



Suva[®]
refrigerants



AS-5

Note: This publication supersedes Bulletins AS-4 and S-30.

Workplace Guidelines for Suva[®] 123 (HCFC-123) in Refrigeration and Air Conditioning Applications

Material Safety Data Sheet

Users must read and understand the HCFC-123 Material Safety Data Sheet (MSDS). Copies of the MSDS are available by contacting DuPont at any of the locations shown on the last page of this bulletin. Users should implement a program to inform employees of the hazards of HCFC-123 and the protective measures to be taken to protect against overexposure during routine operations and emergencies.

Inhalation Exposure Limits

DuPont has concluded that HCFC-123 poses no acute or chronic hazard when it is handled in accordance with recommendations and when exposures are maintained at or below the DuPont acceptable exposure limit (AEL) of 50 ppm (8- and 12-hour time-weighted average or TWA).

An AEL is an airborne exposure limit established by DuPont that specifies time-weighted average airborne concentrations to which nearly all workers may be repeatedly exposed without adverse effects during an 8- or 12-hour day or 40-hour work week.

DuPont has also set an emergency exposure limit (EEL) of 1000 ppm for up to one hour with a one-minute ceiling of 2500 ppm based on the acute or short-term effects of HCFC-123. During an emergency, occurring rarely in a lifetime, workers may be exposed to these concentrations without harmful effects. The short-term (or acute) effects of CFC-11 and HCFC-123 are similar, and any necessary response to emergency situations involving either would be essentially the same.

Storage, Handling, and Use Guidelines

Area Monitor

ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) Standard 15-94, "Safety Code for Mechanical Refrigeration," requires area monitors in refrigeration Machinery Rooms under conditions defined by the standard. An area monitor is required for essentially all indoor applications of HCFC-123. The area monitor should be HCFC-123 specific and have a range of 0 to 150 ppm. Sample points should be representative of worker exposure.

Appropriate respiratory protection should be available for immediate use in the event of a large release or leak. ASHRAE Standard 15-94 provides additional guidance on system and room design.

Table 1 recommends alarm levels based on area monitor readings and describes appropriate action to be taken.

Prohibited Uses

HCFC-123, or mixtures containing HCFC-123, should not be used as an uncontained flushing fluid in refrigeration work or as a general cleaning solvent.

Personal Protective Equipment

Respiratory protection should be worn when performing all operations during which there is potential for exposure in excess of an average of 50 ppm, for an entire 8- or 12-hour work day. DuPont recommends the use of organic vapor cartridges such as those approved by NIOSH for removal of airborne organic contaminants. Expo-

Table 1
HCFC-123 Equipment Room Operation Action Guidelines

Normal—(Indication of 0–2 ppm HCFC-123)	This range is based on normal background readings of HCFC-123 in refrigeration rooms checked to date with a point source refrigerant selective analyzer, calibrated for the expected action guideline range. This level is considered safe for operation but cannot be considered accurate until readings of greater than or equal to 3 ppm are reached, due to long-term instrument drift and environmental factors such as temperature and humidity. This is a “no action” range.
Initial Action Level—Drift Potential (3–5 ppm)	This range indicates a potential need to recalibrate the analyzer.
Maintenance Action Level—Leak (5–30 ppm)	This range indicates a probable leak which should be identified and repaired for conservation purposes.
Level 1 Alarm—AEL (50 ppm)	This level indicates a significant leak. The operator should investigate the leak source. The purpose of the Level 1 Alarm is to indicate a leak and minimize refrigerant loss before it reaches a point which might affect personnel. Building ventilation should not be started, as this would hamper attempts to find the leak. The alarm would only be noted by operating personnel and any data logger.
Level 2 Alarm—3 × AEL (150 ppm)	At this point, ventilation should be turned on to minimize the buildup of refrigerant in the room. The operator should leave the immediate area and obtain the proper personal protective equipment before reentering the area. The Level 2 Alarm should alert not only the immediate area but also a remote area supervisor that a possible large leak is occurring or has occurred. The operating area should be closed to personnel not equipped with the proper respiratory personal protective equipment, and alarms outside the area should indicate that it is not safe to enter.

sure protection requirements are shown in Table 2.

Note: Cartridge performance is affected by humidity. Cartridges should be changed after 2 hours of continuous use unless it is determined that the humidity is less than 75 percent, in which case cartridges can be used for 4 hours. Used cartridges should be discarded daily, regardless of the length of time used. People who will work with HCFC-123 should be trained on the proper use of respirators, and should be fit-tested annually to ensure respirator fit is adequate.

Industrial hygiene evaluations of workplace conditions may justify less stringent respirator program recommendations.

Eye protection, gloves of butyl rubber or other impervious material, and safety shoes should be used when filling and handling drums. Nitrile, PVC-coated nitrile, and PVC protective equipment are not recommended. Directed mechanical ventilation or localized exhaust may facilitate controlling airborne HCFC-123 concentrations.

Coverall chemical goggles and a face shield should be used when making first breaks into a system if liquid splash is a potential problem and full-face respiratory protection is not worn. Eyewash fountains or water hoses with quick opening valves should be accessible to HCFC-123 work areas.

Storage

To avoid over pressurizing the container, drums of HCFC-123 should be stored upright, at a temperature below 125°F (52°C), and out of direct sunlight. All drum bungs should be leak tight (at a minimum sealed with TFE tape). Storage of factory-sealed drums do not require a continuously operating air monitor. A monitor is required, however, if liquid transfer or drumming operations are being performed in an indoor storage location. Quantities stored should be limited to that needed for reasonable maintenance requirements. Empty drums should be stored outside.

No storage of HCFC-123 should be permitted in areas containing alkali or alkaline earth metals such as powdered aluminum, zinc, or beryllium.

Handling

When moving drums of HCFC-123, the use of gloves, safety glasses with side shields, and steel-toe shoes is recommended. Use either a hand truck or forklift when moving drums, since filled units can weigh as much as 680 lb (309 kg). When using a forklift truck, always follow the manufacturer’s recommended weight capacity.

The larger bung on HCFC-123 drums loaded in the United States contains a smaller built-in opening

Table 2
Minimum Respirator Protection

Concentration of HCFC-123 in Air	Exposure Time	Minimum Respirator Protection
Less than 50 ppm* as a time-weighted average (TWA)	8–12 hours per day	None
50–150 ppm*	Less than 30 minutes per work shift	None

When performing tasks which monitoring data indicate may result in concentrations exceeding the above or when performing nonroutine or unusual tasks, the following protection is recommended:

Concentration of HCFC-123 in Air	Minimum Respirator Protection
50–300 ppm	Half Mask, Organic Vapor Cartridge or Canister or Full Mask, Organic Vapor Cartridge or Canister
300 ppm or greater	Full Face Air Line or Self-Contained Breathing Apparatus (SCBA)

*Instantaneous spikes may occur during operations such as disconnecting charging lines or tapping drums. When factored into the time weighted average, existing monitoring data on excursions have not resulted in exceeding the acceptable exposure limit (AEL) during typical routine servicing.

for hose/piping connections. This smaller opening has a metal seal to minimize vapors released to the atmosphere on initial opening of the drum. **On initial opening of a drum, it is recommended that a combination ¾-inch screwed brass ball valve with Teflon® packing and seat and a ¾ × 2-inch pipe nipple be screwed into the threaded bung.** This will rupture the seal and allow for fluid transfer. This operation should be performed outdoors; if indoors, use directed mechanical ventilation or localized exhaust equipment. Appropriate refrigeration fittings can be connected to the valve for transfer into the machine. This procedure minimizes emissions of refrigerant during drum opening.

Charging, Maintenance, and Sampling

When making first breaks into the system, wear appropriate respiratory protection unless the room air monitoring data indicates that HCFC-123 concentration in air can reasonably be expected to remain below the 50 ppm AEL during the work in progress (see **Table 2**). Directed mechanical ventilation or localized exhaust may facilitate controlling airborne concentrations.

When charging refrigerant into or drawing it out of a chiller, connect the drum to the chiller with both a liquid transfer line and a vent line in order to avoid a vacuum or overpressure condition in the drum and to minimize venting of HCFC-123 vapor into the workspace during liquid transfer. The transfer and vent lines should be compatible with HCFC-123. Minimize HCFC-123 emission to

atmosphere from transfer lines during connection and disconnection. If possible, use the previously recommended drum connection device (valve and nipple), and charge refrigerant under cool ambient conditions.

Good workplace practices should be utilized to avoid spills, drippage, exposed contaminated equipment, or open containers of HCFC-123.

When working on a chiller, de-inventory into drums through a recovery device or into a receiver (if provided) and evacuate the system to 29" of mercury (absolute pressure of 3.4 kPa). Break the vacuum with nitrogen, re-evacuate, and break vacuum again with nitrogen. Waste oil should be disposed of in accordance with appropriate regulatory requirements. Waste oil will contain significant quantities of dissolved HCFC-123.

Leaks and Spills

Major leaks or spills will not evaporate readily due to the high boiling point of HCFC-123, forcing recovery as a liquid. Self-Contained Breathing Air (SCBA) is required until levels are reduced sufficiently to permit other or no respiratory protection. Spill control measures should be preplanned, and all washes should be disposed of in accordance with applicable government regulations. If splash potential exists, wear protective equipment fabricated from an impervious material such as butyl rubber.

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