The shaft ventilation exhaust outlet shall comply with Sections 501.3.1 and 1105.7. Mechanically ventilated shafts shall have a minimum airflow velocity as specified in Table 1109.3.2. Makeup air shall be provided at the inlet to the shaft for mechanically ventilated shafts. The shaft shall not be required to be ventilated for double-wall refrigerant pipe where the interstitial space of the double-wall pipe is vented to the outdoors.

[W] 1110.2 Exposure of refrigerant piping system. Refrigerant pipe and joints installed in the field shall be exposed for visual inspection and testing prior to being covered or enclosed.

Exception: Factory-insulated refrigerant piping line-sets are exempt from exposing the piping material for visual inspection.

Chapter 15—Referenced Standards

[W] ASHRAE 15-2024

**Safety Standard for Refrigeration Systems 1101.6, 1104.3.5,
1105.8, 1106.4.3, 1108.1**

[W] ASHRAE 15.2- 2024

**Safety Standard for Refrigeration Systems in Residential Applications 1101.1.1, 1107.4, 1107.5,
1109.2.7, 1109.3.2**

[W] ASHRAE 34-2024

Designation and Safety Classification of Residents 202, 1102.2.1, 1103.1

ASHRAE
180 Technology Parkway,
Peachtree Corners, GA 30092

ASTM
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428

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[W] ASTM A403/A403M-20

[W] ASTM A632-19

Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings

Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing (Small-Diameter) for General Service

EN

EUROPEAN COMMITTEE FOR STANDARDIZATION

Rue de la Science 23

B-1040

Brussels, Belgium

[W] EN 378:2016+A1: 2020

Refrigerating systems and heat pumps. Safety and environmental requirements.

[W] HVI 920-2024:

403.4.7.2.1

Product Performance Certification and Surveillance Procedure 403.4.6.1, 403.4.6.2, 403.4.7.2,

IEC

3 rue de Varembe

PO Box 131

CH-1211 Geneva 20

Switzerland

[W] IEC 60335-2-40-2022 (7th Edition),

Household and similar electric appliances – Safety – Part 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers 1101.2

ASHRAE 15-2024 Appendix j

Addendum j removes the Section 7. 5.3 exception that allowed the use of an A3 or B1 refrigerant outdoors with no restriction other than the total charge limitation of Section 7. 5.1.1. The addendum also removes the Section 7.8 exception that allowed, without restriction, the outdoor use of an A2 refrigerant in high-probability

commercial refrigeration systems. These exceptions were added under Addendum I for the 2019 edition of ANSI/ASHRAE Standard 15 and created an unintended loophole that permitted charge limits of up to 1100 lb (500 kg) if the refrigerating system is installed outdoors. Removal of the exception to Section 7. 5.3

does not prohibit the installation of equipment outdoors using A3 or B1 refrigerants. Group A3 and B1 refrigerants may still be used outdoors if they are listed or not listed but approved by the AHJ. At this time, Standard 15 does not address how all equipment must be installed outdoors when utilizing an A2, A3, or B1 refrigerant, and there are safety concerns about how refrigerant may leak into spaces surrounding the refrigeration system.

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7.5.3 Class 3 (~~Higher Flammability~~) Refrigerants for Refrigeration Systems. *Refrigeration svstems* containing Group A3 and B3 refrigerants (~~shall not~~) shall only be used ((except)) where (~~approved by the AHJ~~) at least one of the following is met:
((Exceptions to 7.5.3

1. This restriction does not apply to laboratories with more than 100 ft² (9.3 m²) of space per person.
2. This restriction does not apply to industrial occupancies.
3. This restriction does not apply to listed self-contained systems containing no more than 0.331 lb (150 g) of Group A3 refrigerant, provided that the equipment is installed in accordance with the listing and the manufacturer's installation instructions.
4. This restriction does not apply to equipment listed to UL 60335-2-89⁷/CSA C22.2 No. 60335-2-89⁸ containing no more than 0.459xLFL (lb), where LFL is in lb/1000 ft³ (13xLFL [kg], where LFL is in kg/m³) of Group A3 refrigerants, provided that the equipment is installed in accordance with the listing and the manufacturer's installation instructions. Refrigeration systems containing more than 0.141xLFL (lb) (4x LFL [kg]) in an independent circuit shall not be installed within 20 ft (6m) of an open flame.
5. This restriction does not apply to equipment listed to UL 60335-3-40⁵/CSA C22.2 No. 60335-2-40⁶ containing no more than 0.106xLFL (lb) (3xLFL [kg]) of Group A3 refrigerant, provided that the equipment is installed in accordance with the listing and the manufacturer's installation instructions.))
6. This restriction does not apply to refrigeration systems located in machinery rooms or outdoors.
 - a. This refrigeration system is installed in a laboratory with more than 100 ft² (9.3 m²) of space per person.
 - b. The refrigeration system is installed in an industrial occupancy.
 - c. The refrigeration system is a listed self contained system containing no more than 0.331 lb (150 g) of Group A3 refrigerant, provided that the equipment is installed in accordance with the listing and the manufacturer's instructions.
 - d. The refrigeration system is within equipment listed to UL 60335-2-89⁷/CSA C22.2 No. 60335-2-89⁸ and all of the following provisions are met:
 1. The refrigeration system contains no more than 0.459xLFL (lb), where LFL is in lb/1000 ft³ (13xLFL [kg], where LFL is in kg/m³) of Group A3 refrigerant,
 2. A refrigeration system containing more than 0.141xLFL 9lb) (4xLFL [kg]) in any independent circuit is installed not less than 20 ft (6M) from an open flame.
 3. The equipment is installed in accordance with the listing and the manufacturer's installation instructions.
 - e. The refrigeration system is within equipment listed to UL 60335-2-40⁵/CSA C22.2 No. 60335-2-40⁶ and contains no more than 0.106xLFL (lb)(3xLFL [kg]) of group A-3 refrigerant, and the equipment is installed in accordance with the listing and the manufacturer's installation instructions.
 - f. The refrigeration system installation is located in a machinery room in accordance with Sections 8.9 and 8.10.

7.8* High Probability Commercial Refrigeration Systems using Group A2 Refrigerants. High-probability systems using Group A2 refrigerants for commercial refrigeration applications within the scope of UL 60335-2-89⁷/CSA C22.2 No. 60335-2-89⁸ shall comply with this section. Refrigeration systems using Group A2 refrigerants shall be limited to listed self-contained systems containing no more than 0.459xLFL (lb), where LFL is in lb/1000 ft³ (13 x LFL [kg], where LFL is in kg/m³), provided that the refrigeration systems containing more than .0141 X LFL (lb), (4xLFL [KG]) in an independent circuit shall not be installed within 20 ft (6m) of an open flame.

Exceptions to 7.8:

1. This restriction does not apply to laboratories with more than 100 ft² (9.3 m²) of space per person.
2. This restriction does not apply to industrial occupancies.
3. This restriction does not apply to refrigeration systems located in machinery rooms (~~or outdoors~~)).