

**RUSHING**

August 23, 2023



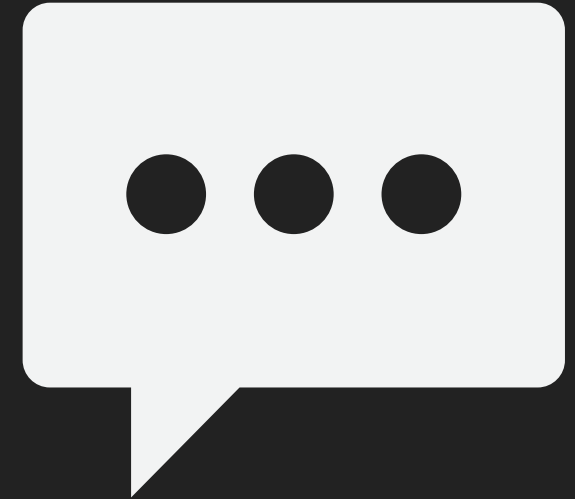
# UPDATES ON REFRIGERANT PHASE OUT WASHINGTON STATE HVAC EQUIPMENT



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# WELCOME!

*Test, test, is everyone there?*



Please enter into the chat:

1. Your Name & Company
2. What year was R-22 phased out for Washington State?



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# MEET YOUR TEAM



**ERIC VANDER MEY**  
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**CHIEF OF ENGINEERING**  
P.E., LEED AP



**REED RUSHING**  
**PRINCIPAL**  
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**AUSTIN BONNES**  
**SENIOR MECHANICAL**  
**ENGINEER**  
P.E.



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# YOUR EXPERTS IN:

1. Mechanical
2. Electrical
3. Plumbing
4. Lighting
5. Energy
6. Sustainability
7. Commissioning



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# WHAT WE'LL COVER

Status of WA State Department of Ecology HFC Phase Out Rulemaking

Timeline of phase out by HVAC equipment type

Refrigerant management program details

Next generation refrigerant options and availability

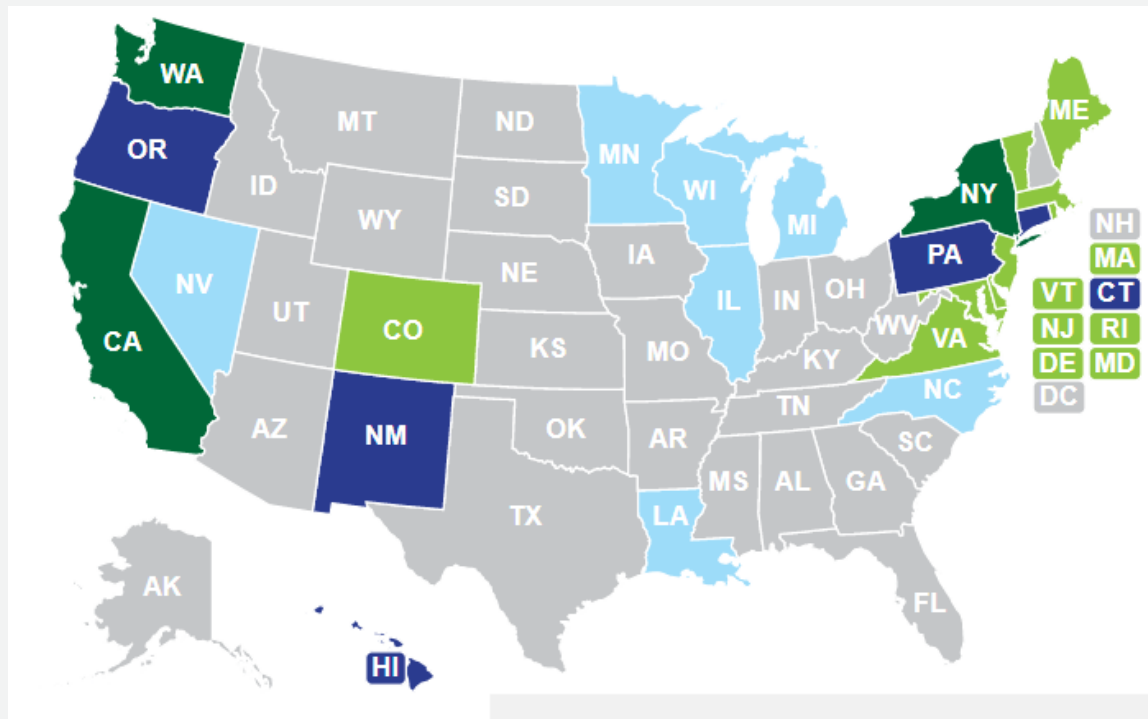
Q&A



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# HFC REFRIGERANT PHASE OUT



■ SNAP + Additional GWP Limits   ■ SNAP 20/21 Signed Into Law   ■ SNAP 20/21 Pending  
■ US Climate Alliance Member

SNAP = Significant New Alternative Policy (SNAP) Program

1996 – US CFC Phase Out

2010 – US HCFC Phase Out

HFC = Hydrofluorocarbon

2017 – US repeals HFC Phase Out

2022 – US ratifies HFC Phase Down

[HFC Policy Tracker — North American Sustainable Refrigeration Council \(nasrc.org\)](http://nasrc.org)




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# WAC 173-443 & WAC 173-455: RULEMAKING TIMELINE



Date	Activity
August 16, 2021	Announced rulemaking (filed CR-101 form)
December 2021	Proposed recommendations to the legislature about <a href="#">how to manage end-of-life of HFCs/refrigerants</a> 
Winter 2022 – Spring 2023	Held stakeholder meetings Developed and prepared rule language
July 13, 2023	Proposed rule (filed CR-102 form) Started public comment period
August 24, 2023	Hold public hearing ← <i>Tomorrow!</i>
August 31, 2023	End public comment period ← <i>In a week!</i>
Summer 2023 – Fall 2023	Review public comments Prepare adoption package
November 2023	Adopt rule (file CR-103 form)
December 2023	Rule effective 31 days after filing



# HOW TO PARTICIPATE



Public Hearing online (webinar)

August 24, 2023, 10am

Written public comments due by  
5pm (PST) on August 31, 2023

<https://aq.ecology.commentinput.com/?id=trCUMYBx2G>



# HFC REFRIGERANT PHASE OUT – CURRENT DRAFT



Equipment Type	Rulemaking status	Rule Type	Effective Date	Impacts/Notes
Chillers	Completed 10/2020	Prohibited Substances	Jan 1, 2024	WAC 173-443 Table 1 for prohibited refrigerants
Room Air Conditioners (PTACs, PTHPs)	CR-102 Filed	GWP<750	Jan 1, 2024	Exception for building permit by 1/1/2024
Other AC & HP HVAC Systems	CR-102 Filed	GWP<750	Jan 1, 2028	Exception for building permit by 1/1/2024
VRF Systems	CR-102 Filed	GWP<750	Jan 1, 2026	Exception for building permit by 1/1/2024
Chiller heat pumps (space heating water)	CR-102 Filed	Prohibited Substances	Jan 1, 2025	WAC 173-433 Table 1 for prohibited refrigerants
Heat pumps (service & potable water)	Not part of current legislation	TBD	TBD	



CR-102 Filed on 7/13/2023  
**Comments due 8/31/2023**

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# WAC 173-443: DEFINITIONS: GENERAL



**WAC 173-443-020 Applicability.** ~~((1))~~ The requirements of this chapter apply to ~~((any))~~:

(1) Person who offers for sale, leases, rents, installs, or otherwise causes to enter into Washington commerce any new product or equipment that contains ~~((7))~~ or uses ~~((7 or will use HFCs or other substitutes for an end-use))~~ a prohibited substance listed in WAC 173-443-040, Table 1;

(2) A person who offers for sale, leases, rents, installs, or otherwise causes to enter into Washington commerce any new refrigeration or air conditioning system that contains or uses a prohibited substance listed in WAC 173-443-040, Tables 2 and 3, respectively;

(3) A person who sells, offers for sale, or purchases a small container of refrigerant or a nonessential consumer product that contains or uses a prohibited substance listed in WAC 173-443-040, Table 4;

(4) A person who owns or operates a facility that has a refrigeration or air conditioning system;

(5) A person who installs, repairs, maintains, services, replaces, or disposes of a refrigeration or air conditioning system; and

(6) A person who wholesales, distributes, or reclaims a refrigerant with a high global warming potential (GWP).

# WAC 173-443: DEFINITIONS: GENERAL



"Air conditioning" means the process of treating air to meet the requirements of a conditioning space by controlling its temperature, humidity, cleanliness, or distribution. "Air conditioning" includes the use of chillers, except for purposes of applying a maximum GWP threshold for new air conditioning equipment under WAC 173-443-040, and the use of heat pumps.

"Air conditioning equipment" or "air conditioning system" means the piece(s) of stationary equipment used to provide air conditioning. "Air conditioning equipment" or "air conditioning system" includes, but is not limited to, room air conditioners and residential and other dehumidifiers; ducted central air conditioners and heat pumps; nonducted air conditioners (both mini and multisplit); packaged roof top units; water source and ground source heat pumps; and remote condensing units used for comfort cooling. "Air conditioning equipment" or "air conditioning system" does not include mobile air conditioning systems, including those used in motor vehicles, rail and trains, aircraft, watercraft, recreational vehicles, recreational trailers, and campers.

"Comfort cooling" means the air conditioning equipment used to provide cooling in order to control heat and/or humidity in occupied facilities including, but not limited to, residential, office, and commercial buildings. Comfort cooling equipment includes, but is not limited to, chillers, commercial split systems, and packaged roof-top units.

# WAC 173-443: DEFINITIONS: GENERAL



"High-GWP refrigerant" means a compound used as a heat transfer fluid or gas that is:

(a) A chlorofluorocarbon, hydrochlorofluorocarbon, hydrofluorocarbon, perfluorocarbon, or any compound or blend of compounds with a GWP value equal to or greater than 150; or

(b) A regulated refrigerant as defined in this section.

- CFC: R-12 – US Phased out 1996
- HCFC: R-22 – US Phased out 2010

"Prohibited substance" means a regulated refrigerant or a substitute that is prohibited from being used by or contained in products or equipment manufactured for end-uses described in WAC 173-443-040, Table 1 through Table 4.

"Global warming potential," "GWP," "global warming potential value," or "GWP value" means 100-year GWP value as it appears in WAC 173-441-040, and if not contained in WAC 173-441-040, then the GWP value means the 100-year GWP value published by the Intergovernmental Panel on Climate Change (IPCC) in its Fifth Assessment Working Group 1 Report (AR5) (IPCC, 2013).

# WAC 173-443: DEFINITIONS: GENERAL



"Date of manufacture" means:  
(a) For air conditioning and refrigeration equipment, the date displayed on the manufacturer's equipment label indicating the equipment's date of manufacture;  
(b) For refrigeration and air conditioning equipment built up and completed on-site (field erected), the date that the refrigerant circuit was completed and initially filled with refrigerant; or  
(c) For foam products imported into the state from outside the United States, the date the foam was originally manufactured, or the date of import if the original manufacture date is not known.

“Effective date of this chapter” = January, 2024 (31 days after CR-103 Filed)

## WAC 173-443-040: Prohibited Substances

TABLE 1. Prohibited Substances for New Products and Equipment

Chiller Changes

TABLE 2. Prohibited Substances for New Refrigeration Equipment

TABLE 3. Prohibited Substances for New Air Conditioning Equipment

New AC Equipment

TABLE 4. Prohibited Substances for Small Containers of Refrigerant and Nonessential Consumer Products

# WAC 173-443: DEFINITIONS: CHILLERS



"Chiller" means a water or heat transfer fluid chilling equipment package custom built in place or a factory-made and prefabricated assembly of one or more compressors, condensers and evaporators, with interconnections and accessories including controls, designed for the purpose of cooling or heating water or a heat transfer fluid. A chiller is a machine specifically designed to make use of a vapor compression cycle or absorption refrigeration cycle to transfer heat from a cold water or heat transfer fluid circulating system to the air, a heat transfer fluid, or other heat exchange media. Chillers can be water-cooled, air-cooled, or evaporatively cooled. Chillers include, but are not limited to, rotary chillers, centrifugal chillers, and positive displacement chillers, including reciprocating, scroll, and screw chillers. A chiller used for air conditioning purposes is considered air conditioning equipment except for purposes of applying a GWP threshold under WAC 173-443-040, Table 2. A chiller used for refrigeration in a retail food facility is considered an indirect type of "supermarket system." A chiller used for industrial process refrigeration is considered a type of "other refrigeration" application.



- Chillers (Table 1)
- Not refrigeration equipment (Table 2)
- Heat pumps space heating water (Table 1)

~~(( "Centrifugal chiller" means air conditioning equipment that utilizes a centrifugal compressor in a vapor compression refrigeration cycle typically used for commercial comfort air conditioning. Under this definition, a centrifugal chiller is a chiller intended for comfort cooling and does not include chillers for industrial process cooling and refrigeration.))~~

~~(( "Positive displacement chiller" means vapor compression cycle chillers that use positive displacement compressors, typically used for commercial comfort air conditioning. Positive displacement chiller in this definition is a chiller intended for comfort cooling and does not include cooling for industrial process cooling and refrigeration.))~~

# WAC 173-443: TABLE 1: PROHIBITED SUB: CHILLERS



		End-Use Category: Air Conditioning	
	End-Use	Prohibited Substances	Effective Date
Cooling (current rule)	<u>Centrifugal chillers - Cooling only (New)</u>	<u>FOR12A, FOR12B, HFC-134a, HFC-227ea, HFC-236fa, HFC-245fa, R-125/134a/600a (28.1/70/1.9), R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R-410A, R-410B, R-417A, R-421A, R-422B, R-422C, R-422D, R-423A, R-424A, R-434A, R-438A, R-507A, RS-44 (2003 composition), THR-03</u>	<u>January 1, 2024</u>
Cooling (current rule)	<u>Positive displacement chillers - Cooling only (New)</u>	<u>FOR12A, FOR12B, HFC-134a, HFC-227ea, KDD6, R-125/134a/600a (28.1/70/1.9), R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R-410A, R-410B, R-417A, R-421A, R-422B, R-422C, R-422D, R-424A, R-434A, R-437A, R-438A, R-507A, RS-44 (2003 composition), SP34E, THR-03</u>	<u>January 1, 2024</u>
Heating / Heating & Cooling (draft rule)	<u>Centrifugal chillers - Heating and heating and cooling (New)</u>	<u>FOR12A, FOR12B, HFC-134a, HFC-227ea, HFC-236fa, HFC-245fa, R-125/134a/600a (28.1/70/1.9), R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R-410A, R-410B, R-417A, R-421A, R-422B, R-422C, R-422D, R-423A, R-424A, R-434A, R-438A, R-507A, RS-44 (2003 composition), THR-03</u>	<u>January 1, 2025</u>
Heating / Heating & Cooling (draft rule)	<u>Positive displacement chillers - Heating and heating and cooling (New)</u>	<u>FOR12A, FOR12B, HFC-134a, HFC-227ea, KDD6, R-125/134a/600a (28.1/70/1.9), R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R-410A, R-410B, R-417A, R-421A, R-422B, R-422C, R-422D, R-424A, R-434A, R-437A, R-438A, R-507A, RS-44 (2003 composition), SP34E, THR-03</u>	<u>January 1, 2025</u>

- No Heat Pump Exemptions for Building Permits by Effective Date of this Chapter
- 4-pipe heat recovery chiller – controlled to CHWS temp only – 2024 or 2025?

# WAC 173-443: TABLE 1: EXEMPTIONS FOR CHILLERS



- No Heat Pump Exemptions for Building Permits by Effective Date of this Chapter
- Exemptions for:
  - Military marine vessels
  - Human-rated spacecraft



**TABLE 1. Exemptions for New Products and Equipment**

<u>End-Use</u>	<u>Prohibited Substances</u>	<u>Exemptions</u>
<u>Air conditioning: Centrifugal chillers Positive displacement chillers</u>	<u>HFC-134a</u>	<u>Military marine vessels where reasonable efforts have been made to ascertain that other alternatives are not technically feasible due to performance or safety requirements.</u>
<u>Air conditioning: Centrifugal chillers Positive displacement chillers</u>	<u>HFC-134a and R-404A</u>	<u>Human-rated spacecraft and related support equipment where reasonable efforts have been made to ascertain that other alternatives are not technically feasible due to performance or safety requirements.</u>



# WAC 173-443: DEFINITIONS: AC EQUIPMENT



"New air conditioning equipment" means any air conditioning equipment or system manufactured for an end-use listed in WAC 173-443-040, Table 3, that is first installed using new components, used components, or a combination of new and used components, and that is one of the following:

- (a) New construction in a new facility;
- (b) A system in an existing facility that undergoes a retrofit;
- (c) A system in an existing facility with a single condenser and single evaporator that has a new exterior condenser, condensing unit, or remote condensing unit; or
- (d) A system in an existing facility with more than one condenser or more than one evaporator that is modified such that the system undergoes cumulative replacement of 75 percent or more of its indoor evaporator units (by number) and 100 percent of its air source or water source condensing units.



- Air Conditioning Equipment covered under Table 3
  - Room Air Conditioners
  - VRF Systems
  - Other Air Conditioning Equipment

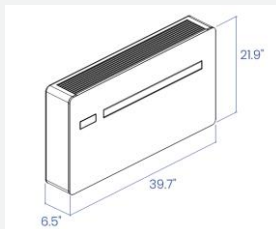
**TABLE 3. Prohibited Substances for New Air Conditioning Equipment**

End-Use	Criteria	Prohibited Substances	Effective Date
Room air conditioners and residential dehumidifiers	New air conditioning equipment	Refrigerants with a GWP of 750 or more	January 1, 2024
Other types of air conditioning equipment used in residential and nonresidential applications	New air conditioning equipment	Refrigerants with a GWP of 750 or more	January 1, 2028
Variable refrigerant flow (VRF) or volume system	New air conditioning equipment	Refrigerants with a GWP of 750 or more	January 1, 2026

# WAC 173-443: DEFINITIONS: ROOM AIR CONDITIONERS



"Room air conditioner" includes window units, wall units, packaged terminal air conditioners (PTACs), packaged terminal heat pumps (PTHPs), and portable air conditioners.



"Packaged terminal air conditioner" or "PTAC" means a wall sleeve and a separate unencased combination of heating and cooling assemblies specified by the builder and intended for mounting through a wall. "Packaged terminal air conditioner" includes a prime source of refrigeration, separable outdoor louvers, forced ventilation, and heating availability by builder's choice of energy.

"Packaged terminal heat pump" or "PTHP" means a packaged terminal air conditioner that utilizes reverse cycle refrigeration as its prime heat source and can have supplementary heating availability by builder's choice of energy.



**TABLE 3. Prohibited Substances for New Air Conditioning Equipment**

End-Use	Criteria	Prohibited Substances	Effective Date
Room air conditioners and residential dehumidifiers	New air conditioning equipment	Refrigerants with a GWP of 750 or more	January 1, 2024

PTAC & PTHP (draft rule)

**TABLE 3. Exemptions for New Stationary Air Conditioning Equipment**

End-Use	Prohibited Substances	Exemptions
Room air conditioners and residential dehumidifiers	Refrigerants with a GWP of 750 or more	Facilities with new air conditioning equipment with a building permit issued before the effective date of this chapter.

VTHP?

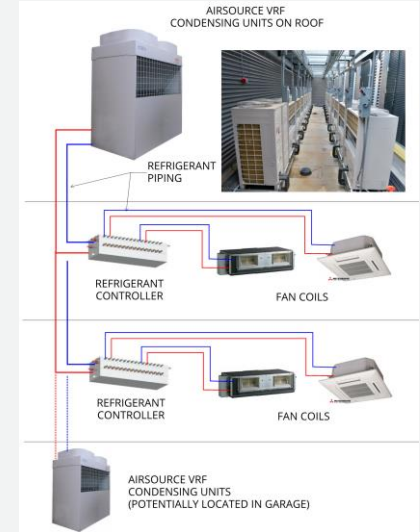


# WAC 173-443: DEFINITIONS: VRF SYSTEMS



"Variable refrigerant flow (VRF) system" means an engineered direct expansion (DX) multisplit system incorporating the following: A split system air conditioner or heat pump incorporating a single refrigerant circuit that is a common piping network to two or more indoor evaporators each capable of independent control, or compressor units. "VRF systems" contain a single module outdoor unit or combined module outdoor units with at least one variable capacity compressor that has three or more stages, with air or water as the heat source. This includes "variable refrigerant volume (VRV) systems."

- VRF Hydrokit (refrigerant to water): Yes
- Mini-split with multiple indoor evaporators: Yes
- Mini-split with single indoor evaporator: No



**TABLE 3. Prohibited Substances for New Air Conditioning Equipment**

<b>VRF Systems (draft rule)</b>	<b>End-Use</b> <u>Variable refrigerant flow (VRF) or volume system</u>	<b>Criteria</b> <u>New air conditioning equipment</u>	<b>Prohibited Substances</b> <u>Refrigerants with a GWP of 750 or more</u>	<b>Effective Date</b> <u>January 1, 2026</u>

**TABLE 3. Exemptions for New Stationary Air Conditioning Equipment**

<b>End-Use</b>	<b>Prohibited Substances</b>	<b>Exemptions</b>
<u>Variable refrigerant flow (VRF) or volume system</u>	<u>Refrigerants with a GWP of 750 or more</u>	<u>Facilities with new air conditioning equipment with a building permit issued before the effective date of this chapter.</u>

# WAC 173-443: DEFINITIONS: OTHER SYSTEMS

"Other air conditioning" or "other air conditioning equipment" means any residential or nonresidential air conditioning equipment or air conditioning system not otherwise defined as a room air conditioner, residential dehumidifier, or variable refrigerant flow (VRF) system.

- Examples of Other AC Equipment covered under Table 3
  - Rooftop packaged units
  - Split Systems that aren't VRF Systems
  - Watersource heat pumps (water-to-air)



**TABLE 3. Prohibited Substances for New Air Conditioning Equipment**

	<u>End-Use</u>	<u>Criteria</u>	<u>Prohibited Substances</u>	<u>Effective Date</u>
Other AC (draft rule)	<u>Other types of air conditioning equipment used in residential and nonresidential applications</u>	<u>New air conditioning equipment</u>	<u>Refrigerants with a GWP of 750 or more</u>	<u>January 1, 2028</u>

**TABLE 3. Exemptions for New Stationary Air Conditioning Equipment**

<u>End-Use</u>	<u>Prohibited Substances</u>	<u>Exemptions</u>
<u>Other types of air conditioning equipment used in residential and nonresidential applications</u>	<u>Refrigerants with a GWP of 750 or more</u>	<u>Facilities with new air conditioning equipment with a building permit issued before the effective date of this chapter.</u>

# HFC REFRIGERANT PHASE OUT – CURRENT DRAFT



Equipment Type	Rulemaking status	Rule Type	Effective Date	Impacts/Notes
Chillers	Completed 10/2020	Prohibited Substances	Jan 1, 2024	WAC 173-443 Table 1 for prohibited refrigerants
Room Air Conditioners (PTACs, PTHPs)	CR-102 Filed	GWP<750	Jan 1, 2024	Exception for building permit by 1/1/2024
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VRF Systems	CR-102 Filed	GWP<750	Jan 1, 2026	Exception for building permit by 1/1/2024
Chiller heat pumps (space heating water)	CR-102 Filed	Prohibited Substances	Jan 1, 2025	WAC 173-433 Table 1 for prohibited refrigerants
Heat pumps (service & potable water)	Not part of current legislation	TBD	TBD	



CR-102 Filed on 7/13/2023  
**Comments due 8/31/2023**

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# NEXT GENERATION REFRIGERANTS

- Washington: Non HFC Refrigerants: GWP <750 (AR5: 100 yr)

- Next generation refrigerants will have lower GWP
- Some have higher flammability or toxicity

- “No Flame Propagation” A1 Refrigerants

- R-410A (HFC), GWP=1890 (50% R-32/50% R-125)
- R-134A (HFC), GWP=1300
- R-513A (HFC), GWP=573 (56% R-1234yf/44% R-134A)
- R-744 (CO<sub>2</sub>), GWP=1 (natural refrigerant)



- “Lower Flammability” A2L Refrigerants

- R-32 (HFC), GWP=677 (IPCC AR6 reclassifying to 771)
- R-454B (HFO), GWP=467 (68.9% R-32/31.1% R-1234yf)
- R-1234yf (HFO), GWP=<1
- R-1234ze (HFO), GWP=<1

- “Flammable” A2 & “Higher Flammability” A3 Refrigerants

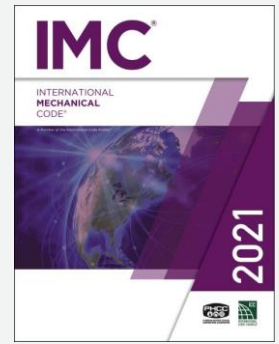
- R-290 (HC, Propane), GWP=3, A3 (used in Europe for Air-to-Water Heat Pumps)

- Future Phaseouts: Embodied Carbon/GHG emissions/PFAS “Forever” Chemicals

ASHRAE Standard 34 Safety Classes

Higher Flammability	<b>A3</b> Propane, Butane	<b>B3</b>	Increasing Flammability
Flammable	<b>A2</b> Methylene Fluoride	<b>B2</b> Methyl Chloride	
Lower Flammability	<b>A2L</b> R-454B	<b>B2L</b> Ammonia	
No Flame Propagation at 60° C	<b>A1</b> R-410A	<b>B1</b> Sulfur Dioxide	
	Lower Toxicity (OEL of 400 ppm or greater)	Higher Toxicity (OEL of less than 400 ppm)	Increasing Toxicity

# A2L REFRIGERANT PIPING RULES



- Split Systems/VRF with field installed refrigerant piping have increased potential for leaks
- Clarification refrigerant piping cannot be exposed in a rated exit corridor
- A2L & B2L Refrigerant Piping new rules (ASHRAE 15 & 2021 IMC Section 1109.3)
  - Shield plates required when located less than 1.5" from nearest edge of framing member
  - Shaft ventilation to outdoors by mechanical or natural means (unless double wall refrigerant piping with interstitial space vented to outdoors)



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# OTHER CHANGES: REF. MANAGEMENT PROGRAM



- Record keeping for vendors, manufacturers, and building/facility owners for 5 years.
- **Yearly fees** for any building/facility with **>= 50lbs** of “High-GWP” refrigerant (basically anything more than a split system).
- Still in development: potentially **\$150-370 per year per equipment** with “High-GWP” refrigerant.

(3) Recordkeeping. As of the effective date of this chapter, a manufacturer of any new air conditioning equipment, as defined in WAC 173-443-030, must maintain for a minimum of five years, and make available upon request by ecology, a copy of the following records:

- (a) The sector or subsector of the equipment;
- (b) Refrigerant type the equipment is designed to use and its GWP value;
- (c) Date of manufacture or import;
- (d) Model and serial number;
- (e) Name of company or retailer to whom the equipment was sold or otherwise distributed;
- (f) The bill of lading; and
- (g) The invoice.

**WAC 173-443-105 Refrigerant management program (RMP) purpose and applicability.** (1) The purpose of the RMP is to reduce greenhouse gas emissions from stationary commercial refrigeration and air conditioning systems and from the installation and servicing of stationary refrigeration and air conditioning systems using high-GWP refrigerants.

(2) The RMP requirements apply to:

- (a) Any owner or operator of a facility that has a refrigeration or air conditioning system with a full charge greater than or equal to 50 pounds of a high-GWP refrigerant;
- (b) Any person who installs, repairs, maintains, services, or disposes of refrigeration or air conditioning equipment; and
- (c) Any person who wholesales, distributes, or reclaims any amount of high-GWP refrigerants in Washington.

**“HIGH-GWP” REFRIGERANT = >200 GWP**



# OTHER CHANGES: REF. MANAGEMENT PROGRAM



- **New leak inspection/detection monitoring requirements**
  - Verification required when any leak is detected, or if refrigerant is added/ removed.
  - Establishes allowable leakage rates.
  - Establishes leak repair requirements and documentation.
  - Establishes requirement for retrofit/retirement plan
  - Annual reports w/ record keeping.

(4) (a) Leak inspection requirements for year-round refrigeration and air conditioning systems with a full charge greater than or equal to 50 pounds, but less than 200 pounds.

(b) By January 1, 2024, the owner or operator of a facility that has a refrigeration or air conditioning system with a full charge greater than or equal to 50 pounds, but less than 200 pounds, that is intended to operate year-round must do all of the following:

(i) Conduct a leak inspection of the full system at least once each year using a calibrated refrigerant leak detection device, or bubble test, unless an automatic leak detection system that meets the requirements of subsection (2)(b) or (c) of this section is installed and functioning correctly on the system.

(ii) Conduct a leak inspection of the full system at the time of verification test or follow-up verification test following a leak repair.

(iii) Conduct a leak inspection of the full system each time refrigerant is added to the system in an amount equal to or greater than five pounds, or one percent of the full charge, whichever is greater.

(iv) Conduct a leak inspection of the full system each time oil residue is observed on any refrigerant circuit component indicating a refrigerant leak.

**AC System >50 pounds: VRF ~12 tons**

# OTHER CHANGES: REF. MANAGEMENT PROGRAM



- Written disclosure to DOE on status, refrigerant type, charge/weight total, and end-use options per equipment type
- No annual fees for vendors/distributors
- Distributors required to provide annual reports, record keeping
- Refrigerant reclaimers submit annual reports, with continued tracking and certification requirements

## NEW SECTION

**WAC 173-443-225 Recordkeeping requirements for refrigerant wholesalers, distributors, and reclaimers.** (1) Beginning January 1, 2024, a refrigerant distributor, wholesaler, or reclaimer of a high-GWP refrigerant must keep all of the following records for a minimum of five years:

(a) Annual reports submitted pursuant to WAC 173-443-215;  
(b) Invoices of all high-GWP refrigerant(s) received through sale or transfer and all high-GWP refrigerant distributed for sale or transfer. These invoices must include all of the following information:

(i) Name of the purchaser;  
(ii) Date of sale or transfer;  
(iii) Quantity sold or transferred; and  
(iv) Type of high-GWP refrigerant(s) purchased, sold, or transferred.

(2) A refrigerant distributor or wholesaler selling a high-GWP refrigerant to a purchaser that is an employer of a certified technician must obtain written documentation showing that the purchaser currently employs at least one certified technician.

(3) The records identified in subsections (1) and (2) of this section must be kept at the facility of the refrigerant distributor or wholesaler and must be made available to an authorized representative of ecology's HFC program upon request.

# WHAT'S NEXT: LOWER GWP THRESHOLDS / FOREVER CHEMICALS

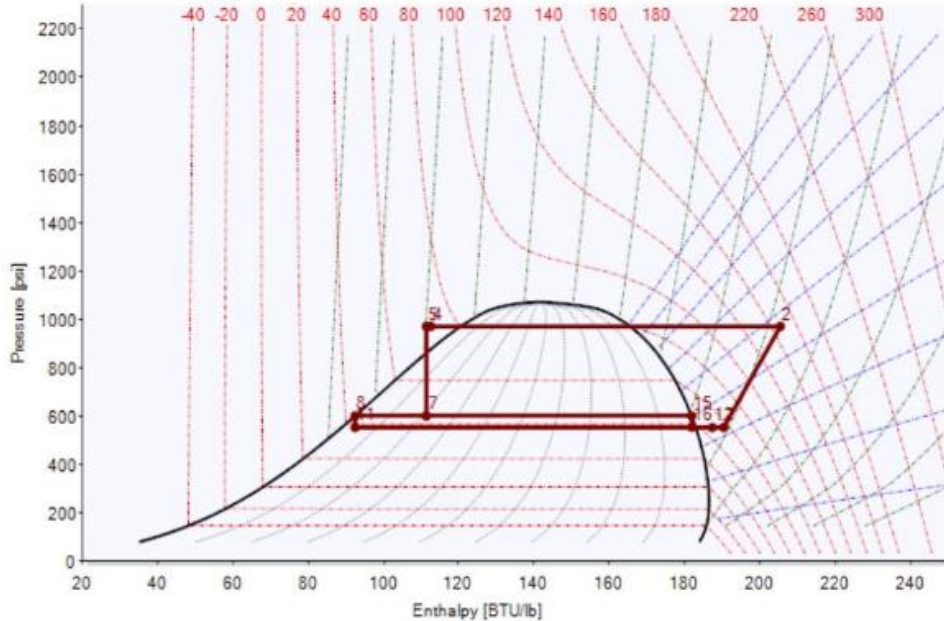
- Refrigerant GWP<10
- Synthetic refrigerants (HFC's and HFO's) break down into **PFAS** aka "**forever chemicals**" in the atmosphere
  - per and polyfluoroalkyl substances
  - EPA: Widely used, long-lasting chemicals, components of which break down very slowly over time
  - PFAS are being found in water supplies
  - Linked to health issues
  - Currently being phased out by Europe Legislation passed by European Parliament starting in 2026 and 2028
- HFCs like R-410A, R-134A, R-454B break down into **>20% PFAS**
- HFOs like R-1234yf break down into **100% PFAS**



# CO2 (R-744) HEAT PUMPS FOR SPACE HEATING

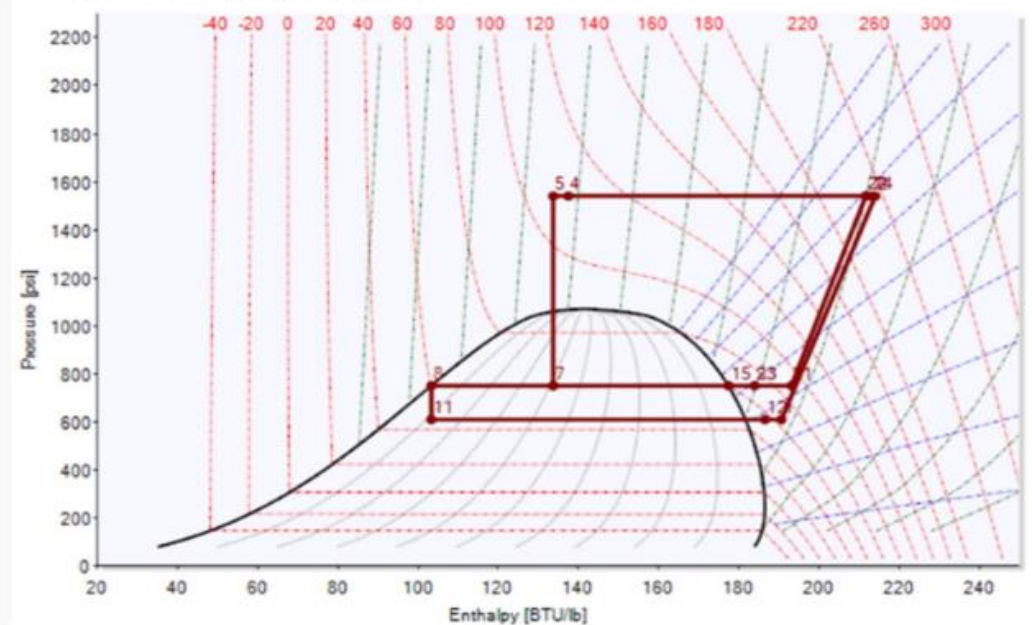
## Subcritical

Refrigerant condenses in the condenser



## Transcritical

Refrigerant does NOT condense in the condenser

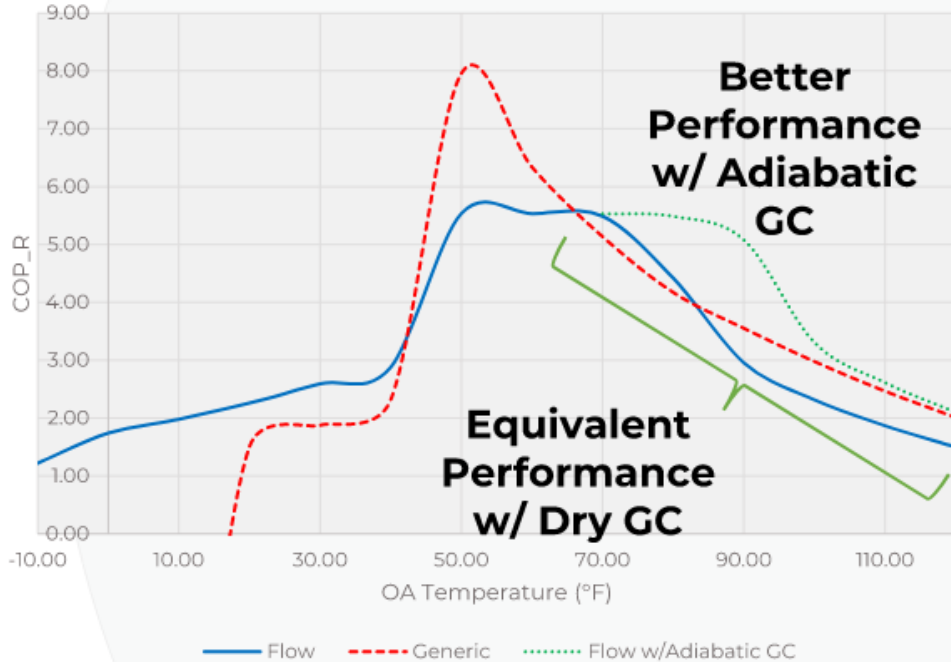


Graphic by: FLOW ENVIRONMENTAL SYSTEMS

# CO2 (R-744) HEAT PUMPS FOR SPACE HEATING

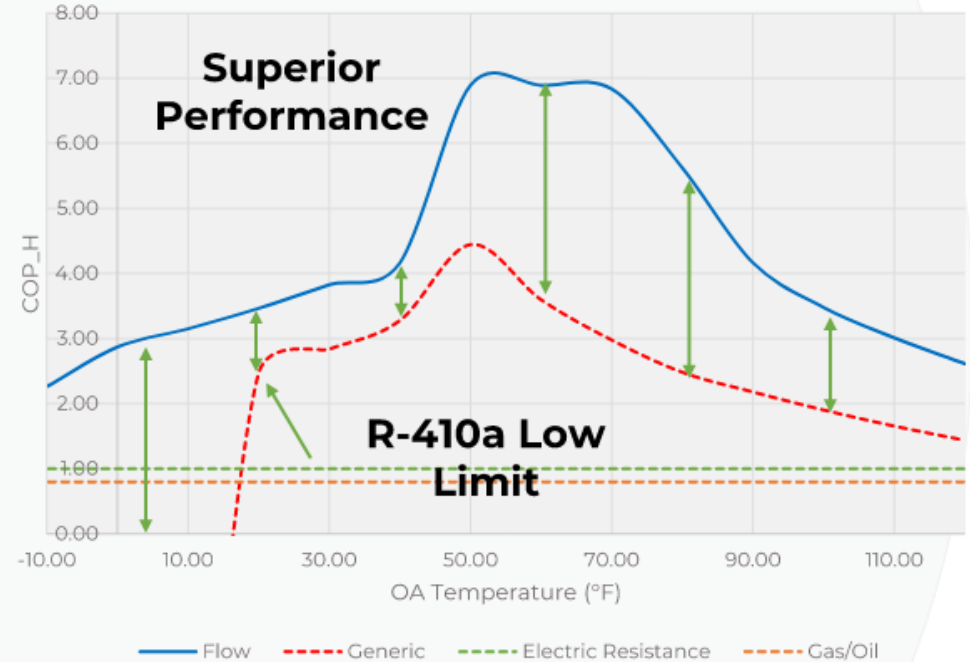
## Cooling COP

Flow Heat Pump vs Standard HFC Heat Pump



## Heating COP

Flow Heat Pump vs Standard HFC Heat Pump



Graphic by: FLOW ENVIRONMENTAL SYSTEMS



RUSHING

Not to be distributed without permission.

# MANY NEW HEAT PUMP SPACE HEATING PRODUCTS COMING!

 **MULTISTACK**

 **oilon**

 **YORK**

 **HECOCLIMA**  
Heating & Cooling Solutions

 **SHARC**  
ENERGY

 **Ecogreen**<sup>®</sup>

 **DAIKIN**

 **WU** Flow  
Environmental  
Systems Inc

 **AERMEC**

 **TRANE**<sup>®</sup>

 **BlueBox**  
by Swegon

 **CLIMA COOL**<sup>®</sup>  
A NIBE GROUP MEMBER

 **AIR**  
ADVANCE INDUSTRIAL REFRIGERATION

 **TRANSOM**

 **Galletti**

*...and more*

# COMPLIANT EQUIPMENT AVAILABILITY

## Available now:

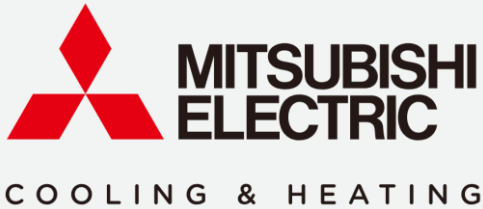
- PTAC/PTHP
- Monoblock Heat Pumps
- Air To Water Heat Pumps
- Air and Water Cooled Chillers
- Heat Recovery Chillers
- Water To Water Heat Pumps

## Not yet Available:

- Mini Splits
  - Single manufacturer available now
  - Others 2024-2025
- VRF – Available 2024-2026
- Rooftop Package Units – 2024-2025



# MANY NEW POTABLE WATER HEAT PUMP PRODUCTS COMING!



Intellihot



*...and more*



# WAC 173-443 POSSIBLE PUBLIC COMMENT RECAP



- No Chiller Heat Pump Exemptions for Building Permits by Effective Date of this Chapter
- Effective Date of this Chapter:
  - January X, 2024
  - Building permit only: Add mechanical permit under 2018 IMC or earlier
- 4-pipe heat recovery chiller – controlled to CHWS temp only – 2024 or 2025?
- GWP for refrigerants not in IPCC AR5 (2013)
- Does VTHP fall into PTHP Table 3 Category?
- No definition of System?
- Refrigerant management thresholds per System or per Building/Facility?
- Does manufacturer internal automatic leak detection technology qualify?

# HOW TO PARTICIPATE



Public Hearing online ([webinar](#))

August 24, 2023, 10am

Written public comments due by  
5pm (PST) on August 31, 2023

<https://aq.ecology.commentinput.com/?id=trCUMYBx2G>

# QUESTIONS?

Please raise  
your hand!



RUSHING

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