
232301 REFRIGERANTS

Part 1 – GENERAL

1.1 Description

A. This section details the guidelines and expectations for refrigerant use and handling on Johns Hopkins University Homewood Campus. Project conditions and requirements vary, thus precluding the absolute adherence to the items identified herein in all cases. However, unless there is adequate written justification and approval from the JHFRE Engineering and Energy Department, it is expected that these guidelines will govern the design and specifications.

1.2 Submittals

N/A

1.3 Quality Assurance

A. Refrigerant recovery systems shall meet the requirements of 40 CFR 82 Protection of Stratospheric Ozone with respect to system capabilities and be certified per AHRI. Provide refrigerant recovery pump and storage tank(s) designed with storage capacity for a full chiller charge. The refrigerant recovery equipment may be remote from the chiller(s) with refrigerant recovery piping to and from the chillers(s). The system shall be designed to allow isolation and “push/pull” refrigerant recovery of individual chillers. All liquid refrigerants shall transfer through a three-core filter drier, with a moisture indicating sight glass in the transfer line at the storage vessel. The refrigerant recovery unit shall be cooled by the system condenser water, with an emergency domestic water back-up connection upon loss of condenser water. Waste water from the emergency back-up shall be discharged to the sanitary sewer system.

Part 2 – PRODUCTS

2.1 If the pertinent type and size equipment is available with zero ozone depletion refrigerants, then that is what shall be specified. It shall also be noted in the drawing schedules. If not, then the most environmentally friendly refrigerant shall be specified.

A. Chillers shall not use HCFC based refrigerants.

B. All new equipment must adhere to the most recent EPA guidelines on HCFC and CFC refrigerant bans. This includes the potential upcoming (2025) banning of R410A and move to A2L refrigerants (including R32 and R454B). Due to R410A-based units requiring a substantial retrofit to accommodate these new refrigerants, no new equipment of this type shall be installed without approval from JHFRE.

2.2 Refrigerant Monitoring System

A. A system for refrigerant exhaust which operates during a refrigerant leak shall be provided per code, with detectors (sensors) distributed/mounted at all likely points of refrigerant accumulation (such as near open drives, floor drains and ventilation points and at all egress doors). In addition, this system shall include audible/strobe alarms within the space and a 3-light tower visual annunciator at each entry point (Red for refrigerant measurements of 100% OEL ppm, Yellow for refrigerant measurements of 50% OEL ppm, and Blue for refrigerant measurements of 5% OEL ppm where OEL is determined from each Refrigerant's Safety Data Sheet). At a minimum, a 3 light tower and audible/strobe alarm shall be located on each interior wall of the mechanical room (for operating personnel safety) and on the outside wall of each entrance to the mechanical room (for responders). The refrigerant exhaust system shall be designed per ANSI/ASHRAE 15. Additionally, the audible alarm's DB rating for refrigerant room shall comply with NFPA Standards.

1. Refrigerant Signage: there shall be two separate signs that indicate the warning for a danger area which contains a large amount of refrigerant. The first shall be placed outside of doorways and the second will be inside. Both will be easily visible for the public and in close proximity to the alarm beacon.

a. The signs shall be constructed of 0.060 Styrene Single-Sided with rounded corners per OSHA standard and mounting holes drilled in each corner.

b. The outside sign shall be 11" high x 17" wide.

c. The inside sign shall be 8.5" high x 11" wide.

d. The signs shall be oriented landscape and have 9 rows of text. There is a bold black line that borders all of the text, and the first row has a red background. All text is black unless otherwise noted.

2. The 11"x17" sign is as follows:

a. First line: has a 2" danger sign (triangle exclamation point in the middle) followed by 1.5" DANGER (centered).

b. Second line: Centered 1": AUTHORIZED PERSONNEL ONLY.

c. Third line: Centered 1": (Type of Refrigerant used) Refrigerant In Use.

d. Fourth line: Centered 1": STAYOUT DURING ANY ALARM.

e. Fifth line: Centered 3/4": (Strobe Light Flashing and/or Audible Alarm).

f. Sixth line: Adjusted left 1/2": ALARM/ STROBE INDICATOR.

g. Seventh line: Adjusted left 1/2": (in color red): DANGER- Refrigerant Leak.

h. Eighth line: Adjusted left 1/2": (in color amber): WARNING- Refrigerant Leak.

i. Ninth line: Adjusted left 1/2": (in color blue): CAUTION- Refrigerant Leak or System Malfunction.

3. The 8.5"x11" sign is as follows:
 - a. First line: has a 1" danger sign (triangle exclamation point in the middle) followed by 1" DANGER (centered).
 - b. Second line: Centered 1/2": AUTHORIZED PERSONNEL ONLY.
 - c. Third line: Centered 1/2": (Type of Refrigerant used) Refrigerant In Use.
 - d. Fourth line: Centered 1/2": EXIT ROOM DURING ANY ALARM.
 - e. Fifth line: Centered 1/4": (Strobe Light Flashing and/or Audible Alarm).
 - f. Sixth line: Adjusted left 1/4": ALARM/ STROBE INDICATOR.
 - g. Seventh line: Adjusted left 1/2": (in color red): DANGER- Refrigerant Leak.
 - h. Eighth line: Adjusted left 1/2": (in color amber): WARNING- Refrigerant Leak.
 - i. Ninth line: Adjusted left 1/2": (in color blue): CAUTION- Refrigerant Leak or System Malfunction.

Part 3 – EXECUTION

3.1 Refrigerant Spaces shall be defined as any building spaces that include refrigeration units or systems having a refrigeration circuit containing more than 220lbs of a Group A1 (per ASTM) or 30lbs of any other group refrigerant. These spaces require the following safety precautions:

A. Approved emergency signs, charts and labels in accordance with NFPA 704 shall be posted in easily recognizable and highly visible locations.

B. A detector shall be provided at an approved location where refrigerant from a leak is expected to accumulate. This system will initiate audible and visible alarms inside of the room and outside each entrance as well as send an emergency signal to the BAS where the concentration of refrigerant detected exceeds the lesser of the following conditions:

1. The corresponding Threshold Limit Value – Time Weighted Average values for the refrigerant classification per the American Conference of Governmental Industrial Hygienists (ACGIH).

2. 25% of the lower flammable limit (LFL).

C. A clearly identified switch (emergency stop) with tamper-proof cover shall be provided to allow off-only control of all refrigerant compressors, pumps and normally-closed automatic refrigerant valves.

D. A clearly identified switch with tamper-proof cover shall be provided to allow on-only control of mechanical room ventilation fans.