STATE OF WASHINGTON

STATE BUILDING CODE COUNCIL

May 2018

Log No. _____

1. State Building Code to be Amended:

- ☐ International Building Code
- ☐ ICC ANSI A117.1 Accessibility Code
- ☐ International Existing Building Code
- ☐ International Residential Code
- ☐ International Fire Code
- ☐ Uniform Plumbing Code
- ☒ International Mechanical Code
- ☐ International Fuel Gas Code
- ☐ NFPA 54 National Fuel Gas Code
- ☐ NFPA 58 Liquefied Petroleum Gas Code
- ☐ Wildland Urban Interface Code

For the Washington State Energy Code, please see specialized energy code forms

Section(s): **2021 IMC Sections 501.3.1, 1104.3, 1105.7, 1102.5, 1109.3.2, 1110.2**

Title: **Chapter 11 and ASHRAE 15**

2. Proponent Name (Specific local government, organization or individual):

Proponent: **Eric Vander Mey, PE**
Title: **Principal**
Date: **11/12/2024**

3. Designated Contact Person:

Name: **Eric Vander Mey**
Company: **Delta E Consulting**

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E-Mail: **ericv@deltaeconsulting.com**

4. **Proposed Code Amendment**. Reproduce the section to be amended by underlining all added language, striking through all deleted language. Insert new sections in the appropriate place in the code in order to continue the established numbering system of the code. If more than one section is proposed for amendment or more than one page is needed for reproducing the affected section of the code, additional pages may be attached.

   Clearly state if the proposal modifies an existing amendment or if a new amendment is needed. If the proposal modifies an **existing amendment**, show the modifications to the existing amendment by underlining all added language and striking through all deleted language. If a new amendment is needed, show the modifications to the **model code** by underlining all added language and striking through all deleted language.

   Code(s) **2021 International Mechanical Code (IMC)**
   Section(s) **501.3.1, 1104.3, 1105.7, 1102.5, 1109.3.2, 1109.4.2, 1110.2**

   Enforceable code language must be used.
   Amend section to read as follows:

Base language in black text is from 2021 WSMC
See revisions proposed below with track changes in blue text

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:
8. For specific systems see the following sections:
8.1 Clothes dryer exhaust, Section 504.4.
8.2 Kitchen hoods and other kitchen exhaust equipment, Sections 506.3.13, 506.4 and 506.5.
8.3 Dust stock and refuse conveying systems, Section 511.2.
8.4 Subslab soil exhaust systems, Section 512.4.
8.5 Smoke control systems, Section 513.10.3.
8.6 Refrigerant discharge for relief devices, Section 1105.7.
8.7 Machinery room discharge, Section 1105.6.1.
8.8 Natural ventilation and mechanical exhaust discharge for 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 1109.3.2.

Commented [EV1]: Add pointers to chapter 11 sections to correlate to ASHRAE 15-2022.

1104.3: Refrigerant restrictions.
Refrigerant applications, maximum quantities and use shall be restricted in accordance with Sections 1104.3.1 through 1104.3.4.

1104.3.1 Air-conditioning for human comfort.
~~In other than industrial occupancies where the quantity in a single independent circuit does not exceed the amount in Table 1103.1, Group B1, B2 and B3 refrigerants shall not be used in high-probability systems for air-conditioning for human comfort.~~
High-probability systems used for human comfort 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.

Commented [EV2]: Match language in 2024 IMC for 1104.3.1

3. Industrial occupancies.

1104.3.2 ~~Nonindustrial occupancies.~~ A2, A3, B2 and B3 refrigerants.
~~Group A2 and B2 refrigerants shall not be used in high-probability systems where the quantity of refrigerant in any independent refrigerant circuit exceeds the amount shown in Table 1104.3.2. Group A3 and B3 refrigerants shall not be used except where approved.~~
~~Exception: This section does not apply to laboratories where the floor area per occupant is not less than 100 square feet (9.3 m2).~~

Group A2 and B2 refrigerants shall not be used in high-probability systems. Group A3 and B3 refrigerants shall not be used except where approved.
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.

Commented [EV3]: Revise section 1104.3.2 to match 2024 IMC changes

Remove Table 1104.3.2 to match 2024 IMC provisions:

TABLE 1104.3.2 MAXIMUM PERMISSIBLE QUANTITIES OF REFRIGERANTS

TYPE OF REFRIGERATION SYSTEM	MAXIMUM POUNDS FOR VARIOUS OCCUPANCIES			
	Institutional	Public assembly	Residential	All other occupancies
Sealed absorption system				
In exit access	0	0	3.3	3.3
In adjacent outdoor locations	0	0	22	22
In other than exit access	0	6.6	6.6	6.6
Unit systems				
In other than exit access	0	0	6.6	6.6

For SI: 1 pound = 0.454 kg.

1104.3.3: All occupancies.
The total of all Group A2, B2, A3 and B3 refrigerants shall not exceed 1,100 pounds (499 kg) except where approved.

1104.3.4: Protection from refrigerant decomposition.
Where any device having an open flame or surface temperature greater than 800°F (427C) is used in a room containing more than 6.6 pounds (3 kg) of refrigerant in a single independent circuit, a hood and exhaust system shall be provided in accordance with Section 509.
Such exhaust system shall exhaust combustion products to the outdoors.
Exception: A hood and exhaust system shall not be required where any of the following apply:
1. The refrigerant is R-718 (water) or R-744 (carbon dioxide).
2. The combustion air is ducted from the outdoors in a manner that prevents leaked refrigerant from being combusted.
3. A refrigerant detector is used to stop the combustion in the event of a refrigerant leak (see Sections 1105.3 and 1105.5).

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

Commented [EV4]: Add new section to provide reference to ASHRAE 15 requirements

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 ventilation discharge air shall terminate outside of the ~~structure~~ building and 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. ~~and~~The point of vent discharge shall be not less than 20 feet (6096 mm) from any window, 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.
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.

Commented [EV5]: Revise to match ASHRAE 15-2022 language

1109.2.2: Refrigerant pipe enclosure.
Refrigerant piping shall be protected by locating it within the building elements or within protective enclosures.

Exception: Piping protection within the building elements or protective enclosure shall not be required in any of the following locations:
1. Where installed without ready access or located more than 7 feet 3 inches (2210 mm) above the finished floor.
2. Where located within 6 feet (1829 mm) of the refrigerant unit or appliance.
3. Where located in a machinery room complying with Section 1105.
4. Outside the building:
4.1. Where protected from damage from the weather, including but not limited to hail, ice and snow loads.
4.2. Where protected from damage within the expected foot or traffic path.
4.3. Where installed underground not less than 8 inches (200 mm) below finished grade and protected against corrosion.

1109.2.5: Refrigerant pipe shafts.
Refrigerant piping that penetrates two or more floor/ceiling assemblies shall 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. Refrigerant pipe shafts that are naturally or mechanically ventilated shall be

constructed as exterior building envelope walls with thermal insulation and air barrier construction required by the Washington State Energy 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.

Commented [EV6]: Revise to match ASHRAE 15-2022 language. This is provided in a separate code change proposal based on 2027 IMC code change proposal and is provided here for reference.

1109.3.2: Shaft ventilation.
Refrigerant pipe shafts with systems using Group A2L or B2L refrigerant shall be naturally or mechanically ventilated. The shaft natural ventilation discharge outlet and mechanical ventilation discharge exhaust outlet shall comply with Sections 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. A *makeup air* opening shall be provided at the top of the shaft. 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. *Makeup air* shall be provided at the inlet to the shaft for mechanically ventilated shafts. 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.
~~1.~~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.

Commented [EV7]: Clarify this applies to natural and mechanical ventilation outlets.

Commented [EV8]: Add requirement from ASHRAE 15-2022.

Commented [EV9]: Add requirement from ASHRAE 15-2022.

Commented [EV10]: This is provided in a separate code change proposal based on 2027 IMC code change proposal and is included here for reference.

1109.4 Installation requirements for Group A2, A3, B2 or B3 refrigerant.
Piping systems using Group A2, A3, B2 or B3 refrigerant shall comply with the requirements of Sections 1109.4.1 and 1109.4.2.

1109.4.1 Piping material.
Piping material for Group A2, A3, B2 or B3 refrigerant located inside the building, except for machinery rooms, shall be copper pipe, brass pipe or steel pipe. Pipe joints located in areas other than the machinery room shall be welded. Self-contained listed and labeled equipment or appliances shall have piping material based on the listing requirements.

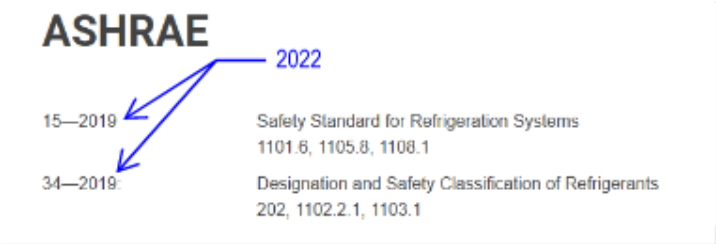
1109.4.2 Shaft ventilation.
~~Refrigerant pipe shafts with systems using Group A2, A3, B2 or B3 refrigerant shall be continuously mechanically ventilated.~~ Refrigerant pipe shafts with one or more systems using any Group A2, A3, B2 or B3 refrigerant shall be continuously mechanically ventilated and shall include a refrigerant detector. The shaft 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.

Commented [EV11]: Use code language from 2024 IMC Section 1109.3.2 for section 1109.4.2 that is removed in 2024 IMC.

Commented [EV12]: Add requirement from ASHRAE 15-2022.

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



5. **Briefly explain your proposed amendment, including the purpose, benefits and problems addressed.** Specifically note any impacts or benefits to business, and specify construction types, industries and services that would be affected. Finally, please note any potential impact on enforcement such as special reporting requirements or additional inspections required.

   Clarify IMC requirements to correlate to latest ASHRAE 15-2022 requirements.

6. **Specify what criteria this proposal meets.** You may select more than one.
   - ☒ The amendment is needed to address a critical life/safety need.
   - ☒ The amendment clarifies the intent or application of the code.
   - ☒ The amendment is needed to address a specific state policy or statute.
   - ☒ The amendment is needed for consistency with state or federal regulations.
   - ☐ The amendment is needed to address a unique character of the state.
   - ☒ The amendment corrects errors and omissions.

7. **Is there an economic impact:** ☒ Yes ☐ No

   If no, state reason:

   Clarifies IMC requirements to correlate to ASHRAE 15 a referenced standard in IMC Chapter 11 that is already required to be complied with.

   Cost savings based on every project will not have to use alternate means and methods code alternate request with the Authority Having Jurisdiction to utilize the latest ASHRAE 15-2022 and ASHRAE 34-2022 requirements.

   As the 2021 IMC requires compliance with both IMC Chapter 11 and ASHRAE 15.

   If yes, provide economic impact, costs and benefits as noted below in items a – f.

   Soft cost engineering and AHJ savings of a minimum of $2,500 per applicable project.
   Construction cost savings will be much greater depending on the project and the pathway selected.

a. ***Life Cycle Cost.*** Use the OFM Life Cycle Cost **Analysis tool** to estimate the life cycle cost of the proposal using one or more typical examples. Reference these **Instructions;** use these **Inputs.** Webinars on the tool can be found **Here** and **Here**). If the tool is used, submit a copy of the excel file with your proposal submission. If preferred, you may submit an alternate life cycle cost analysis.

b. ***Construction Cost.*** Provide your best estimate of the construction cost (or cost savings) of your code change proposal.

   For residential projects, also provide construction cost of savings of $200 to $2000/(per dwelling unit or sleeping unit) for not having to install the rated, vented shaft system for mini-split units and not having construct shaft to meet exterior envelope requirements for thermal insulation and air barrier per energy code requirements.

   Show calculations here, and list sources for costs/savings, or attach backup data pages

   Costs savings will vary based on number of dwelling units or sleeping units served by each rated but unvented refrigerant piping shaft. The more units each rated shaft serves the lower the cost savings per unit.

c. ***Code Enforcement.*** List any code enforcement time for additional plan review or inspections that your proposal will require, in hours per permit application:

   Resolves conflict between ASHRAE 15-2022 and 2021/2024 IMC.

   Does not require design professional to submit code alternate for AHJ review and approval saving engineering and code official costs.

d. ***Small Business Impact.*** Describe economic impacts to small businesses:
   No impact as this provides cost savings and aligns with ASHRAE 15-2022 simplifying code compliance.

e. ***Housing Affordability.*** Describe economic impacts on housing affordability:

f. ***Other.*** Describe other qualitative cost and benefits to owners, to occupants, to the public, to the environment, and to other stakeholders that have not yet been discussed:

   Allows for more cost effective transition to A2L and other refrigerants to meet Washington State Department of Ecology and US EPA requirements.

Please send your completed proposal to: sbcc@des.wa.gov

All questions must be answered to be considered complete. Incomplete proposals will not be accepted.