



STATE OF VERMONT

Agency of Natural Resources

**Chapter 38: Rules regarding phase-down of the use of
Hydrofluorocarbons**

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Table of Contents

SUBCHAPTER 1 – GENERAL PROVISIONS.....	1
§ 38-101. Authority	1
§ 38-102. Purpose.....	1
§ 38-103. Applicability	1
§ 38-104. Severability	1
§ 38-105. Enforcement.....	1
SUBCHAPTER 2 – DEFINITIONS	2
SUBCHAPTER 3 – PROHIBITIONS	8
§ 38-301. Prohibitions.....	8
Table 1: End-use and Prohibited Substitutes.....	8
§ 38-302. Exemptions and Special Use Conditions	12
Table 2: Special Use Conditions for prohibited substitutes.....	12

SUBCHAPTER 1 – GENERAL PROVISIONS

§ 38-101. Authority

These Rules are adopted by the Secretary of the Agency of Natural Resources pursuant to the authority granted by Act 65 § 2(a) (2019).

§ 38-102. Purpose

The purpose of this Rule is to achieve greenhouse gas emissions reductions through the phase out of high global warming potential hydrofluorocarbons (HFCs) in air conditioning and refrigeration equipment, aerosol propellants, and foam end-uses.

§ 38-103. Applicability

This Rule applies to any person who offers a product or equipment for sale, lease, or rent, or who installs or otherwise causes any equipment or product to enter into commerce in Vermont if that equipment or product consists of, uses, or will use a prohibited substitute in an end use listed in Section 37-301 of this Rule, unless an end use is subject to an exemption or special use condition listed in Section 37-302 of this Rule.

§ 38-104. Severability

The provisions of these Rules shall be severable. If any provision of these Rules or any application of these Rules to any person or circumstance is deemed to be invalid by a court of competent jurisdiction, the invalidity shall not affect other provisions or applications that can be given effect without the invalid provision or application.

§ 38-105. Enforcement

Each sale, lease, rental, installation or cause of any equipment or product to enter into commerce in Vermont in violation of any of the requirements of this Rule shall constitute a separate violation.

SUBCHAPTER 2 – DEFINITIONS

For the purposes of this Rule, the following definitions shall apply:

“Aerosol Propellant” means a liquefied or compressed gas that is used in whole or in part, such as a cosolvent, to expel a liquid or other material from the same self-pressurized container or from a separate container.

“Air Conditioning Equipment” means chillers, both centrifugal chillers and positive displacement chillers, intended for comfort cooling of occupied spaces.

“Capital Cost” means an expense incurred in the production of goods or in rendering services, including but not limited to the cost of engineering; purchase and installation of components or systems, and instrumentation, and contractor and construction fees.

“Centrifugal Chiller” means air conditioning equipment that utilizes a centrifugal compressor in a vapor-compression refrigeration cycle. Under this definition, a centrifugal chiller is a chiller intended for comfort cooling and does not include chillers used for industrial process cooling and refrigeration.

“Chiller” means a water or heat transfer fluid chilling equipment package custom built in place, or a factory-made and prefabricated assembly of one (1) or more compressors, condensers and evaporators, with interconnections and accessories including controls, designed for the purpose of cooling water or a heat transfer fluid. A chiller is a machine specifically designed to make use of a vapor compression refrigeration 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 centrifugal chillers, and positive displacement chillers, including reciprocating, scroll, and screw chillers.

“Class I substance” and *“class II substance”* mean those substances listed in the 42 U.S.C. § 7671a, as it read on November 15, 1990 and Appendix A or B of Subpart A of 40 C.F.R. Part 82, as those read on January 3, 2017.

“Cold Storage Warehouse” means a cooled facility designed to store meat, produce, dairy products, and other products that are delivered to other locations for sale to the ultimate consumer.

“*Component*” means a part of a refrigeration system, including but not limited to condensing units, compressors, evaporators, and receivers; and all of its connections and subassemblies, without which the refrigeration system will not properly function or will be subject to failures.

“*Cumulative Replacement*” means all additions or changes in multiple components within a three-year period.

“*Effective Date*” or “*Effective Date of Prohibition*” means the date after which the prohibitions provided in Subchapter 3 of this Rule go into effect.

“*End-use*” means processes or classes of specific applications within industry sectors, including but not limited to those listed in Subchapter 3 of this Rule.

“*Flexible Polyurethane*” means a non-rigid polyurethane foam, including but not limited to that used in furniture, bedding, and chair cushions.

“*Foam*” means a product with a cellular structure formed via a foaming process in a variety of materials that undergo hardening via a chemical reaction or phase transition.

“*Foam Blowing Agent*” means a substance that functions as a source of gas to generate bubbles or cells in the mixture during the formation of foam.

“*Household Refrigerators and Freezers*” means refrigerators, refrigerator-freezers, freezers, and miscellaneous household refrigeration appliances intended for residential use. For the purposes of this regulation, “household refrigerators and freezers” does not include “household refrigerators and freezers - compact”, or “household refrigerators and freezers - built-in.”

“*Household Refrigerators and Freezers Compact*” means any refrigerator, refrigerator-freezer or freezer intended for residential use with a total refrigerated volume of less than 7.75 cubic feet (220 liters).

“*Household Refrigerators and Freezers - Built-in*” means any refrigerator, refrigerator-freezer or freezer intended for residential use with 7.75 cubic feet or greater total volume and 24 inches or less depth not including doors, handles, and custom front panels; with sides which are not finished and not designed to be visible after installation; and that is designed, intended, and marketed

exclusively to be: installed totally encased by cabinetry or panels that are attached during installation and securely fastened to adjacent cabinetry, walls or floor; and equipped with an integral factory-finished face or accept a custom front panel.

“Hydrofluorocarbons” means a class of greenhouse gases that are saturated organic compounds containing hydrogen, fluorine, and carbon.

“Integral Skin Polyurethane” means a self-skinning polyurethane foam, including but not limited to that used in car steering wheels and dashboards.

“Metered Dose Inhaler,” or *“Medical Dose Inhaler,”* or *“MDI”* means a device that delivers a measured amount of medication as a mist that a patient can inhale, typically used for bronchodilation to treat symptoms of asthma, chronic obstructive pulmonary disease (COPD), chronic bronchitis, emphysema, and other respiratory illnesses. An MDI consists of a pressurized canister of medication in a case with a mouthpiece.

“New” means: (a) Products or equipment that are manufactured on or after the effective date of the prohibitions in Section 301 of this Rule; (b) Products or equipment first installed for an intended purpose with new or used components on or after the effective date of the prohibitions in Section 301 of this Rule; (c) Products or equipment expanded by the addition of components to increase system capacity on or after the effective date of the prohibitions in Section 301 of this Rule; or (d) Products or equipment replaced or cumulatively replaced such that the cumulative capital cost on or after the effective date of the prohibition in Section 301 of this Rule of replacement exceeds 50% of the capital cost of replacing the whole system.

“Person” means an individual, partnership, corporation, association, unincorporated organization, trust, or any other legal or commercial entity, including a joint venture or affiliated ownership. The word "person" also means any subdivision, agency, or instrumentality of this State, of any other state, of the United States, or of any interstate body.

“Phenolic Insulation Board and Bunstock” means phenolic insulation including but not limited to that used for roofing and walls. Bunstock or bun stock is a large solid box-like structure formed during the production of polystyrene insulation.

“Polyolefin” means foam sheets and tubes made of polyolefin, a macromolecule formed by the polymerization of olefin monomer units.

“Polystyrene Extruded Boardstock and Billet (XPS)” means a foam formed from polymers of styrene and produced on extruding machines in the form of continuous foam slabs which can be cut and shaped into panels used for roofing, walls, flooring, and pipes.

“Polystyrene Extruded Sheet” means polystyrene foam including that used for packaging and buoyancy or floatation. It is also made into food-service items, including hinged polystyrene containers (for "take-out" from restaurants); food trays (meat and poultry) plates, bowls, and retail egg containers.

“Polyurethane” means a polymer formed principally by the reaction of an isocyanate and a polyol and which would include polyisocyanurate (‘polyiso’).

“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.

“Refrigerant” or *“Refrigerant Gas”* means any substitute, including blends and mixtures, that is used for heat transfer purposes.

“Refrigerated Food Processing and Dispensing Equipment” means retail food refrigeration equipment that is designed to process and dispense food and beverages that are intended for immediate or near-immediate consumption, including but not limited to chilled and frozen beverages, ice cream, and whipped cream. This end use excludes water coolers and units designed solely to cool and dispense water.

“Refrigeration Equipment” means any stationary device that is designed to contain and use refrigerant gas to establish or maintain colder than ambient temperatures in a confined space, including but not limited to retail or commercial refrigeration equipment, household refrigerators and freezers, and cold storage warehouses.

“Remote Condensing Units” means retail refrigeration equipment or units that have a central condensing portion and may consist of one or more compressors, condensers, and receivers assembled into a single unit, which may be located external to the sales area. The condensing portion (and often other parts of the system) is located outside the space or area cooled by the evaporator. Remote

condensing units are commonly installed in convenience stores, specialty shops (e.g., bakeries, butcher shops), supermarkets, restaurants, and other locations where food is stored, served, or sold.

“Retail Food Refrigeration” or *“Commercial Refrigeration”* means equipment designed to store and display chilled or frozen goods for commercial sale including but not limited to stand-alone units, refrigerated food processing and dispensing equipment, remote condensing units, supermarket systems, and vending machines.

“Retrofit” means to convert an appliance from one refrigerant to another refrigerant. Retrofitting includes the conversion of the appliance to achieve system compatibility with the new refrigerant and may include, but is not limited to, changes in lubricants, gaskets, filters, driers, valves, o-rings or appliance components.

“Rigid Polyurethane and Polyisocyanurate Laminated Boardstock” means laminated board insulation made with polyurethane or polyisocyanurate foam, including that used for roofing and walls.

“Rigid Polyurethane Appliance Foam” means Polyurethane foam in domestic appliances used for insulation.

“Rigid Polyurethane Commercial Refrigeration and Sandwich Panels” means polyurethane foam, used to provide insulation in walls and doors, including that used for commercial refrigeration equipment, and used in doors, including garage doors.

“Rigid Polyurethane High-pressure Two-component Spray Foam” means a liquid polyurethane foam system sold as two parts (i.e., A-side and B-side) in non-pressurized containers; and is field or factory applied in situ using high-pressure proportioning pumps at 800-1600 pounds per square inch (psi) and an application gun to mix and dispense the chemical components.

“Rigid Polyurethane Low-pressure Two-component Spray Foam” means a liquid polyurethane foam system sold as two parts (i.e., A-side and B-side) in containers that are pressurized to less than 250 psi during manufacture of the system for application without pumps; and are typically applied in situ relying upon a liquid blowing agent and/or gaseous foam blowing agent that also serves as a propellant.

“Rigid Polyurethane Marine Flotation Foam” means buoyancy or flotation polyurethane foam used in boat and ship manufacturing for both structural and flotation purposes.

“Rigid Polyurethane One-component Foam Sealants” means a polyurethane foam generally packaged in aerosol cans that is applied in situ using a gaseous foam blowing agent that is also the propellant for the aerosol formulation.

“Rigid Polyurethane Slabstock and Other” means a rigid closed-cell polyurethane foam formed into slabstock insulation for panels and fabricated shapes for pipes and vessels.

“Stand-alone Unit” means retail refrigerators, freezers, and reach-in coolers (either open or with doors) where all refrigeration components are integrated and the refrigeration circuit may be entirely brazed or welded. These systems are fully charged with refrigerant at the factory and typically require only an electricity supply to begin operation.

“Stand-alone Low-Temperature Unit” means a stand-alone unit that maintains food or beverages at temperatures at or below 32°F (0 °C).

“Stand-alone Medium-Temperature Unit” means a stand-alone unit that maintains food or beverages at temperatures above 32°F (0 °C).

“Substitute” means any chemical, product, or alternative manufacturing process, whether new or retrofit, that is used to perform a function previously performed by a class I substance or class II substance or is intended for use in the end-use listed in Subchapter 3 of this Rule, and any substitute subsequently adopted to perform that function, including hydrofluorocarbons.

“Supermarket Systems” means multiplex or centralized retail food refrigeration equipment systems designed to cool or refrigerate, which operate with racks of compressors installed in a machinery room and which includes both direct and indirect systems.

“Vending Machine” means a self-contained unit that dispenses goods that must be kept cold or frozen.

SUBCHAPTER 3 – PROHIBITIONS

§ 38-301. Prohibitions

No person may offer any product or equipment for sale, lease, rent, or install, or otherwise cause any equipment or product to enter into commerce in Vermont that uses a substitute in any end-use listed in the following table.

Table 1: End-use and Prohibited Substitutes.

End-Use Category: Aerosol Propellants

End-Use	Prohibited Substitutes	Effective Date
Aerosol Propellants	HFC-125, HFC-134a, HFC-227ea and blends of HFC-227ea and HFC-134a	January 1, 2021

End-Use Category: Air Conditioning

End-Use	Prohibited Substitutes	Effective Date
Centrifugal chillers (new)	FOR12A, FOR12B, HFC-134a, HFC-227ea, HFC-236fa, HFC245fa, 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, R438A, R-507A, RS-44 (2003 composition), THR-03	January 1, 2024
Positive displacement chillers (new)	FOR12A, FOR12B, HFC-134a, HFC-227ea, KDD6, R125/ 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, R438A, R-507A, RS-44 (2003 composition), SP34E, THR-03	January 1, 2024

End-Use Category: Refrigeration

End-Use	Prohibited Substitutes	Effective Date
Cold storage warehouses (new)	HFC-227ea, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R404A, R-407A, R-407B, R-410A, R-410B, R-417A, R-421A, R421B, R-422A, R-422B, R-422C, R-422D, R-423A, R-424A, R428A, R-434A, R-438A, R-507A, RS-44 (2003 composition)	January 1, 2023

Household refrigerators and freezers (new)	FOR12A, FOR12B, HFC-134a, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R-407F, R-410A, R-410B, R-417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R424A, R-426A, R-428A, R-434A, R-437A, R-438A, R-507A, RS24 (2002 formulation), RS-44 (2003 formulation), SP34E, THR-03	January 1, 2022
Household refrigerators and freezers—compact (new)	FOR12A, FOR12B, HFC-134a, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R-407F, R-410A, R-410B, R-417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R424A, R-426A, R-428A, R-434A, R-437A, R-438A, R-507A, RS24 (2002 formulation), RS-44 (2003 formulation), SP34E, THR-03	January 1, 2021
Household refrigerators and freezers—built in appliances (new)	FOR12A, FOR12B, HFC-134a, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R-407F, R-410A, R-410B, R-417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R424A, R-426A, R-428A, R-434A, R-437A, R-438A, R-507A, RS24 (2002 formulation), RS-44 (2003 formulation), SP34E, THR-03	January 1, 2023
Supermarket Systems (Retrofit)	R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R428A, R-434A, R-507A	January 1, 2021
Supermarket Systems (New)	HFC-227ea, R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R-428A, R-434A, R-507A	January 1, 2021
Remote Condensing Units (Retrofit)	R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R428A, R-434A, R-507A	January 1, 2021
Remote Condensing Units (New)	HFC-227ea, R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R-428A, R-434A, R-507A	January 1, 2021
Stand-Alone Units (Retrofit)	R-404A, R-507A	January 1, 2021
Stand-Alone Medium-Temperature Units (New)	FOR12A, FOR12B, HFC-134a, HFC-227ea, KDD6, R125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R407A, R-407B, R-407C, R-407F, R-410A, R-410B, R417A, R-421A, R-421B, R-422A, R-422B, R-422C, R422D, R-424A, R-426A, R-428A, R-434A, R-437A, R438A, R-507A, RS-24	January 1, 2021

	(2002 formulation), RS-44 (2003 formulation), SP34E, THR-03	
Stand-Alone Low-Temperature Units (New)	HFC-227ea, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407A, R-407B, R-407C, R-407F, R-410A, R-410B, R-417A, R-421A, R-421B, R422A, R-422B, R-422C, R-422D, R-424A, R-428A, R434A, R-437A, R-438A, R-507A, RS-44 (2003 formulation)	January 1, 2021
Refrigerated food processing and dispensing equipment (New)	HFC-227ea, KDD6, R-125/ 290/ 134a/ 600a (55.0/1.0/42.5/1.5), R-404A, R-407A, R-407B, R-407C, R-407F, R-410A, R-410B, R417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R424A, R-428A, R-434A, R-437A, R-438A, R-507A, RS-44 (2003 formulation)	January 1, 2021
Vending Machines (Retrofit)	R-404A, R-507A	January 1, 2021
Vending Machines (New)	FOR12A, FOR12B, HFC-134a, KDD6, R125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R407C, R-410A, R-410B, R-417A, R-421A, R-422B, R422C, R-422D, R-426A, R-437A, R-438A, R-507A, RS-24 (2002 formulation), SP34E	January 1, 2022

End-Use Category: Foams

End-Use	Prohibited Substitutes	Effective Date
Rigid Polyurethane and Polyisocyanurate Laminated Boardstock	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof	January 1, 2021
Flexible Polyurethane	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof	January 1, 2021
Integral Skin Polyurethane	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6	January 1, 2021
Polystyrene Extruded Sheet	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6	January 1, 2021
Phenolic Insulation Board and Bunstock	HFC-143a, HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof	January 1, 2021

Rigid Polyurethane Slabstock and Other	HFC-134a, HFC-245fa, HFC-365mfc and blends thereof; Formacel TI, Formacel Z-6	January 1, 2021
Rigid Polyurethane Appliance Foam	HFC-134a, HFC-245fa, HFC-365mfc and blends thereof; Formacel TI, Formacel Z-6	January 1, 2021
Rigid Polyurethane Commercial Refrigeration and Sandwich Panels	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6	January 1, 2021
Polyolefin	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6	January 1, 2021
Rigid Polyurethane Marine Flotation Foam	HFC-134a, HFC-245fa, HFC-365mfc and blends thereof; Formacel TI, Formacel Z-6	January 1, 2021
Polystyrene Extruded Boardstock and Billet (XPS)	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel B, Formacel Z-6	January 1, 2021
Rigid polyurethane (PU) high-pressure two-component spray foam	HFC-134a, HFC-245fa, and blends thereof; blends of HFC365mfc with at least 4 percent HFC-245fa, and commercial blends of HFC-365mfc with 7 to 13 percent HFC-227ea and the remainder HFC-365mfc; Formacel TI	January 1, 2021
Rigid PU low-pressure two-component spray foam	HFC-134a, HFC-245fa, and blends thereof; blends of HFC365mfc with at least 4 percent HFC-245fa, and commercial blends of HFC-365mfc with 7 to 13 percent HFC-227ea and the remainder HFC-365mfc; Formacel TI	January 1, 2021
Rigid PU one-component foam sealants	HFC-134a, HFC-245fa, and blends thereof; blends of HFC365mfc with at least 4 percent HFC-245fa, and commercial blends of HFC-365mfc with 7 to 13 percent HFC-227ea and the remainder HFC-365mfc; Formacel TI	January 1, 2021

§ 38-302. Exemptions and Special Use Conditions

(a) Except where existing equipment is retrofit, nothing in this Rule shall require a person that acquired a product or equipment used for an end-use listed in Section 301 of this Rule prior to a corresponding end-use effective date to cease use of that product or equipment.

(b) Products or equipment used for an end-use listed in Table 1 of Section 301 of this Rule and manufactured prior to an applicable end-use prohibition effective date in Table 1 (including foam systems not yet applied on site) may be offered for sale, lease, rent, or installed or used after an applicable end-use prohibition effective date in Table 1.

(c) Notwithstanding Section 301 of this Section, the following prohibited substitutes and associated end-use categories are subject to special use conditions in Table 2 below.

Table 2: Special Use Conditions for prohibited substitutes.

End-Use Category	Prohibited Substitutes	Acceptable Uses
Aerosol Propellants	HFC-134a	Cleaning products for removal of grease, flux and other soils from electrical equipment; refrigerant flushes; products for sensitivity testing of smoke detectors; lubricants and freeze sprays for electrical equipment or electronics; sprays for aircraft maintenance; sprays containing corrosion preventive compounds used in the maintenance of aircraft, electrical equipment or electronics, or military equipment; pesticides for use near electrical wires, in aircraft, in total release insecticide foggers, or in certified organic use pesticides for which EPA has specifically disallowed all other lower-GWP propellants; mold release agents and mold cleaners; lubricants and cleaners for spinnerettes for synthetic fabrics; duster sprays specifically for removal of dust from photographic negatives, semiconductor chips, specimens under electron microscopes, and energized electrical equipment; adhesives and sealants in large canisters; document preservation sprays; FDA-approved MDIs for medical purposes; wound care sprays; topical

		coolant sprays for pain relief; and products for removing bandage adhesives from skin.
Aerosol Propellants	HFC-227ea and blends of HFC-227ea and HFC-134a	FDA-approved MDIs for medical purposes.
Air Conditioning	HFC-134a	Military marine vessels where reasonable efforts have been made to ascertain that other alternatives are not technically feasible due to performance or safety requirements.
Air Conditioning	HFC-134a and R-404A	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.
Foams	All substitutes	Military applications where reasonable efforts have been made to ascertain that other alternatives are not technically feasible due to performance or safety requirements until January 1, 2022.
Foams – Except Rigid polyurethane (PU) spray foam	All substitutes	Space- and aeronautics-related applications where reasonable efforts have been made to ascertain that other alternatives are not technically feasible due to performance or safety requirements until January 1, 2025.
Rigid polyurethane (PU) two-component spray foam	All substitutes	Military or space- and aeronautics-related applications where reasonable efforts have been made to ascertain that other alternatives are not technically feasible due to performance or safety requirements until January 1, 2025.