



## Maryland Green Purchasing Committee Approved Specification – Appliances

### **HOW TO USE THIS DOCUMENT:**

This document sets prohibitions and minimum requirements for commercial and residential appliances procured by the State of Maryland with which Contractors are required to comply. Contractors are required to follow and when possible, go beyond these standards in their product offerings to the maximum extent practicable where such products are cost competitive and meet form, function and utility requirements.

This document also includes additional environmentally desirable attributes that offered products are encouraged to meet or exceed, to the maximum extent practicable, whenever they are cost-competitive (using a total cost of ownership assessment) and meet form, function and utility requirements. Environmentally desirable practices are also included that Contractors are encouraged to follow.

### **PRODUCTS COVERED UNDER THIS SPECIFICATION:**

Air Purifiers	Refrigerators (Commercial and Domestic)
Clothes Washer	Compact
Coffee Brewers	Full-Sized
Dehumidifiers	Laboratory Grade
Dishwashers	Under Counter
Electric Hand Dryers	Refrigerator-Freezers (Commercial and Domestic)
Freezers (Commercial and Domestic)	Room Air Conditioners
Compact	Steam Cookers
Full-Sized	Vending Machines
Laboratory Grade	Water Coolers
Fryers	
Griddles	
Hot Food Holding Cabinets	
Ice Makers	
Ovens	

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### 1. ENVIRONMENTALLY PREFERABLE PURCHASING: LEGISLATION, STATUTES, AND REGULATIONS

#### *For Procurement Officers and Agencies*

##### **Environmentally Preferable Purchasing** (COMAR: [21.11.07.09](#))

“All procurement agencies shall purchase environmentally preferable products and services unless purchasing environmentally preferable products and services would limit or supersede any requirements under any provision of law or result in the purchase of products and services that:

- (1) Do not perform adequately for the intended use;
- (2) Exclude adequate competition; or
- (3) Are not available at a reasonable price in a reasonable period of time.”

##### **Mercury and Products that Contain Mercury** (COMAR: [21.11.07.07](#))

“All procurement agencies shall give a preference under this regulation to procuring products and equipment that are mercury-free. If mercury-free products and equipment that meet the agency's product performance requirements are not commercially available, the procurement agency shall give preference under this regulation to products containing the least amount of mercury necessary to meet performance requirements.”

##### **Efficient Product Purchase Goal** ([Executive Order 01.01.2001.02](#))

“The State shall purchase ENERGY STAR products when purchasing energy-using products, including computers, printers, copiers and other office equipment, or shall purchase products in the top 25% in energy efficiency for products where labels are not available.”

##### **Low Noise Emission Products** ([§14-403](#))

“To the extent practicable, each unit of the State government shall buy or lease for use by the State government supplies that are the quietest available supplies. Supplies that are certified as low-noise-emission products under the federal Noise Control Act of 1972 are considered to meet [this requirement].”

##### **Limitations on Hazardous Substances** (Environment Article [§6-1201](#) *et seq.*)

A person may not manufacture, process, sell, or distribute in the State a new product or flame-retardant part of a new product that contains more than one-tenth of 1% of pentaBDE (pentabrominated diphenyl ether) or octaBDE (octabrominated diphenyl) by mass.”

“A person may not manufacture, lease, sell, or distribute for sale or lease in the State electrical or electronic equipment that contain more than one-tenth of 1% of decaBDE (decabrominated diphenyl ether) by mass.”

##### **Maryland High Performance Buildings Act** (State Finance and Procurement Article [§3-602.1](#))

“The State shall employ green building technologies when constructing or renovating a State building not subject to this section; and (2) high performance buildings shall meet the criteria and standards established under the “High Performance Green Building Program” adopted by the Maryland Green Building Council. “Major renovation” means the renovation of a building where: (i) the building shell is to be reused for the new construction; (ii) the heating, ventilating, and air conditioning (HVAC),

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electrical, and plumbing systems are to be replaced; and (iii) the scope of the renovation is 7,500 square feet or greater.”

### **Prohibitions on the Use of Hydrofluorocarbons in Certain End Uses** ([COMAR: 26.11.33](#))

Maryland will begin phasing out the use of hydrofluorocarbon (HFCs) emissions in certain end uses in 2021 by adopting specific United States EPA Significant New Alternatives Policy Program’s (SNAP) prohibitions derived from SNAP Program Rules 20 and 21.

### *For Contractors, Bidders, and Offerors*

#### **Verifying Environmental Claims** (State Finance and Procurement Article [§14-410](#))

“A bidder or offeror for a procurement contract shall certify in writing that any claims of environmental attributes made relating to a product or service are consistent with the Federal Trade Commission’s Guidelines for the Use of Environmental Marketing Terms.”

## 2. PROHIBITED PRODUCTS

- Pursuant to Environment Article §6-1201-1204, products containing more than one-tenth of 1% of pentaBDE, octaBDE, or decaBDE by mass are prohibited.
- Pursuant to COMAR 21.11.07.07, products that contain mercury are prohibited, unless there are no commercially available mercury-free products for a specific application. In such cases, the Contractor must offer products containing the least amount of mercury necessary to meet performance requirements.

The Contractor must clearly label in its bid/offer all products that contain mercury.

- Pursuant to Environment Article §9-1901-1907, the Contractor is prohibited from offering or using packaging or packaging components (e.g. inks, dyes, pigments, adhesives, stabilizers, and additives) with lead, cadmium, mercury or hexavalent chromium at concentration levels exceeding 100 parts per million by weight or 0.01%.
- Equipment employing Chlorofluorocarbon (CFC)-based refrigerants are prohibited.
- The use of Hydrofluorocarbons (HFCs) in certain end-uses are prohibited. HVAC system and equipment purchases must comply with Maryland’s HFC prohibitions **effective immediately**.

*Please refer to Appendix B for a full list of prohibitions and exceptions.*

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### 3. MINIMUM REQUIREMENTS

#### A. Product Requirements

- All refrigerant-using products must utilize low global warming potential (GWP) substitutes approved under the U.S. EPA’s Significant New Alternative Policy (SNAP) program.
  - *High GWP refrigerants (e.g. HFCs) are primarily used in the heating and cooling sectors (e.g. refrigerators, vending machines, air conditioners, etc..).*
  - *SNAP’s acceptable refrigerants by end-use can be found at <https://www.epa.gov/snap/snap-substitutes-sector>. These substitutes can also be filtered by Retrofit or New, and sorted by GWP.*

#### I. Energy Efficiency Requirements

- **All products listed below** must be ENERGY STAR certified, using the most recent version of the ENERGY STAR certification system in effect at the time of purchase or if applicable, be compliant with the California Title 20 Appliance Efficiency Standards.
  - ▶ Air Purifiers
  - ▶ Clothes Washer (Commercial and Domestic)
  - ▶ Clothes Dryers
  - ▶ Commercial Coffee Brewers
  - ▶ Commercial Dishwashers
  - ▶ Commercial Fryers
  - ▶ Commercial Griddles
  - ▶ Commercial Hot Food Holding Cabinets
  - ▶ Commercial Ice Makers
  - ▶ Commercial Ovens
  - ▶ Commercial Steam Cookers
  - ▶ Dehumidifiers
  - ▶ Freezers (Commercial and Domestic)
    - ◆ Compact
    - ◆ Full-Sized
    - ◆ Laboratory Grade
  - ▶ Refrigerators (Commercial and Domestic)
    - ◆ Compact
    - ◆ Full-Sized
    - ◆ Laboratory Grade
  - ▶ Refrigerator-Freezers (Commercial and Domestic)
  - ▶ Room Air Conditioners
  - ▶ Vending Machines
  - ▶ Water Coolers

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- **Electric Hand Dryers** must meet the following criteria:
  - ▶ Be certified by Underwriters Laboratory, Inc., with UL labels;
  - ▶ Have a minimum 5-year limited warranty;
  - ▶ Adhere to ADA protrusion requirements;
  - ▶ Have a one-piece, heavy duty, vandal and rust resistant cover;
  - ▶ Be manufactured by a company specializing in Electric Hand Dryers with a minimum of 5 years' experience;
  - ▶ Offer complete hands-free operation including automatic optical sensor for on/off operation;
  - ▶ Have the ability to dry hands in 15 seconds or less with maximum 135-degree Fahrenheit;
  - ▶ Have internal air filtration;
  - ▶ Possess a sound level of not more than 80dB;
  - ▶ Operate on a maximum 15-amp branch circuit;
  - ▶ Be able to provide unheated and heated air; and
  - ▶ If heated air is used, the ability to provide an automatic thermostat-controlled wire element heater.
- Products that are not covered by the ENERGY STAR certification and excluding electric hand dryers must be in the top 25% in energy efficiency for products.

Evidence of the product's high efficiency rating must be submitted with the bid/offer.

### B. Preventative Maintenance, Service and Repair Requirements for New and Existing Equipment

- 1) Pursuant to EPA regulations found in 40 CFR Part 82, Subpart F, technicians who maintain, service, or repair equipment that may release refrigerants must possess the Section 608 Technician Certification.
- 2) Contractors must ensure HFC and HFC blend refrigerants are captured and reclaimed from existing equipment to reduce the production of new HFCs, to the maximum extent practicable. Technicians must demonstrate that they have the proper certifications and refrigerant recovery and recycling equipment prior to performing work.
- 3) Contractors are encouraged to use certified reclaimed refrigerant for routine servicing, maintenance or repair.
- 4) Commercial Refrigeration Systems
  - To ensure energy efficient operations are optimized and refrigerant emissions are reduced, Contractor shall ensure technicians follow best practices for all preventative maintenance checks, servicing, and repairs. Technicians shall perform regular leak prevention checks at a schedule appropriate for the equipment end-use and determined by the State or as required by law. \*

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- ▶ US EPA’s GreenChill provides best practices for [Refrigerant Leak Prevention through Regular Maintenance](#) and [Commercial Refrigeration Leak Prevention & Repair](#).

### C. End-of-Life Requirements

- 1) Contractors must notify purchasers of any available take-back service for reuse, refurbishment, and/or recycling for purchased and previously purchased equipment, including information on how to utilize the service. This information shall be made available to the purchasing State agency at time of purchase through written or online documentation.
- 2) Pursuant to Section 608 of the Clean Air Act, ozone-depleting substance (ODS) and HFC refrigerants may not be vented from appliances. \*
- 3) Under EPA regulations at [40 CFR Part 82, Subpart F](#), technicians who dispose of equipment that may release refrigerants must possess the [608 Technician Certification](#).
- 4) Before disposing of any appliance containing more than 5 pounds of refrigerants, a Section 608 Certified technician must recover the refrigerant to ensure it is not released into the environment. Refrigerants of different types should be separated.
- 5) In accordance with Section 608 of the Clean Air Act, refrigerant recovery and recycling equipment must meet the requirements set forth in [Appendix B2, B3, and B4 to 40 CFR 82, Subpart F](#).
- 6) Contractors installing new refrigerators, freezers, or other appliances and removing old appliances must certify that old products are properly recycled or disposed. Contractors must be able to provide evidence of appliance’s proper disposal to the State upon request.
  - Small appliances may be disposed of through the **Responsible Appliance Disposal (RAD) program** referenced below.
    - ▶ Contractors are encouraged to recycle old appliances using a Partner in the US EPA’s [Responsible Appliance Disposal \(RAD\) program](#). Partners in the RAD program go beyond federal requirements by responsibly recycling equipment using the best environmental practices available. Recycling facilities servicing RAD partners can be found [here](#).
    - ▶ The RAD Program also provides [Example Language for Procuring Refrigerated Appliance Recycling Services Using Best Environmental Practices](#).
    - ▶ Contractors are encouraged to consider becoming a Partner - or an Affiliate (as appropriate) in the EPA’s RAD program.

*\*Please note that R-600 (isobutane) R-441A (a blend of ethane, propane, n-butane and isobutane) in household refrigerators, freezers, and combination refrigerators and freezers, and R-290 (propane) in retail food refrigerators and freezers (stand-alone units only are exempt*

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*from the venting prohibition because EPA has determined that their emissions do not pose a threat to the environment).*

### D. HFC Tracking and Reporting Requirements

- Contractor shall require contractors or technicians to track and report on the amounts of refrigerants, including HFCs and HFC blends, added or removed during routine installation, maintenance, service, repair, and disposal of all equipment, appliances, and supplies.

The Contractor must be able to provide HFC tracking and reporting information to the State upon request.

## 4. ADDITIONAL ENVIRONMENTALLY DESIRABLE ATTRIBUTES

### A. Product Recommendations

- Contractors are encouraged to provide appliances that are listed on ENERGY STAR's Most Efficient List for the most recent version in effect at the time of purchase.

The ENERGY STAR Most Efficient List can be found at:

[https://www.energystar.gov/products/most\\_efficient](https://www.energystar.gov/products/most_efficient)

- Contractors are encouraged to provide appliances which are remanufactured or incorporate recycled materials in their manufacture, to the extent practicable. Contractors must identify remanufactured or recycled content characteristics in their bids/proposals.

### B. Packaging Recommendations

- Where the Contractor uses packaging in addition to manufacturer packaging, the Contractor is encouraged to select packaging that minimizes or eliminates the use of disposable containers and/or incorporates recycled content and is easily recyclable through the State's contracted recycling programs. The Contractor shall avoid the use of polystyrene foam packaging (e.g., peanuts) and other difficult-to-recycle packaging materials. Where appropriate, Contractor packaging using reusable crates or reusable pallets is preferred over boxed packaging.
- For corrugated cardboard packaging (also known as containerboard packaging), the Contractor is encouraged to use versions that contain a minimum of 25% by weight of post-consumer materials, which is the minimum post-consumer content level for packaging specified by the U.S. Environmental Protection Agency Comprehensive Procurement Guidelines.

### C. Shipping/Transport Recommendations

- To promote fuel efficiency and reduce greenhouse gases and air pollution, the Contractor is encouraged to use a SmartWay Transport/Carrier Partner for the shipment



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or transport of products. *A list of SmartWay Transport partners can be found here:*  
<https://www.epa.gov/smartway/smartway-partner-list>

### 5. ENVIRONMENTALLY PREFERABLE PURCHASING LANGUAGE

**Instruction to Procurement Officers: Please include the following language to your solicitation if it does not already exist.**

#### A. On Environmentally Preferable Purchasing:

**The State of Maryland is committed to purchasing environmentally preferable products and services (EPPs).** Maryland’s State Finance & Procurement Article §14-410 defines environmentally preferable purchasing as “the procurement or acquisition of goods and services that have a lesser or reduced effect on human health and the environment when compared with competing goods or services that serve the same purpose.”

Accordingly, Bidders/Offerors are strongly encouraged to offer EPPs to fulfill this contract, to the greatest extent practicable.

#### B. On Maryland’s Green Purchasing Reporting Requirements:

**The State of Maryland requires, at a minimum, from the Contractor annual sales data over the life of this contract; the State also reserves the right to request quarterly sales data over the life of this contract.**

The report shall include at a minimum details about the third-party sustainability certifications and other environmental attributes of products and services sold on this price agreement per the contract specifications.

To facilitate consistent reporting on this contract, the Contractor will be provided with a CONTRACTOR GREEN SALES REPORT template from the Green Purchasing Committee (GPC), the Office of State Procurement (OSP) or the Department of General Services (DGS).

#### C. On Environmental Claims

**All environmental benefit claims made by the Contractor concerning products or services offered on this contract must be consistent with the [Federal Trade Commission’s Guidelines for the Use of Environmental Marketing Claims](#).**

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### Appendix A – Definitions

**California Title 20 Appliance Efficiency Standards:** Minimum energy efficiency standards that apply to various appliances. These appliances are listed in the California Energy [Commission’s Modernized Appliance Efficiency Database System \(MAEDbS\)](#).

**End-of-life management:** Process by which products are disposed of after their term of useful service expires.

**Energy efficient:** A product that performs more work per unit of energy as compared to all similar products.

**ENERGY STAR:** A joint program of the U.S. Department of Energy and the U.S. Environmental Protection Agency certifies and lists relatively energy-efficient products in several categories such as light fixtures, LEDs, appliances, and office equipment.

**Environmentally preferable:** Products and services that have a lesser or reduced effect on human health and the environment when compared to other products and services that serve the same purpose.

**Global Warming Potential (GWP):** A measure of a greenhouse gas’s impact on global warming compared to 1 ton of carbon dioxide (CO<sub>2</sub>) over a period of 100 years. Some examples of the use of GWP, as provided by the EPA, include:

- o Carbon Dioxide (CO<sub>2</sub>): 1 GWP
- o Methane (CH<sub>4</sub>): 28-36 GWP
- o Nitrous Oxide (N<sub>2</sub>O): 265-298 GWP

**Hazardous substance:** 1) Material posing a threat to human health and/or the environment, that can be toxic, corrosive, ignitable, explosive, or chemically reactive; or 2) a substance that must be reported to the EPA if released into the environment.

**HFC:** Hydrofluorocarbon; often used as a refrigerant.

**PBDEs:** also known as polybrominated diphenyl ethers or brominated flame retardants. Persistent and bioaccumulating chemicals such as polybrominated diphenyl ethers (PBDEs) are added to computers, office electronics, plastics, and polymer resins to reduce the risk of fire; PBDEs include Pentabromodiphenyl ether (pentaBDE), Octabromodiphenyl ether (octaBDE), and Decabromodiphenyl ether, (decaBDE).

**Recycled Content Product:** A product created from: 1) excess or waste material that was generated in manufacturing and converting processes; or 2) material that was recovered from a consumer product at the end of its life. Products with recycled content divert waste from landfills.

**Refrigerant:** A chemical substance or mixture, either a fluid or a gas, used in a heat pump and refrigeration cycle to absorb heat. Refrigerants are used in air conditioners, refrigerators, freezers, and heat pumps.

**Remanufactured Product:** A product that is rebuilt to the specifications of the original product, but from a combination of reused, repaired, and new parts.



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**SmartWay:** Program established by the U.S. EPA to help improve fuel efficiencies and sustainability in freight transportation.

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### Appendix B – HFC Prohibitions by End-Use Category

A complete list of HFC prohibitions and exceptions in all end-use categories can be found here:  
<http://www.dsd.state.md.us/comar/comarhtml/26/26.11.33.03.htm>.

End-Use Category: Aerosol Propellants	
End-Use	Prohibited Substances
Aerosol Propellants	HFC-125, HFC-134a, HFC-227ea and blends of HFC-227ea and HFC-134a
End-Use Category: Air Conditioning	
End-Use	Prohibited Substances
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
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
End-Use Category: Refrigeration	
End-Use	Prohibited Substances
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)
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

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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
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
Supermarket systems (retrofit)	R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R428A, R-434A, R-507A
Supermarket systems (new)	HFC-227ea, R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R-428A, R-434A, R-507A
Remote condensing units (retrofit)	R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R428A, R-434A, R-507A
Remote condensing units (new)	HFC-227ea, R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R-428A, R-434A, R-507A
Stand-alone units (retrofit)	R-404A, R-507A
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 (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)

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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)
Vending machines (retrofit)	R-404A, R-507A
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
End-Use Category: Foams	
End-Use	Prohibited Substances
Rigid polyurethane and polyisocyanurate laminated boardstock	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof
Flexible Polyurethane	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof
Integral Skin Polyurethane	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6
Polystyrene Extruded Sheet	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6
Phenolic Insulation Board and Banstock	HFC-143a, HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof
Rigid Polyurethane: Slabstock and Other	HFC-134a, HFC-245fa, HFC-365mfc and blends thereof; Formacel TI, Formacel Z-6
Rigid polyurethane appliance foam	HFC-134a, HFC-245fa, HFC-365mfc and blends thereof; Formacel TI, Formacel Z-6
Rigid polyurethane commercial refrigeration and sandwich panels	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6

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Polyolefin	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6
Rigid polyurethane marine flotation foam	HFC-134a, HFC-245fa, HFC-365mfc and blends thereof; Formacel TI, Formacel Z-6
Polystyrene extruded boardstock and billet (XPS)	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel B, Formacel Z-6
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
Rigid polyurethane (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
Rigid polyurethane (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

### List of Exceptions by End-Use Category

End-Use Category	Prohibited Substances	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

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		release agents and mold cleaners; lubricants and cleaners for spinneretes 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 — except rigid polyurethane (PU) spray foam	All substances	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 substances	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.



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Rigid polyurethane (PU) two-component spray foam	All substances	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.
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