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Quick Guide on Changing Refrigerant Requirements

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QUICK GUIDE FOR DESIGNERS ON CHANGING REFRIGERANT REQUIREMENTS

This quick guide is intended to provide a simple summary of changing refrigerant requirements for HVAC applications based on Federal and California regulations. Though there are broader implications for other industries (including industrial and transportation), this guide focuses on commercial HVAC applications.

BACKGROUND:

The Kigali Amendment (2016) is an international agreement to the Montreal Protocol that phases down global production and consumption of hydrofluorocarbons (HFCs) due to their high global warming potential (GWP). The United States formally ratified the Kigali Amendment in 2022, committing to reduce HFC consumption by 85% below baseline levels by 2036.

The EPA's [Significant New Alternatives Policy \(SNAP\) Program](#), established under Section 612 of the Clean Air Act, manages substitutes for ozone-depleting substances and regulates refrigerant acceptability by end use. However, a 2017 D.C. Circuit Court ruling limited the EPA's authority under SNAP, determining that it could not require the replacement of non-ozone-depleting substances (such as HFCs).

To restore regulatory authority, Congress passed the [American Innovation and Manufacturing \(AIM\) Act](#) of 2020, granting the EPA explicit authority to phase down HFCs in alignment with Kigali. Under this authority, the EPA issued the [Technology Transitions Rule](#) (TTR) in 2023, which sets timelines for transitioning away from high-GWP refrigerants in new equipment across multiple sectors. Some subsequent rulemakings have proposed or adopted modifications to portions of the initial TTR requirements. The AIM Act mandates an 85% reduction in HFC production and consumption by 2036, consistent with Kigali, and provides the EPA with authority to issue additional regulations beyond the current TTR to achieve future phase-down steps.

Several states have enacted their own refrigerant regulations. California's Cooling Act (SB 1013) adopted HFC restrictions similar to those in prior federal SNAP rules and was implemented through [California Air Resources Board \(CARB\) regulations](#). [California SB 1206](#) further restricts the sale and distribution of high-GWP HFCs.

IMPLICATIONS:

The transition away from high-GWP HFCs is driving a shift in the commercial HVAC industry toward alternative refrigerant classes. Whereas most commercial HVAC systems have historically used A1 safety group refrigerants (as defined by ASHRAE Standard 34: *low toxicity, non-flammable*), new regulations increasingly favor A2L refrigerants (*low toxicity, mildly flammable*).

The mild flammability of A2L refrigerants has important design and code implications, particularly regarding machinery room requirements and safety controls in ASHRAE Standard 15 (see summary on third page). For high probability systems (direct expansion), Standard 15 limits the allowable refrigerant charge so that a worst-case leak does not produce concentrations exceeding the refrigerant's allowable limit (RCL) in the smallest occupiable space. Because A2L refrigerants have lower RCL values than A1 refrigerants, they are subject to stricter charge limits. Compliance strategies include using smaller system charges, connecting adjacent spaces to increase effective room volume, or incorporating mitigation features such as leak detection and automatic ventilation. Additional installation restrictions also apply.

Properties of some common refrigerants in commercial HVAC are summarized on the third page. Alternative refrigerants under consideration include:

- R-290 (propane, A3): Common in international markets, but generally restricted from most U.S. commercial comfort-cooling applications due to its high flammability.
- R-717 (ammonia, B2L): Permitted for indirect, low-probability systems (e.g., chillers located outdoors or in machinery rooms) but rarely used in commercial HVAC due to toxicity and code complexity.
- R-744 (CO₂, A1): Transcritical operation limits applications; high costs due to very high operating pressure.

OTHER REFERENCES:

[HVAC Industry Refrigerant Update \(Trane\)](#)

[HFC Policy Tracker by State \(North American Sustainable Refrigeration Council\)](#)

FEDERAL/EPA REGULATIONS¹

Self-contained products must be **manufactured** by compliance date. Field-built systems must be **installed** by compliance date.

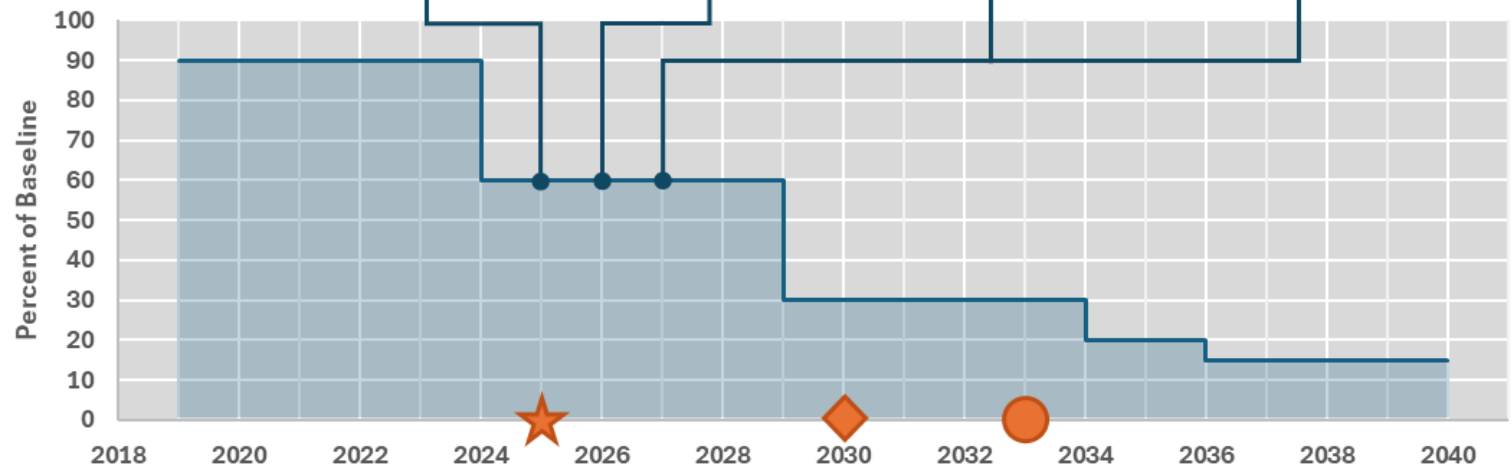
Comfort Cooling
Chillers and
Stationary
AC/HP Products
> 700 GWP

Field-built
Stationary
AC/HP
Systems
> 700 GWP

Data centers,
CRAC, and IT
equipment
cooling
> 700 GWP

VRF > 700 GWP
installation
extension if
components made
before 1/1/26

Kigali Amendment Schedule for HFC Phase-Down in U.S.



CALIFORNIA REGULATIONS²

Systems/products must be **installed** by compliance date

Light
Stationary
AC
> 750 GWP

Comfort
Cooling
Chillers
> 750 GWP

Other
Stationary
AC
> 750 GWP

VRF
> 750 GWP

BAN ON SALE OF BULK HFCs*

★ 2025: GWP > 2,200

◆ 2030: GWP > 1,500

● 2033: GWP > 750

*unless reclaimed

1: Per Federal regulations, a *self-contained product* is functional upon leaving a factory. A *field-built system* is assembled and charged in the field using multiple components. An [EPA proposal](#) would remove the current 1/1/26 installation deadline for stationary residential and light commercial AC/HP systems using components manufactured or imported by 1/1/25.

2: Per California regulations, light stationary AC refers to room/wall/window AC, PTACs, PTHPs, portable AC, and residential dehumidifiers

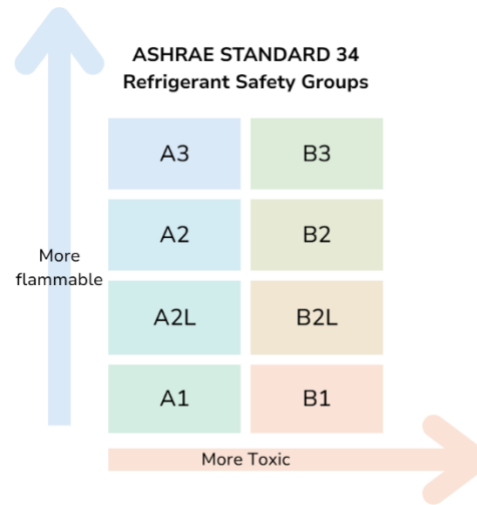
FEDERAL REGULATIONS

EPA Technology Transitions Rule

- Prohibits manufacturing, import, sale, installation, or export of equipment using HFCs in some sectors
- Excludes existing products/systems installed or in-use before deadline
- Sell-through period for some self-contained products of 3 years after manufacturing deadline

Rule by the EPA pertaining to VRF (12/12/24)

- Allows installation of VRF systems (>65 kBtu/hr) until 1/1/27 if manufactured in the US or imported by 2026
- Allows installation of VRF systems until 1/1/28 if a building permit was issued by 10/5/23



CALIFORNIA REGULATIONS

CA Significant New Alternatives Policy (SNAP) Program (SB 1013 + CARB regulations)

- More stringent deadlines for some subsectors and additional requirements for state-owned equipment

Senate Bill 1206

- Limits sale of bulk HFCs refrigerants (unless reclaimed)
- GWP > 2,200 in 2025; > 1,500 in 2030; > 750 in 2033

COMMON HVAC REFRIGERANTS

Refrigerant	Pressure Conditions	GWP (kg CO ₂ eq)	ASHRAE Class
R-123	Low	77	B1
R-514A	Low	1.7	B1
R-1233zd(E)	Low	1	A1
R-134a	Medium	1430	A1
R-513A	Medium	630	A1
R-515B	Medium	298	A1
R-1234yf	Medium	6	A2L
R-1234ze(E)	Medium	4	A2L
R-410A	High	2088	A1
R-454B	High	467	A2L
R-32	High	675	A2L
Low-pressure applications: large centrifugal compressors			
Medium-pressure applications: screw and smaller centrifugal compressors			
High-pressure applications: scroll compressors, unitary and packaged equipment			

ASHRAE STANDARD 15 MACHINERY ROOM REQUIREMENTS

Focus	A1 Refrigerants	A2L Refrigerants
Construction	Self-closing doors (8.9.2)	Non-combustible, 1-hr rated construction (8.11.3) Self-closing fire doors (8.11.2) Pipe penetrations tightly sealed (8.11.5)
Emergency shutdown button	None	Located outside door (8.11.7)
Emergency ventilation	Mechanical ventilation with detections above limit (8.9.8)	Mechanical ventilation with detections above limit, ventilation rate ~5X to 20X higher than A1 rate, additional inlet requirements
Additional Measures	None	Upon detection above limit, automatically de-energize refrigerant equipment and unclassified electrical devices > 1 kVA (8.11.6.2)
Note: This is a simplified summary comparing key machinery room requirements. See Standard 15 or applicable codes for more information or for differences in requirements for high probability systems or for other refrigerant classifications		