



DuPont Fluorochemicals

DuPont
HCFC-124
Properties, Uses,
Storage, and Handling

Suva[®] refrigerants

DuPont fire extinguishant

The information set forth herein is furnished free of charge and is based on technical data that DuPont believes to be reliable. It is intended for use by persons having technical skill and at their own discretion and risk. Because conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information. Nothing herein is to be taken as a license to operate under or a recommendation to infringe any patents.

Table of Contents

Introduction	1
Background	1
Hydrochlorofluorocarbon 124	1
Uses	1
Refrigeration	1
Fire Suppression	1
Physical Properties	2
Chemical/Thermal Stability	2
Stability with Metals	2
Thermal Decomposition	5
Concerns if R-12 or R-114 and Refrigerants Containing HCFC-124 Are Mixed	5
Materials Compatibility	6
Elastomers and Plastics	6
Desiccants	6
Refrigeration Lubricants	6
Safety	9
Inhalation Toxicity	9
Cardiac Sensitization	9
Skin and Eye Contact	10
Spills or Leaks	10
Storage Tanks	10
Filling and Charging Operations	10
Refrigerant Recovery Systems	11
Air Monitors and Leak Detection	11
Types of Detectors	11
Nonselective Detectors	11
Halogen-Selective Detectors	11
Compound-Specific Detectors	12
Storage and Handling	12
Shipping in the United States	12
Handling Precautions for HCFC-124 Shipping Containers	12
Recovery, Recycle, Reclamation, and Disposal	12
Recovery	13
Recycle	13
Reclamation	13
Disposal	13

Introduction

Background

Chlorofluorocarbons (CFCs), which were developed over 60 years ago, have many unique properties. They are low in toxicity, nonflammable, noncorrosive, and compatible with other materials. In addition, they offer the thermodynamic and physical properties that make them ideal for a variety of uses. CFCs have been used as refrigerants; as blowing agents in the manufacture of insulation, packaging, and cushioning foams; as cleaning agents for metal and electronic components; and in many other applications.

However, the stability of these compounds, coupled with their chlorine content, has linked them to depletion of the earth's protective ozone layer. As a result, DuPont is phasing out production of CFCs and introducing more environmentally acceptable alternatives, such as hydrochlorofluorocarbon (HCFC) 124.

Hydrochlorofluorocarbon 124

HCFC-124 is a major component of blends intended to replace R-12 in refrigeration applications. It may also be used as a pure refrigerant to replace R-114 in limited specific applications. HCFC-124 also has potential utility as a fire extinguishant. It may be identified by any of the following names:

Hydrochlorofluorocarbon 124

2-chloro-1,1,1,2-tetrafluoroethane

HCFC-124

Suva 124 refrigerant

FE-241 fire extinguishant

Table 1 gives the chemical name and formula for HCFC-124.

Uses

Refrigeration

HCFC-124 is a major component of Suva MP39 and Suva MP66 refrigerants. These refrigerants closely match the performance of R-12 and, along with Suva 134a, are DuPont's primary replacements for R-12 and R-500 in a wide range of applications. R-12 and R-500 have been used in supermarkets, air conditioning, food service, and transport refrigeration. Suva MP refrigerants offer equivalent or improved capacity and energy efficiency in these applications.

HCFC-124 may be used by itself as a pure refrigerant to replace R-114 in some applications, although its vapor pressure is somewhat higher than that of R-114. In addition, when replacing R-114 with HCFC-124, significantly higher refrigeration capacity will be encountered. This may result in electrical overload of the motor unless precautions are taken. The expansion device may also need to be modified.

Fire Suppression

DuPont is actively pursuing HCFC-124 as a transitional product to replace Halon 1301 and Halon 1211 in total flooding and streaming applications.

Table 1
Product Information

	Chemical Name	Formula	CAS Number	Molecular Weight
HCFC-124	2-chloro-1,1,1,2-tetrafluoroethane	CHClFCF ₃	2837-89-0	136.48

Physical Properties

Physical properties of HCFC-124 are shown in **Table 2**.

Pressure-enthalpy diagrams for HCFC-124 are shown in **Figures 1 and 2**.

Thermodynamic tables in English and SI units are available in Bulletins T-124-ENG (H-47755) and T-124-SI (H-47756).

Chemical/Thermal Stability

Stability with Metals

Stability tests for refrigerant with metals are typically performed in the presence of refrigeration lubricants. Results of sealed tube stability tests are available for R-12/mineral oil and alkylbenzene lubricants, which have shown long-term stability in contact with copper, steel, and aluminum in actual refrigeration systems. Mineral oils and alkylbenzenes are possible candidates for use with refrigerants containing HCFC-124. Tests with HCFC-based refrigerants in general show acceptable compatibility and stability with alkylbenzene lubricants. As can be seen in **Tables 3 and 4**, HCFC-124 is significantly more stable than CFC-114. This is indicated by the much lower chloride generation in the stability tests.

Note: Lubricant/refrigerant combinations shown throughout this report are for the purposes of comparing the stability and compatibility of different lubricants with HCFC-124. No recommendation is made or implied that these combinations will operate successfully in refrigeration systems.

Table 2
General Property Information for HCFC-124

Physical Property	Units	Value
Molecular Weight	(avg.)	136.48
Boiling Point at 1 atm	°C	-12.1
	°F	10.3
Critical Temperature	°C	122.2
	°F	252.0
Critical Pressure	kPa	3614
	psia	524.5
Critical Density	kg/m ³	565
	lb/ft ³	35.28
Liquid Density at 25°C (77°F)	kg/m ³	1401
	lb/ft ³	87.6
Density, Satd. Vapor at -15°C (5°F)	kg/m ³	6.88
	lb/ft ³	0.43
Specific Heat Liquid at 25°C	kJ/kg·K	1.13
	Btu/lb·°F	0.27
Specific Heat Vapor at 25°C and 1 atm	kJ/kg·K	0.742
	Btu/lb·°F	0.177
Vapor Pressure at 25°C	kPa	386
	psia	56
Heat of Vaporization at Boiling Point	kJ/kg	194
	Btu/lb	83.2
Thermal Conductivity at 25°C Liquid	W/m·K	0.0722
	Btu/hr-ft·°F	0.0417
Vapor at 1 atm	W/m·K	0.0106
	Btu/hr-ft·°F	0.0061
Viscosity at 25°C Liquid	mPa·s	0.299
	cP	0.299
Vapor at 1 atm	mPa·s	0.0120
	cP	0.0120
Flammability Limit in Air at 1 atm	vol%	None
Ozone Depletion Potential	(CFC-12 = 1)	0.02
Halocarbon Global Warming Potential	(CFC-11 = 1)	0.10
TSCA Inventory Status	Reported/Included?	Yes, consent order
Inhalation Exposure Limit	AEL* (8 and 12 hr TWA)	1000

*Acceptable Exposure Limit (AEL) is an airborne inhalation exposure limit established by DuPont that specifies time-weighted average concentrations to which nearly all workers may be repeatedly exposed without adverse effects.

Figure 1. Pressure-Enthalpy Diagram for HCFC-124 (English Units)

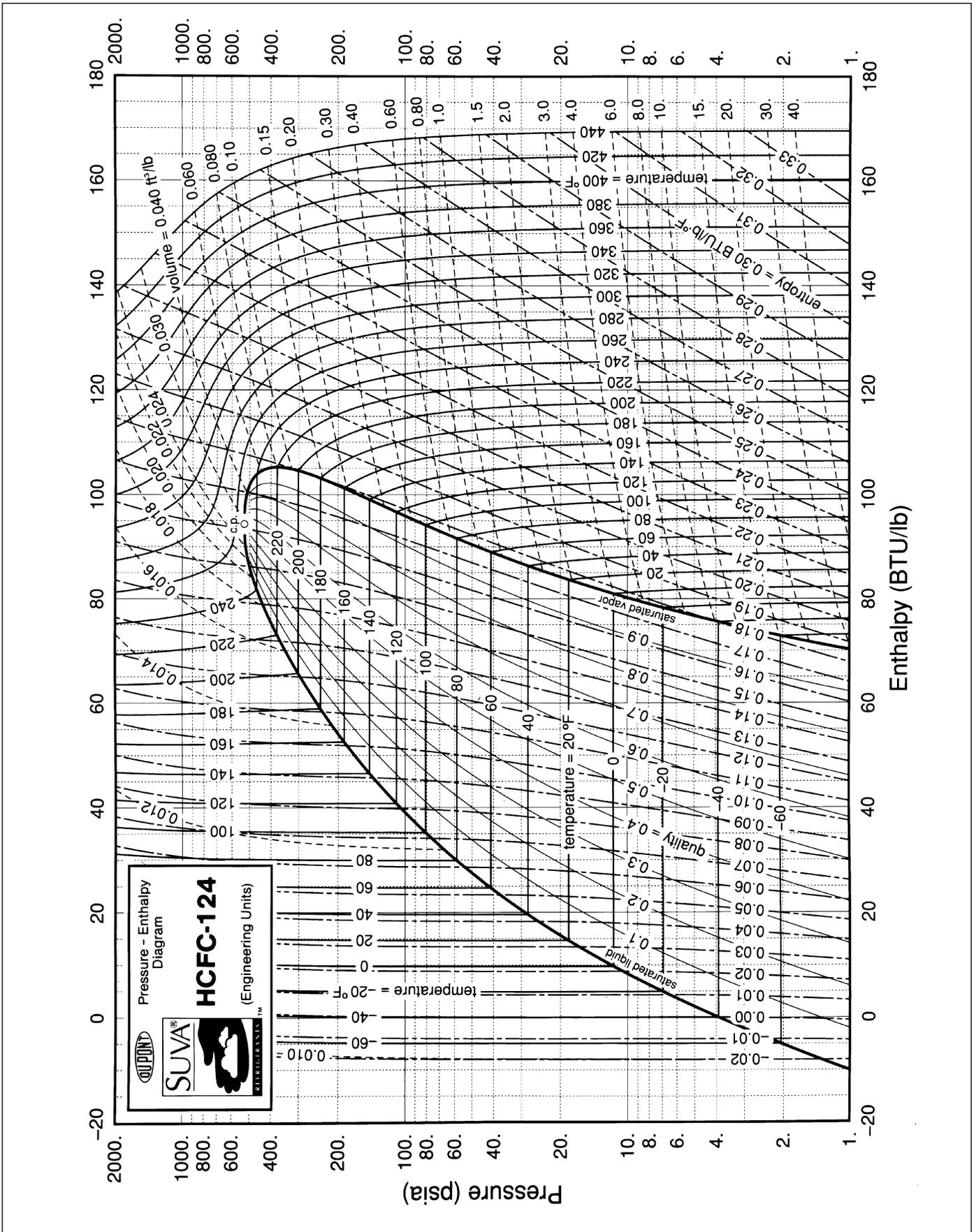


Figure 2. Pressure-Enthalpy Diagram for HCFC-124 (SI Units)

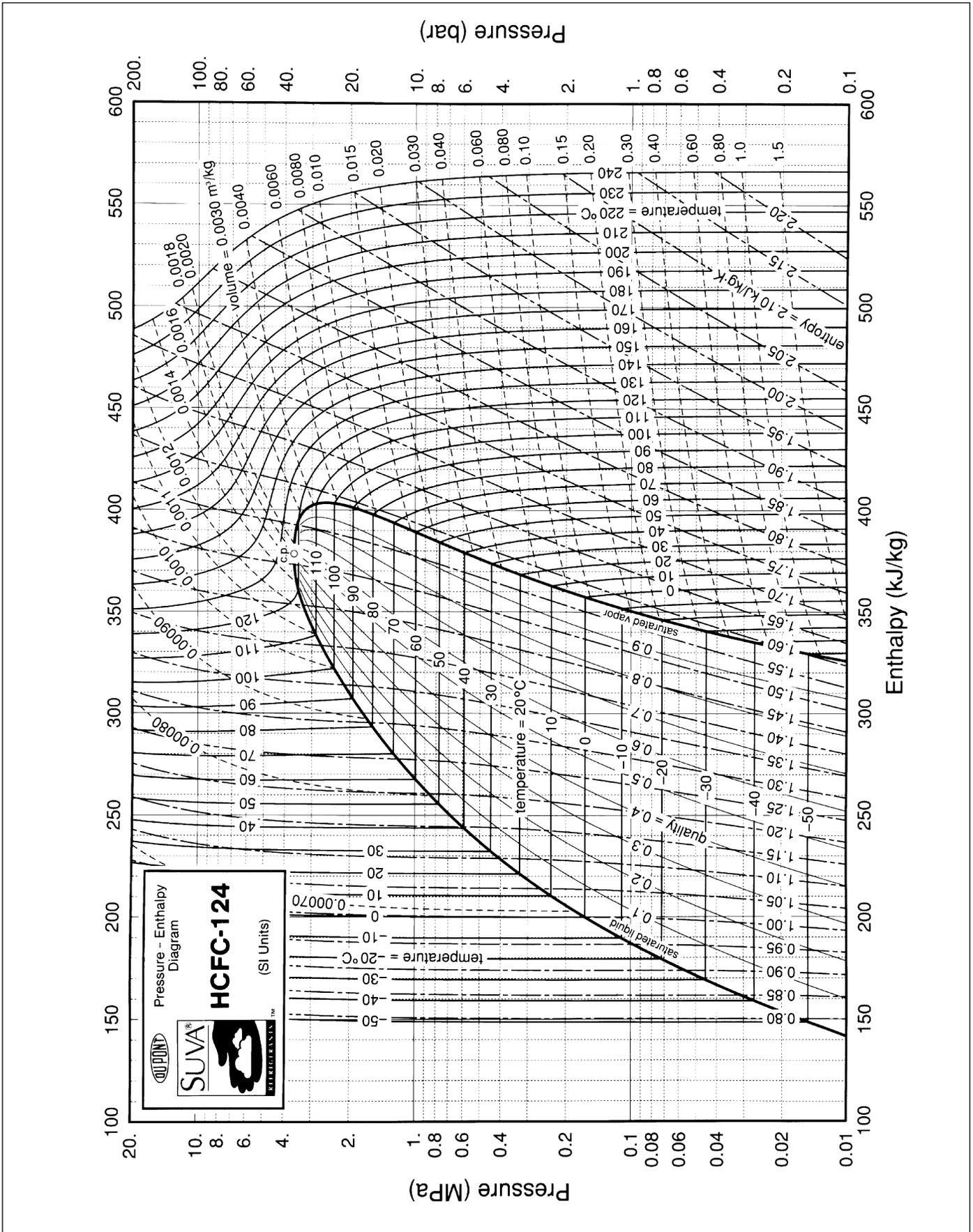


Table 3
Compatibility with Metal Compressor Materials

	Chloride Analysis, ppm	
	HCFC-124 (Alkylbenzene)	CFC-114 (Paraffinic Mineral Oil)
Aluminum Impeller	3.7	45.3
Copper Tube	0.2	30.3
Titanium Tube	2.1	53.7
Gray Cast Iron	0.4	43.0
Steel Tubing	0.8	12.1

Aged 14 days at 175°C

Table 4
Chemical Stability

Lubricant	Average Chloride Ion Values, µg	
	HCFC-124	CFC-114
Naphthenic	120	531
Alkylbenzene	105	1,039
Paraffinic	166	798

Aged 14 days at 175°C

Copper, steel, and aluminum coupons

Thermal Decomposition

Like R-12 and R-114, HCFC-124 will decompose when exposed to high temperatures from sources such as open flames or electric resistance heaters. Decomposition may produce toxic and irritating compounds such as hydrochloric and hydrofluoric acid and possibly carbonyl halides. The pungent odors released will irritate the nose and throat and generally force people to evacuate the area. Therefore, it is important to prevent decomposition by following DuPont recommendations for handling and use.

Concerns if R-12 or R-114 and Refrigerants Containing HCFC-124 Are Mixed

R-12 and R-114 and HCFC-124 are chemically compatible with each other; this means that they do *not* react with each other and form other compounds. However, when different refrigerants are mixed by accident or deliberately, they will form mixtures that are very difficult to separate. Therefore, mixtures of R-12 or R-114 and HCFC-124 containing refrigerants cannot be separated in on-site recycle machines or in the typical facilities of an off-site reclaimer. These mixtures will have to be disposed of by incineration.

Also, mixtures of R-12 or R-114 and HCFC-124 containing refrigerants will have performance properties different than either refrigerant alone. These properties may not be acceptable for your systems. We do not recommend mixing refrigerants in any system. First remove the R-12 or R-114 properly and then charge the new refrigerant.

Materials Compatibility

Because HCFC-124 will be used in different applications, it is important to review materials of construction for compatibility when designing new equipment, retrofitting existing equipment, or preparing storage and handling facilities. The compatibility data summarized here will include materials commonly used in refrigeration applications.

Elastomers and Plastics

It should be recognized that these data reflect compatibility in sealed tube tests, and that HCFC-124 compatibility in real systems can be influenced by the actual operating conditions, the nature of the polymers used, compounding formulations of the polymers, and the curing or vulcanization processes used to create the polymer. Elastomers should always be tested under actual operating conditions before reaching final conclusions about their suitability.

The rankings shown in **Table 5** are based on samples of each polymer subjected to aging at room temperature for two weeks in HCFC-124 alone.

Table 6 shows compatibility of HCFC-124 with various plastics using the same aging conditions. Physical properties of the test samples were determined before and after aging. The resulting ratings are based on zero (0) being best and two (2) being worst for the purposes of comparison. The factors included in the overall assessment of compatibility included:

- visual observations of material changes due to aging
- changes in weight and volume of the samples due to aging
- changes in hardness of the samples due to aging
- changes in flexural properties of the samples due to aging

Desiccants

In refrigeration systems, keeping the refrigerant and lubricant free of moisture is very important. Driers filled with moisture-adsorbing desiccant are typically used to prevent moisture accumulation.

Pure HCFC-124 is reported by UOP to be compatible with their XH-6 and XH-9 molecular sieve desiccants and by W. R. Grace to be compatible with their MS 592 or MS 594 molecular sieve desiccants. Equivalent molecular sieves produced by other manufacturers may also be used. Loose filled and compacted bead driers contain only molecular sieve desiccants, while solid core driers contain molecular sieves mixed with other materials. Consult the manufacturers of solid core driers for their recommendations.

Suva refrigerant blends containing HCFC-124 plus other components may not be compatible with XH-6 molecular sieve desiccant. Refer to the appropriate DuPont bulletins for information on these refrigerants.

Refrigeration Lubricants

Most compressors require a lubricant to protect internal moving parts. The compressor manufacturer usually recommends the type of lubricant(s) and proper viscosity that should be used to ensure acceptable operation and equipment durability. Recommendations are based on several criteria, which can include lubricity, miscibility, compatibility with materials of construction, thermal stability, and compatibility with other lubricants. It is important to follow the manufacturers' recommendations for lubricants to be used with their equipment.

**Table 5
Polymer Compatibility with HCFC-124**

Polymer	Rating	Linear Swell, %	Weight Gain, %	Hardness Change
Natural Rubber	0	3	22	-7
Butyl Rubber	0	<1	8	-8
Nordel® EPDM	0	-1	3	-5
Neoprene CR	0	<1	3	-4
SBR	1	<1	6	-15
Nitrile Rubber				
NBR	0	<1	10	-7
HNBR	2	28	169	-17
Vamac® EA	2*	32	175	-14
Hypalon® CSM	0	3	9	-5
Fluoroelastomers				
Viton® A	2	16	57	-13
Viton B	2	23	85	-34
Viton GF	2	25	88	-25
Kalrez®	2	19	47	—
Fluorinated Silicone	2	17	81	-16
Silicone	2	19	125	-12
Epichlorohydrin Homopolymer	0	-0.2	6	-4
Adiprene® U	2	29	172	-18
FA® Polysulfide	0	-1	3	-2
Thermoplastics				
Alcryn®	0	7	38	8
Santoprene®	0	1	12	-7
Geolast®	1	8	70	-13
Hytrel® polyester	0	8	36	0
Gasketing Materials				
Cork	—	2	134	—
Vegetable fiber	—	-0.2	34	—
Gylon® filled PTFE	—	2	6	—
Armalon® PTFE felt	—	2	32	—

RATING:

"0"—both linear swell and hardness change are less than 10%

"1"—either swell OR hardness change greater than 10%

"2"—both swell AND hardness change greater than 10%

COMMENTS:

*sample lost elasticity; did not return to original shape when deformed

TEST CONDITIONS:

Two weeks at room temperature; refrigerant only

Table 6
Compatibility of HCFC-124 with Plastics

Plastic	Rating	Weight Change, %
Polypropylene	1	2
Styron® polystyrene	1	6
Polyvinyl chloride		
PVC	0	0
CPVC	0	<1
Fluorocarbon		
Teflon® PTFE	1	4
Tefzel® ETFE	2	5
PVDF	0	<1
Surlyn® ionomer	1	2
Lucite® acrylic	2*	—
Kralastic® ABS	2*	—
Ethocel® cellulosic	2*	40
Epoxy	0	0
Delrin® acetal	0	1
Noryl® PPO	0	<1
Tuffak® PC	0	<1
Polyester		
Rynite® PET	0	<1
Valox® PBT	0	<1
Arylon® polyarylate	0	<1
Xydar® LCP	0	0
Zytel® nylon	0	0
Polyimide		
Vespel® PI	0	1
Ultem® PEI	0	0
Torlan® PAI	0	0
Ryton® PPS	0	1
Polysulfone		
Polysulfone	0	<1
Radel® Polyarylsulfone	0	0

RATING:

"0"—compatible by visual inspection and weight change

"1"—borderline by visual inspection or weight change

"2"—incompatible by visual inspection and weight change

COMMENTS:

*sample dissolved

TEST CONDITIONS:

Two weeks at room temperature; refrigerant only

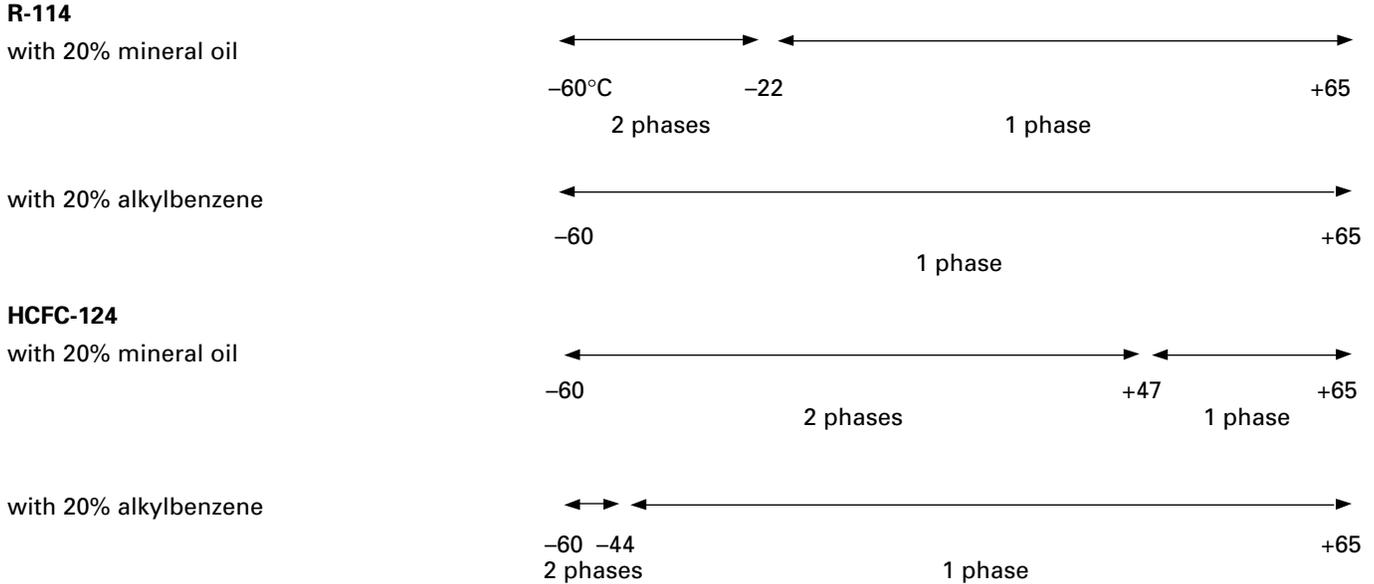
Current lubricants used with R-12 and R-114 have nearly complete miscibility, which eases the problems of designing systems to allow lubricant return back to the compressor. Many refrigeration systems take advantage of this miscibility when considering lubricant return.

HCFC-124 exhibits less miscibility with common mineral oil lubricants used with R-12 or R-114. However, alkylbenzene appears to be a good lubricant candidate for HCFC-124.

Compressor and equipment manufacturers will recommend lubricants to use with their equipment. It would be difficult to summarize all possible lubricant candidates that may be screened by various equipment manufacturers. In addition, there will be continuing research and development of new lubricants, because the market for alternative refrigerants continues to stimulate other market areas.

Table 7 shows a summary of miscibility tests done with an 80/20 volume mixture of refrigerant and lubricant over a wide range of temperatures, with visual inspection for phase separation as the tubes are slowly warmed. Alkylbenzene offers excellent miscibility with HCFC-124. This table does not show that any refrigerant/lubricant combination is acceptable, only whether the two appear to be miscible at the conditions shown.

Table 7
Miscibility Summary (Temperature in °C)



Safety

Users of DuPont HCFC-124 should read and understand the DuPont Material Safety Data Sheet (MSDS). Copies of the HCFC-124 MSDS can be obtained from DuPont Customer Service or International Offices (see the last page of this document for locations and telephone numbers) or from any DuPont authorized distributor.

ASHRAE Classification = A1.

Inhalation Toxicity

HCFC-124 poses no acute or chronic hazard when it is handled in accordance with DuPont recommendations and when exposures are maintained below recommended limits, such as the DuPont Acceptable Exposure Limit (AEL) of 1000 ppm, 8 or 12 hour time weighted average (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 during a 40-hr work week without adverse effects.

Like R-114, exposure above the recommended limit to the vapors of HCFC-124 by inhalation may cause human health effects that can include temporary

nervous system depression with anesthetic effects such as dizziness, headache, confusion, loss of coordination, and even loss of consciousness. Higher exposures to the vapors may cause temporary alteration of the heart's electrical activity with irregular pulse, palpitations, or inadequate circulation. Death can occur from gross overexposure. **Intentional misuse or deliberate inhalation of HCFC-124 vapors may cause death without warning. This practice is extremely dangerous.**

If you are exposed to HCFC-124 vapors and experience any of the above symptoms, move immediately to fresh air and seek medical attention.

Cardiac Sensitization

An effect that occurs with most hydrocarbons and halocarbons at high concentrations is that the human heart can become sensitized to adrenalin, leading to cardiac irregularities and even cardiac arrest. The likelihood of these cardiac problems increases if you are under physical or emotional stress. HCFC-124 can cause these responses well above the AEL.

If you are exposed to very high concentrations of HCFC-124, move immediately from the area and seek medical attention as a precaution. **DO NOT**

attempt to remain in the area to fix a leak or perform other duties—the effects of over-exposure can be very sudden.

Medical attention must be given immediately if someone is having symptoms of overexposure to HCFC-124. **DO NOT treat the patient with drugs such as epinephrine, because these drugs could increase the risk of cardiac problems.** If the person is having trouble breathing, administer oxygen. If breathing has stopped, give artificial respiration immediately.

Skin and Eye Contact

At room temperature, HCFC-124 vapors have little or no effect on the skin or eyes. However, in liquid form, HCFC-124 can cause frostbite. If contact with liquid does occur, soak the exposed areas in luke-warm water, not cold or hot. In all cases, seek medical attention as soon as possible.

Always wear protective clothing when there is a risk of exposure to liquid refrigerants. Where splashing of refrigerant may occur, always wear eye protection and a face shield.

Spills or Leaks

If a large release of vapor occurs, such as from a large spill or leak, the vapors may concentrate near the floor or in low elevation areas, which can displace the oxygen needed for life, resulting in suffocation.

Evacuate everyone until the area has been well ventilated. Re-enter the area only while using self-contained breathing apparatus. Use blowers or fans to circulate the air at floor or low levels.

Always use self-contained breathing apparatus or an air-line respirator when entering tanks or other areas where vapors might exist. Use the buddy system (a second employee stationed outside the tank) and a lifeline. Refer to the Material Safety Data Sheet (MSDS) for HCFC-124 for more complete safety information.

HCFC-124 has virtually no odor and, therefore, can be extremely difficult to detect in enclosed areas. Frequent leak checks and the installation of permanent leak detectors may be necessary for enclosed areas or machinery rooms. Refer to ASHRAE Standards 15 and 34 for machinery room requirements.

To ensure safety when using HCFC-124 refrigerant in enclosed areas:

- Route relief and purge vent piping outdoors, away from air intakes.
- Make certain the area is well ventilated at all times; use auxiliary ventilation, if necessary, to remove vapors.
- Make sure the work area is free of vapors prior to beginning any work.
- Install air monitoring equipment to detect leaks.
- Equipment should *never* be leak tested with a pressurized mixture of air and HCFC-124. A mixture of dry nitrogen and HCFC-124 can be used.

Storage Tanks

- Bulk storage tanks should be evacuated prior to initial filling and should *never* be under positive air pressure.
- Tanks should not be pressurized above 1.5 times the normal working pressure with HCFC-124 refrigerant. Relief devices on either the tanks or refrigerant supply system should be verified to be set below this pressure.
- Tank pressures should be monitored routinely to look for accumulation of air.
- Air lines should *never* be connected to refrigerant storage tanks.

Filling and Charging Operations

- Before starting work, read the DuPont Material Safety Data Sheet (MSDS) for HCFC-124.
- Before evacuating cylinders or refrigeration equipment, any remaining refrigerant should be removed using a recovery system.
- Vacuum pump discharge lines should be free of restrictions that could increase discharge pressures.
- Cylinders or refrigeration equipment should normally be evacuated at the start of filling and never be under positive air pressure.
- Filled cylinders should periodically be analyzed for air (nonabsorbable gases or NAGs).

Refrigerant Recovery Systems

Efficient recovery of refrigerant from equipment or containers requires evacuation at the end of the recovery cycle. Suction lines to a recovery compressor should be periodically checked for leaks to prevent compressing air into the recovery cylinder during evacuation. In addition, the recovery cylinder pressure should be monitored, and evacuation stopped in the event of a rapid pressure rise, indicating the presence of noncondensable air. The recovery cylinder contents should then be analyzed for NAG, and the recovery system leak checked if air is present. Do not evacuate a refrigeration system that has a major leak.

Air Monitors and Leak Detection

Service personnel have used leak detection equipment for years when servicing equipment. Leak detectors exist not only for pinpointing specific leaks, but also for monitoring an entire room on a continual basis. **American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standard 15 requires air monitors in refrigeration machinery rooms as defined in the Standard. In conformance with the Standard, an air monitor capable of measuring 0–1500 ppm of HCFC-124 may be required for indoor installations. The user should check ASHRAE Standard 15 to determine what is required for the particular application.**

There are several reasons for leak pinpointing or area monitoring, including:

- conservation of refrigerant
- protection of employees
- detection of fugitive or small emissions
- protection of equipment

Leak detectors can be placed into two broad categories: leak pinpointers and area monitors. Before purchasing a monitor or pinpointer, several criteria should be considered, which include sensitivity, detection limits, and selectivity.

Types of Detectors

Using selectivity as a criterion, leak detectors can be placed into one of three categories: nonselective, halogen-selective, or compound-specific. In general, as the specificity of the monitor increases, so will the complexity and cost.

A different technology that can be employed to find leaks is by using a dye or fluorescent additive that is placed in the refrigeration system and emitted with the leaking refrigerant and lubricant.

A detailed discussion of leak detection, along with a list of manufacturers of leak detection equipment, can be found in DuPont Bulletin ARTD-27 (H-31753-2).

Nonselective Detectors

Nonselective detectors are those that will detect any type of emission or vapor present, regardless of its chemical composition. These detectors are typically quite simple to use, very rugged, inexpensive, and almost always portable. However, their inability to be calibrated, long-term drift, lack of selectivity, and lack of sensitivity limit their use for area monitoring.

Some nonselective detectors designed for use with R-114 may have a lower sensitivity when used with HCFC-124 refrigerant. However, newly designed detectors with good sensitivity for HCFCs are now available. Be sure to consult with the manufacturer before selecting or using a nonselective detector with HCFC-124 refrigerant.

Halogen-Selective Detectors

Halogen-selective detectors use a specialized sensor that allows the monitor to detect compounds containing fluorine, chlorine, bromine, and iodine, without interference from other species. The major advantage of such a detector is a reduction in the number of “nuisance alarms”—false alarms caused by the presence of some compound in the area other than the target compound.

These detectors are typically easy to use, feature higher sensitivity than the nonselective detectors (detection limits are typically <5 ppm when used as an area monitor and <0.05 oz/yr [<1.4 g/yr] when used as a leak pinpointer) and are very durable. In addition, due to the partial specificity of the detector, these instruments can be easily calibrated.

Compound-Specific Detectors

The most complex detectors, which are also the most expensive, are compound-specific detectors. These units are typically capable of detecting the presence of a single compound, without interference from other compounds. In an area where different refrigerant mixtures are used, these detectors may offer more specificity than is needed for normal leak management. Discuss these issues with the equipment manufacturer before making a purchase decision.

Storage and Handling

Shipping in the United States

HCFC-124 is a liquefied compressed gas. According to the U.S. Department of Transportation (DOT), a nonflammable compressed gas is defined as a nonflammable material having an absolute pressure greater than 40 psia at 21°C (70°F) and/or an absolute pressure greater than 104 psia at 54°C (130°F).

The appropriate DOT designations are as follows:

DOT Proper Shipping Name	LIQUEFIED GAS N.O.S. (CHLOROTETRAFLUOROETHANE)
Hazard Class	2.2
UN Number	1021
DOT/IMO Labels	NONFLAMMABLE GAS

Handling Precautions for HCFC-124 Shipping Containers

The following rules for handling HCFC-124 containers are strongly recommended:

- Use personal protective equipment, such as side shield safety glasses, gloves, and safety shoes when handling containers.
- Avoid skin contact with HCFC-124 as it may cause frostbite.
- Never heat a container to temperatures higher than 52°C (125°F).
- Never apply direct flame or live steam to a container or valve.

- Never refill disposable cylinders with anything. The shipment of refilled disposable cylinders is prohibited by DOT regulations.
- Never refill returnable cylinders without DuPont consent. DOT regulations forbid transportation of returnable cylinders refilled without DuPont authorization.
- Never use a lifting magnet or sling (rope or chain) when handling containers. A crane may be used when a safe cradle or platform is used to hold the container.
- Never use containers as rollers, supports, or for any purpose other than originally intended.
- Protect containers from any object that will result in a cut or other abrasion in the surface of the metal.
- Never tamper with the safety devices in the valves or containers.
- Never attempt to repair or alter containers or valves.
- Never force connections that do not fit. Make sure the threads on the regulators or other auxiliary equipment are the same as those on the container valve outlets.
- Keep valves tightly closed and valve caps and hoods in place when the containers are not in use.
- Store containers under a roof to protect them from weather extremes.
- Use a vapor recovery system to collect vapors from lines after unloading.

Recovery, Recycle, Reclamation, and Disposal

Responsible use of HCFC-124 requires that the product be recovered for reuse or disposal whenever possible. DuPont purchases used refrigerant for reclamation through its distributor networks in the United States, Canada, and Europe. In the United States, Suva 124 refrigerant is accepted as part of this program. Recovery and reuse of refrigerant makes sense from an environmental and economic standpoint. In addition, the U.S. Clean Air Act and other global regulations prohibit venting of CFC and HCFC refrigerants during the maintenance, servicing, or disposal of refrigeration equipment.

Recovery

Recovery refers to the removal of refrigerant from equipment and collection in an appropriate container. As defined by the Air Conditioning and Refrigeration Institute (ARI), recovery does not involve processing or analysis of the refrigerants. HCFC-124 may be recovered from refrigeration equipment using permanent on-site equipment or many of the portable recovery devices now available in the marketplace. The portable devices contain a small compressor and some have an air-cooled condenser. In many, the recovery cylinder serves as the condenser. They may be used for vapor (and in some cases, liquid) recovery. At the end of the recovery cycle, the system is evacuated thoroughly to remove vapors. In the United States, the Environmental Protection Agency (EPA) sets standards for recovery equipment. Before purchasing a specific recovery unit, check with the manufacturer to be sure that it contains proper materials of construction and lubricant for the refrigerants you intend to recover.

Recycle

Refrigerant recycle refers to reducing the contaminant levels in used refrigerants by passing the refrigerants through devices that separate out or reduce the amount of lubricant, water, acidity, and particulates. Recycle is usually a field or shop procedure with no analytical testing of refrigerant. HCFC-124 may be recycled using many of the devices now on the market. In the United States, the EPA sets standards for these devices. Recycle is already standard practice in many areas of the commercial refrigeration industry. Consult with the manufacturer before specifying a recycle device for any refrigerant.

Reclamation

Reclamation refers to the reprocessing of used refrigerant to new product specifications. Quality of the reclaimed product is verified by chemical analysis. In the United States, Suva 124 refrigerant is included in DuPont's refrigerant reclamation program. Contact DuPont or one of our authorized distributors for further information.

Reclamation offers advantages over on-site refrigerant recycling procedures, because recycling systems cannot guarantee complete removal of all contaminants. Putting refrigerants that do not meet new product specifications into expensive equipment may cause damage.

Disposal

Disposal refers to the destruction of used refrigerant. Disposal may be necessary when the refrigerant has become badly contaminated with other products and no longer meets the acceptance specifications of reclaimers. Although DuPont does not accept severely contaminated refrigerant for disposal, licensed waste disposal firms are available. Be sure to check the qualifications of any firm before sending them used refrigerants.

**DuPont Fluorochemicals
Fluorochemicals Customer Service Center
Wilmington, DE 19898**

**For sales information:
(800) 235-SUVA
In Delaware (302) 995-2150**

**For technical information:
(800) 582-5606
In Delaware (302) 999-3129**

Europe

DuPont de Nemours
International S.A.
2 Chemin du Pavillon
P.O. Box 50
CH-1218 Le Grand-Saconnex
Geneva, Switzerland
41-22-717-5111

Canada

DuPont Canada, Inc.
P.O. Box 2200, Streetsville
Mississauga, Ontario
L5M 2H3
(905) 821-3300

Mexico

DuPont, S.A. de C.V.
Homerio 206
Col. Chapultepec Morales
C.P. 11570 Mexico, D.F.
52-5-722-1000

South America

DuPont do Brasil S.A.
Alameda Itapicuru, 506
Alphaville 06400 Barueri
Sao Paulo, Brazil
55-11-421-8509

DuPont Argentina S.A.
Casilla Correo 1888
Correo Central
1000 Buenos Aires, Argentina
54-1-311-8167

Pacific

DuPont Australia
P.O. Box 930
North Sydney, NSW 2060
Australia
61-2-923-6165

Japan

Mitsui DuPont Fluoro-
chemicals Company, Ltd.
Chiyoda Honsha Building
5-18, 1-Chome Sarugakucho
Chiyoda-Ku, Tokyo 101 Japan
81-3-5281-5805

Asia

DuPont Taiwan
P.O. Box 81-777
Taipei, Taiwan
886-2-514-4400

DuPont Asia Pacific Limited
P.O. Box TST 98851
Tsim Sha Tsui
Kowloon, Hong Kong
852-734-5345

DuPont Thailand
P.O. Box 2398
Bangkok 10501, Thailand
66-2-238-4361

DuPont China Ltd.
Room 1704, Union Bldg.
100 Yanan Rd. East
Shanghai, PR China 200 002
Phone: 86-21-328-3738
Telex: 33448 DCLSH CN
Fax: 86-21-320-2304

DuPont Far East, Inc.
P.O. Box 12396
50776 Kuala Lumpur,
Malaysia
Phone: 60-3-232-3522
Telex: (784) 30391 DUFE M
Fax: 60-3-238-7250

DuPont Korea Ltd.
C.P.O. Box 5972
Seoul, Korea
82-2-721-5114

DuPont Singapore
Pte. Ltd.
1 Maritime Square #07 01
World Trade Centre
Singapore 0409
65-273-2244

DuPont Far East,
Philippines
5th Floor, Solid Bank
Building
777 Paseo de Roxas
Makati, Metro Manila
Philippines
63-2-818-9911

DuPont Far East Inc.
7A Murray's Gate Road
Alwarpet
Madras, 600 018 India
91-44-454-029

DuPont Far East Inc.–
Pakistan
9 Khayaban-E-Shaheen
Defence Phase 5
Karachi, Pakistan
92-21-533-350

DuPont Far East Inc.
P.O. Box 2553/Jkt
Jakarta 10001
Indonesia
62-21-517-800

