



STATE OF WASHINGTON
STATE BUILDING CODE COUNCIL

May 2018
Log No. _____

1. State Building Code to be Amended:

- | | |
|---|---|
| <input type="checkbox"/> International Building Code | <input checked="" type="checkbox"/> International Mechanical Code |
| <input type="checkbox"/> ICC ANSI A117.1 Accessibility Code | <input type="checkbox"/> International Fuel Gas Code |
| <input type="checkbox"/> International Existing Building Code | <input type="checkbox"/> NFPA 54 National Fuel Gas Code |
| <input type="checkbox"/> International Residential Code | <input type="checkbox"/> NFPA 58 Liquefied Petroleum Gas Code |
| <input type="checkbox"/> International Fire Code | <input type="checkbox"/> Wildland Urban Interface Code |
| <input type="checkbox"/> Uniform Plumbing Code | |
- For the Washington State Energy Code, please see specialized [energy code forms](#)

Section(s): 2024 IMC Sections 1101.2 & 1103.2

Title: IMC Chapter 11 and CE Certification

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

Proponents: Eric Vander Mey, PE | Delta E Consulting
Shawn Oram, PE & Scott Spielman, PE | Ecotope Inc.
Date: 9/19/2024

3. Designated Contact Person:

Name: Eric Vander Mey
Company: Delta E Consulting
Cell: (206) 321-1677
E-Mail: eriev@deltaconsulting.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) **2024 International Mechanical Code (IMC)**
Section(s) **1101.2 & 1103.2**

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

Base language in black text is from 2024 IMC
See revisions proposed below original proposal changes in blue text and modifications in red text

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

Table 1101.2 Factory-built equipment and appliances

EQUIPMENT	STANDARDS
Air-conditioning equipment	UL 1995 or UL/CSA 60335-2-40
Packaged terminal air conditioners and heat pumps	UL 484 or UL/CSA 60335-2-40
Split-system air conditioners and heat pumps	UL 1995 or UL/CSA 60335-2-40
Dehumidifiers	UL 474 or UL/CSA 60335-2-40
Unit coolers	UL 412 or UL/CSA 60335-2-89
Commercial refrigerators, freezers, beverage coolers and walk-in coolers	UL 471 or UL/CSA 60335-2-89
Refrigerating units and walk-in coolers	UL 427 or UL 60335-2-89
Refrigerant-containing components and accessories	UL 207

1101.2.1: Group A2L, A2, A3 and B1 high-probability equipment. P CDP

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.

1104.3.2: Group A2, A3, B2 and B3 refrigerants.

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:

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.
6. Self-contained equipment using Groups A3 and B3 refrigerants that are listed to UL 60335-2-89 and installed in accordance with the listing, the manufacturer's installation instructions, and ASHRAE 15.
7. Self-contained equipment using Groups A3 and B3 refrigerants that are listed to UL 60335-2-40 and installed in accordance with the listing, the manufacturer's installation instructions, and ASHRAE 15.
8. This restriction for A3 and B3 refrigerants does not apply to refrigeration systems located in machinery rooms or outdoors.
9. Factory built low-probability equipment located in machinery rooms or outdoors containing a maximum of 10.8 pounds (4.9 kg) of Group A3 or B3 refrigerant.

Commented [EV1]: Submitted in separate Washington State code proposal to align with 2027 IMC Code Change Proposal M67-24. Provided here for reference.

Commented [EV2]: Submitted in separate Washington State code proposal to align with 2027 IMC Code Change Proposal M67-24. Provided here for reference.

Commented [EV3]: Submitted in separate Washington State code proposal to align with 2027 IMC Code Change Proposal M67-24. Provided here for reference.

Commented [EV4]: Submitted in separate Washington State code proposal to align with ASHRAE 15-2022. Provided here for reference.

Commented [EV5]: Alternate language for exception 9 that limits the charge to 10.8 pounds based on the charge limit in IEC 60335-2-40.

Add the following to referenced standards in Chapter 15

[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](#)

12/10/2025: Additional backup information provided for revised proposal from Scott Spielman at Ecotope:

I believe it is important to keep the NEEA QPL option because I would like a non-profit agency in our region to be given the opportunity to advance natural refrigerants. My research has led me to believe that UL is severely hampering the green economy in the US through its added cost to manufacturers and restricting the use of the best, and least expensive refrigerant available – R290.

The QPL listing allows the region to immediately demonstrate R290 products that have proven reliable in other parts of the world – such as the Viessman Vitocal, which BPA did a feasibility study on and has thousands of installations in Europe. The IEC 60335-2-40 certification allows for US manufacturers to enter the region, but I am concerned that accredited certification agencies are overwhelmed with the volume of recertification happening during our current multi-stage refrigerant transition so progress will be slow with that route.

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.

Allow use of IEC 60335-2-40 that is utilized in Europe.

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:

No, this is an alternate exception that is not required to comply with so there is not a significant cost impact.

In general using these exceptions provides cost savings and additional options for code compliance that are not mandatory.

As this is an added exception it is not adding a new requirement, allowing projects to comply without a code alternates.

Additionally, NEEA AWHS v8.1 allows for CE in place of UL for products installed outdoors and using natural refrigerant (Pg. 25).

<https://neea.org/img/documents/Advanced-Water-Heating-Specification.pdf>

3.3.2 Standards Approval and Testing

CHPWH systems using synthetic refrigerants shall meet UL 60335-2-40 or UL 1995 through testing by a Nationally Recognized Testing Laboratory (NRTL).³ **Products using natural hydrocarbon refrigerants shall meet UL 60335-2-40, UL 1995, or have a CE listing.⁴**

So, this code proposal is following what has already been put forward by NEEA.

Allows for A3 refrigerants like R-290 that are natural refrigerants with a Global Warming Potential (GWP) of 3 or other low GWP natural refrigerants. Natural refrigerants are needed to reduce global warming and to improve health and wellness as HFC and HFO refrigerants break down into PFAS forever chemicals in earth's atmosphere.

There are many installations of R-290 chillers and heat pumps in Europe currently. See information below from Atmosphere Report:

Figure 15: Hydrocarbon Chiller Installations in Europe

(as of December 2023)

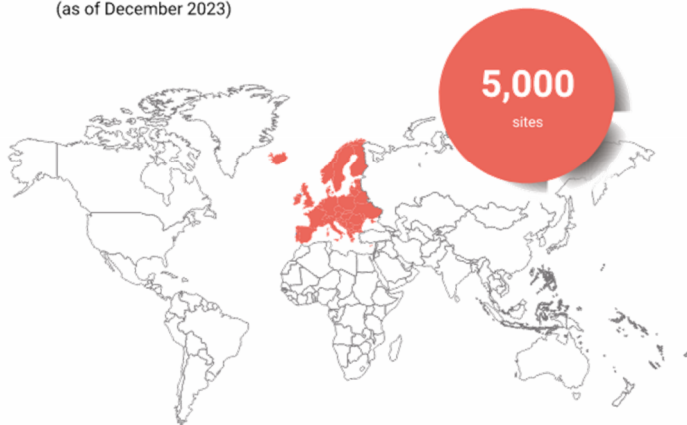


Image Credits: <https://atmosphere.cool/atmo-market-report-2023/>

Other resources:

https://www.bpa.gov/-/media/Aep/energy-efficiency/emerging-technologies/202401_e3t_natural_refrigerant_policy_whitepaper_final.pdf

<https://www.veic.org/Media/Default/Reports/CalNEXT%20Propane%20Air-to-Water%20Heat%20Pump%20Market%20Study.pdf>

<https://www.energy.ca.gov/publications/2024/benefits-and-challenges-using-low-gwp-a3-refrigerants-residential-air>

<https://naturalrefrigerants.com/eia-supports-ashrae-proposal-for-4-9kg-propane-charge-in-outdoor-heat-pumps-in-u-s/#:~:text=Current%20international%20standards%20and%20codes,size%20of%20A3%20refrigerant%20outdoors.>

<https://naturalrefrigerants.com/ashrae-committee-chair-expects-2025-or-later-for-approval-of-higher-r290-charge-for-heat-pumps-in-u-s/#:~:text=It%20will%20most%20likely%20not,according%20to%20the%20committee's%20chair.>

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

- 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.

As this is an exception that projects do not have to use no life cycle cost analysis was conducted. Use of natural A3 refrigerants like R-290 reduce life cycle costs for buildings and the built environment by reducing global warming, increasing equipment efficiency, and have a higher heating hot water supply temperature envelope.

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

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

No specific associated construction cost as this is an exception that does not need to be utilized. Only projects that want to use A3 or B3 refrigerants will need to use the exception.

R-290 heat pumps typically cost 1.5 to 2 times more than heat pumps utilizing A2L refrigerants. But also cost less than other heat pumps utilizing R-744 (CO2) refrigerants that typically cost 2 to 3 times more than heat pumps utilizing A2L refrigerants.

- 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.

Requires some training for code officials and inspectors to understand safety concerns with flammable or toxic refrigerants.

- d. **Small Business Impact.** Describe economic impacts to small businesses:

No significant impact as this is a code alternate and aligns with ASHRAE 15-2022 simplifying code compliance and is an optional path.

May require specialty maintenance personnel training which could lead to opportunities to small business growth or new businesses.

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

Generally, reduces costs as R-290 heat pumps are less costly than R-744 heat pumps.

Use of natural A3 refrigerants like R-290 reduce life cycle costs for buildings and the built environment by reducing global warming, increasing equipment efficiency, have a higher heating hot water supply temperature envelope.

Allows for more options and additional equipment that is being used outside of North America.

- 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 A3 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.

