UNIVERSITY OF NOTRE DAME

REFRIGERANT PROCEDURE

1. PURPOSE

   Chlorofluorocarbons contained in some refrigerants are considered to be ozone depleting compounds and therefore damaging to the environment. The Environmental Protection Agency (EPA) requires a Refrigerant Compliance Program. It is the intent of the University of Notre Dame to comply with all Federal, State, and local regulations. Accordingly, the University has adopted a chlorofluorocarbon management process.

2. SCOPE

   Section 608 of the Clean Air Act prohibits the knowing release of refrigerant during the maintenance, service, repair, or disposal of air-conditioning and refrigeration equipment. All personnel working with equipment containing refrigerants on the Notre Dame Campus are subject to this program in accordance with the United States Environmental Protection Agency (US EPA) Section 608 of the Clean Air Act.

3. DEFINITIONS

   1. **Industrial process refrigeration**- These are complex customized appliances that are directly linked to the processes used in, for example, the chemical, pharmaceutical, petrochemical, and manufacturing industries. This sector also includes industrial ice machines, appliances used directly in the generation of electricity, and ice rinks. Where one appliance is used for both industrial process refrigeration and other applications, it will be considered industrial process refrigeration equipment if 50 percent or more of its operating capacity is used for industrial process refrigeration.
   2. **Mothballing**- To evacuate refrigerant from an appliance, or the affected isolated section or component of an appliance, to at least atmospheric pressure, and to temporarily shut down that appliance. However, the timelines pick up again as soon as the system is brought back on-line.
   3. **Commercial refrigeration**- These are refrigeration appliances used in the retail food and cold storage warehouse sectors. Retail food appliances include the refrigeration equipment found in supermarkets, convenience stores, restaurants and other food service establishments. Cold storage includes the refrigeration equipment used to store meat, produce, dairy products, and other perishable goods.
   4. **Comfort cooling**- These are air-conditioning appliances 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 appliances include but are not limited to chillers, commercial split systems, and packaged rooftop units.

4. PROHIBITION ON VENTING

4.1. EPA regulations 40 CFR Part 82, Subpart F under Section 608 of the Clean Air Act prohibit individuals from intentionally venting ozone-depleting substances or their substitutes while maintaining, servicing, repairing, or disposing of air-conditioning or refrigeration equipment. The following types of releases are permitted:

4.1.1. "*de minimis*" quantities of refrigerant released while making good faith attempts to recapture and recycle or safely dispose of refrigerant including releases that occur when connecting or disconnecting hoses to charge or service appliances.

4.1.2. Refrigerant emitted during the normal operation of air-conditioning and refrigeration equipment (as opposed to during the maintenance, servicing, repair, or disposal of this equipment), such as from mechanical purging and leaks. However, the EPA requires that leaks above a certain size be repaired in equipment that contains 50 pounds of refrigerant or more.

4.1.3. Releases of substitute refrigerants that EPA has determined do not pose a threat to the environment.

5. STATIONARY REFRIGERATION SERVICE PRACTICE REQUIREMENTS

5.1. Appliances with more than five pounds of refrigerant:

5.1.1. Technicians shall evacuate air-conditioning and refrigeration equipment to established vacuum levels when opening the equipment for maintenance, service, repair, or disposal. The required level of evacuation can be found in the Appendix A.

5.1.2. Except for equipment manufactured before November 15, 1993, the recovery or recycling equipment shall have been certified by an EPA-approved equipment testing organization. To ensure that they are recovering the correct level of refrigerant, technicians shall use the recovery equipment according to the directions of its manufacturer.

5.2. Appliances with five or fewer pounds of refrigerant:

5.2.1. Technicians repairing small appliances, such as household refrigerators, window air conditioners, and water coolers, shall recover:

- 80 percent of the refrigerant when:
  - The technician uses recovery or recycling equipment manufactured before November 15, 1993, or
  - The compressor in the appliance is not functional.
- 90 percent of the refrigerant when:
  - The technician uses recovery or recycling equipment manufactured after November 15, 1993, and
  - The compressor in the appliance is functional.

5.3 Exceptions to the Evacuation Requirements

5.3.1 Repairs to Leaking Equipment: If technicians cannot evacuate to the specified levels because of refrigerant leaks, or because it would substantially contaminate the refrigerant being recovered, they shall:

- Isolate leaking components from non-leaking components wherever possible;
- Evacuate non-leaking components to the specified levels; and
- Evacuate leaking components to the lowest level that can be attained without substantially contaminating the refrigerant. This level cannot exceed 0 pounds per square inch (psig).

5.3.2 Repairs that are Not Major and Are Not Followed by Evacuation: If a technician is not evacuating the equipment to the environment after a repair is completed, and if the repair is not major, then the following requirements shall be met:

- For high- or very high-pressure appliances, the equipment shall be evacuated to zero psig before it is opened.
- For low-pressure appliances, the equipment shall be pressurized to zero psig before it is opened. Methods that require subsequent purging (e.g., nitrogen) cannot be used except with appliances containing R-113.
- Repairs to Leaking Equipment: If technicians cannot evacuate to the specified levels because of refrigerant leaks, or because it would substantially contaminate the refrigerant being recovered, they:
  - Isolate leaking components from non-leaking components wherever possible;
  - Evacuate non-leaking components to the specified levels; and
  - Evacuate leaking components to the lowest level that can be attained without substantially contaminating refrigerant. This level cannot exceed 0 pounds per square inch (psig).

5.4 Reclamation Requirement

5.4.1 Recovered refrigerant can be returned to the same system or other systems owned by the same person without restriction. However, if recovered refrigerant changes ownership, it shall be reclaimed by an EPA-certified refrigerant reclaimer.

5.5 Changing Refrigerant Oil: The requirements described above cover refrigerant contained in oil. The oil in a refrigeration appliance can contain large amounts of dissolved refrigerant. EPA requires a reduction in the pressure prior to an oil change to ensure that the bulk of the refrigerant contained in the oil is recovered. It is a violation to change oil at higher than five psig. There are two acceptable procedures for recovering refrigerant contained in oil:

5.5.1 Evacuate (or pressurize) the refrigeration appliance, or isolated portion, to a pressure no greater than 5 psig and then remove the oil; or

5.5.2 Drain the oil into a system receiver to be evacuated (or pressurized) to a pressure no greater than five psig.

6. STATIONARY REFRIGERATION LEAK REPAIR REQUIREMENTS

6.1. General Leak Repair Requirements (see 40 CFR Part 82, Subpart F for additional guidance).

6.1.1. Owners or operators shall take corrective action when an appliance with a full charge of 50 or more pounds is discovered to be leaking ozone-depleting refrigerant at a rate that exceeds the applicable trigger rate (See Appendix B). These requirements will also apply to appliances containing substitute refrigerants.

6.1.2. Corrective Action

- Repair leaks within 30 days from the date the leak was discovered, or
- Develop, within 30 days, a plan to retrofit or retire the appliance and complete the actions under that plan within 1 year.
- Owners or operators of industrial process refrigeration equipment and federally owned chillers shall conduct initial and follow-up verification tests at the conclusion of any repair efforts. These tests are essential to ensure that the repairs have been successful. This requirement will apply to owners and operators of all appliances subject to the leak repair requirements. In cases where an industrial process shutdown is required, a repair period of 120 days is substituted for the normal 30-day repair period. Any appliance that requires additional time may be subject to recordkeeping/reporting requirements.
- Additional time is permitted for conducting repairs on industrial process refrigeration equipment and federally owned equipment where the necessary repair parts are unavailable or if other applicable federal, state, or local regulations make a repair within required timeline (e.g., 30 or 120 days) impossible.

6.1.3. Retrofitting or Retiring Appliances

- Owners or operators who choose to retrofit or retire appliances shall develop a retrofit or retirement plan within 30 days of detecting a leak that exceeds the trigger rates. A copy of the plan shall be kept on site, and the original plan shall be made available to EPA upon request. Activities under the plan shall be completed within 1 year from the date of the plan.
- EPA will permit additional time to retrofit or retire industrial process refrigeration equipment and federally owned appliances as follows:
  - The owners or operators shall make a request within six months from the expiration of the initial 30-day period.
  - EPA will permit additional time to the extent reasonably necessary if a delay is caused by the requirements of other applicable federal, state, or local regulations, or if a suitable replacement refrigerant in

accordance with the Significant New Alternatives Policy (SNAP) regulations is not available.

- EPA will permit one additional 12-month period if the appliance is custom-built and the supplier of the appliance or a critical component has quoted a delivery time of more than 30 weeks from when the order was placed (assuming the order was placed in a timely manner). In some cases, EPA may provide additional time beyond this 12-month extension period if a request is made by the end of the ninth month of the extension.

- Relief from Retrofit/Retirement Requirements
  - The owners or operators of industrial process refrigeration equipment or federally owned chillers may be relieved from the retrofit or repair requirements if:
  - Second efforts to repair the same leaks that were subject to the first repair efforts are successful; or
  - Within 180 days of the failed follow-up verification test, the owners or operators determine the leak rate is below the trigger rate. In this case, the owners or operators shall notify EPA as to how this determination will be made, and shall submit the information within 30 days of the failed verification test.
  - For all appliances subject to the leak repair requirements, the timelines may be suspended if the appliance has been mothballed.

7. TECHNICIAN CERTIFICATION

7.1. EPA regulations require that technicians who maintain, service, repair, or dispose of equipment that could release ozone-depleting refrigerants into the atmosphere shall be certified.

7.2. Technicians are required to pass an EPA-approved test to earn Section 608 Technician Certification. The tests are specific to the type of equipment the technician seeks to work on. Tests shall be administered by an EPA-approved certifying organization. Section 608 Technician Certification credentials do not expire.

7.3. Only EPA-certified technicians are allowed to purchase ozone-depleting substances (ODS) used as refrigerants.

8. DISPOSAL REQUIREMENTS

8.1. Disposal of Equipment Dismantled On-site

8.1.1. Refrigeration and air-conditioning equipment that is typically dismantled on-site before disposal (e.g., retail food refrigeration, central residential air conditioning, chillers, and industrial process refrigeration) shall have refrigerant recovered in accordance with EPA's requirements for servicing prior to their disposal (See Section 5).

9. REFRIGERANT RECOVERY AND RECYCLING EQUIPMENT CERTIFICATION

9.1. EPA regulations require that refrigerant recovery and recycling equipment be tested to ensure it meets EPA requirements. These requirements can be found in Appendix B2, B3 and B4 to Subpart F of Part 82 Performance of Refrigeration Recovery, Recycling, and/or Reclaim Equipment.
9.2. Recovery and recycling equipment used with most air-conditioning and refrigeration equipment shall meet the standards identified in Appendix A.
9.3. Small appliance recovery equipment shall be able to recover either:
9.3.1. Ninety percent (90%) of the refrigerant in the small appliance when the small appliance compressor is functional, or
9.3.2. Eighty percent (80%) of the refrigerant in the small appliance when the compressor is not functional.
9.4. EPA has approved the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) EXIT and Underwriters Laboratories (UL) EXIT to certify recycling and recovery equipment. Certified equipment can be identified by a label that states: "This equipment has been certified by AHRI/UL to meet EPA's minimum requirements for recycling and/or recovery equipment intended for use with [appropriate category of appliance]."

10. RECORD KEEPING

10.1. Technicians:
10.1.1. Technicians shall keep a copy of their proof of certification at their place of business.
10.1.2. Technicians servicing appliances that contain 50 or more pounds of ozone depleting refrigerant shall provide the owner with an invoice that indicates the amount of refrigerant added to the appliance and records of leak inspections and tests performed to verify repairs of leaking appliances.
10.1.3. Technicians disposing of appliances containing between 5 and 50 pounds of refrigerant shall keep records of the disposal. These are typically field-installed appliances such as residential AC split systems. This requirement applies to appliances containing ozone depleting or HFC refrigerant. The records primarily include: location and date of recovery, type of refrigerant recovered, monthly totals of the amounts recovered, and amounts sent for reclamation.
10.2. Owners and Operators:

10.2.1. Owners or operators of appliances that contain 50 or more pounds of ozone depleting refrigerant, including HFCs and other non-exempt substitute refrigerants, shall keep servicing records documenting the date and type of service, the quantity of refrigerant added, records of leak inspections, and tests performed to verify repairs of leaking appliances.

10.2.2. In addition, owners or operators shall submit a report to EPA for any appliance containing 50 or more pounds of refrigerant that leaks 125 percent or more of the full charge in a calendar year. This report shall describe efforts to identify leaks and repair the appliance.

11. GREENHOUSE GAS REPORTING REQUIREMENTS RELATED TOSTATIONARY REFRIGERATION AND AIR CONDITIONING

11.1. EPA's Greenhouse Gas Reporting Program (GHGRP) requires reporting of greenhouse gas (GHG) data and other relevant information from large sources and suppliers in the United States. The specific regulations can be found at 40 CFR Part 98.

11.1.1. Under Fluorinated Gas Production (Subpart L), facilities shall annually report the amount of HFCs emitted from production, transformation, destruction, and venting of residual quantities.

11.1.2. Under HCFC-22 Production and HFC-23 Destruction (Subpart O), facility-reporting requirements include HFC–23 emissions from HCFC–22 production processes and HFC–23 destruction processes, the quantity of HFC–23 destroyed, and a one-time report including the information about the destruction process.

12. FREQUENCY OF REVIEW

12.1. This procedure shall be reviewed annually and updated as needed to meet applicable regulatory changes. Field audits will be conducted at least annually.

13. REFERENCES

13.1. Recycling and Emissions Reduction, 40 CFR Part 82, Subpart F.

Revision History Table

History	Effective Date
Removed January 2019 date from: 6.1.1, 6.1.2, 6.1.3, 7.1, 10.1.2, 10.1.3, 10.2.1, 10.2.2	July 2020
Updated hyperlink in Section 2. Updated hyperlink in Section 4.1. Updated hyperlink in Section 6.1. Updated hyperlink in Section 9.1. Added hyperlink in Section 11.1. Updated hyperlink in Section 13.1.	October 2021
Updated links and spacing throughout document.	January 2024

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APPENDIX A
REQUIRED LEVEL OF EVACUATION OF APPLIANCES

Type of Appliance	**Inches of Hg vacuum (relative to standard atmospheric pressure of 29.9 inches Hg)**	
	Using pre-1993 equipment	Using post-1993 equipment
Very high-pressure appliance	0	0
High-pressure appliance, or isolated component of such appliance, with a full charge of less than 200 pounds of refrigerant	0	0
High-pressure appliance, or isolated component of such appliance, with a full charge of 200 pounds or more of refrigerant	4	10
Medium-pressure appliance, or isolated component of such appliance, with a full charge of less than 200 pounds of refrigerant	4	10
Medium-pressure appliance, or isolated component of such appliance, with a full charge of 200 pounds or more of refrigerant	4	10
Low-pressure appliance	25 mm Hg absolute	25 mm Hg absolute

APPENDIX B

TRIGGER RATES

Appliance Type	Current Leak Rate	Leak Rate Effective 1/1/2019
Industrial process refrigeration	35%	30%
Commercial refrigeration	35%	20%
Comfort cooling	15%	10%
All other appliances	15%	10%