Technical Information

DuPont Fluoroproducts

DuPont™ FE-227™
Fire Extinguishing Agent (HFC-227ea)

Properties, Uses, Storage, and Handling

DUPONT®

The miracles of science™

DuPont™ FE-227™ Fire Extinguishing Agent

Properties, Uses, Storage, and Handling

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Introduction

Chlorofluorocarbons (CFCs) and bromofluorocarbons/bromochlorofluorocarbons (Halons) which were developed in the 1930s, have unique properties. They are low in toxicity, nonflammable, noncorrosive, and compatible with other materials. In addition, they have thermodynamic and physical properties that make them ideal for a variety of uses. CFCs have been used as aerosol propellants, refrigerants, blowing agents for plastic foams, cleaning agents for metal and electronic components, and in many other applications. The Halon compounds have been used as fire extinguishing agents and explosion suppressants for protection of high-value equipment. They are used in hand-held portable extinguishers, total flooding systems, and local application systems.

The atmospheric stability of these compounds, coupled with their bromine and/or chlorine content, has linked them to depletion of the earth's protective ozone layer. As a result, these compounds are being phased out of production. DuPont has developed environmentally acceptable alternative compounds such as HFC-227ea as a replacement for some CFCs and Halons.

HFC-227ea

Because HFC-227ea does not contain chlorine or bromine, it has an ozone-depletion potential (ODP) of zero. Uses are as a fire extinguishant and a pharmaceutical propellant. It could be considered as a pure refrigerant or as a blend component for special applications, but it is not currently in commercial use for refrigerant applications. HFC-227ea is nonflammable, has low toxicity, and is nonozone depleting.

It may be identified by any of the following names:

1,1,1,2,3,3,3 heptafluoropropane

Hydrofluorocarbon (HFC) 227ea

Hydrofluoroalkane (HFA) 227ea

FE-227™ fire extinguishant

Uses

Fire Extinguishant

When used as a fire extinguishing agent, HFC-227ea is called FM-200®* or FE-227™. It is listed as an acceptable Halon replacement for Halon 1301 in the United States Environmental Protection Agency's Significant New Alternatives Policy (SNAP) program in fixed fire extinguishing systems and local application systems. FE-227™ is noncorrosive, electrically nonconductive and free of residue. It is ideally suited for protection of high-value assets such as in computer rooms, telecommunication facilities, and museums.

The fire extinguishing concentrations of FE-227™ allow it to be used as a total flooding agent in normally occupied spaces.

The heptane cup burner extinguishing concentration (determined by DuPont utilizing a NFPA/ISO compliant cup burner) for FE-227™ in air is 6.7% (volume).

Physical Properties

Physical properties of HFC-227ea are shown in **Table 1**.

Saturated vapor pressure and density are given in **Tables 2a** and **2b**.

Saturated vapor pressure is shown in **Figures 1a** and **1b**.

For complete thermodynamic properties, see DuPont Bulletin T-227ea.

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* Registered trademark of Great Lakes Chemical Corporation.

Table 1
Physical Properties of HFC-227ea

Property	
Chemical name	1,1,1,2,3,3,3-Heptafluoropropane
Chemical formula	CF_3CHFCF_3
CAS No.	431-89-0
Molecular Wt.	170.03
Boiling Point, 1 atm, °C (°F)	–16.45 (2.3)
Freezing Point, °C (°F)	–131 (–204)
Flammable Limits	nonflammable
Critical Temperature, °C (°F)	101.6 (214.9)
Critical Pressure, kPa (psia)	2930.6 (424.7)
Critical Density, kg/m^3 (lb/ft^3)	621 (38.77)
Liquid Density @ 25°C (77°F), kg/m^3 (lb/ft^3)	1386 (86.53)
Vapor Density @ 25°C (77°F) and 1atm, kg/m^3 (lb/ft^3)	7.148 (0.4462)
Specific Heat, Liquid (Cp) @ 25°C (77°F), kJ/kg–°C (Btu/lb°F)	1.247 (0.2979)
Specific Heat, Vapor (Cp) @ 25°C (77°F), kJ/kg–°C (Btu/lb°F) and 1 atm	0.8136 (0.1945)
Vapor Pressure, Saturated @ 25°C (77°F), kPa (psia)	453.3 (65.7)
Heat of Vaporization @ B.P., kJ/kg (Btu/lb)	132.6 (56.7)
Thermal Conductivity, Liquid @ 25°C (77°F), W/m–°C (Btu/hr-ft°F)	0.0533 (0.0308)
Thermal Conductivity, Vapor @ 25°C (77°F), W/m–°C (Btu/hr-ft°F)	0.0127 (0.0073)
Viscosity, Liquid @ 25°C (77°F), cP (lb/ft-hr)	0.2442 (0.5907)
Relative dielectric strength @1atm, 25°C (N_2=1)	2.00
Solubility of Water in HFC-227ea @ 20°C (68°F), ppm	600
Ozone Depletion Potential	0.0 (CFC-11 = 1)
Global Warming Potential, GWP (100 yr ITH. For CO_2, GWP = 1)	2900
Atmospheric Lifetime, years	36.5
TSCA Inventory Status	Reported, Included
European List of New Chemical Substances	EINECS, Listed (207-079-2)
SNAP Status	Listed
Inhalation Exposure Limit	TLV Not Established
	DuPont AEL = 1000 ppm 8 hr & 12 hr TWA

Table 2a
Vapor Pressure and Density of HFC-227ea (SI)

Temperature, °C	Saturated Vapor Pressure, kPa	Liquid Density at Saturation, kg/m³	Vapor Density at 1 atm, kg/m³
–15	106.80	1539	8.44
–10	131.64	1521	8.25
–5	160.75	1503	8.07
0	194.63	1485	7.89
5	233.75	1466	7.73
10	278.64	1447	7.57
15	329.82	1427	7.43
20	387.84	1407	7.28
25	453.30	1386	7.15
30	526.77	1364	7.02
35	608.89	1342	6.89
40	700.30	1319	6.77
45	801.70	1295	6.66
50	913.79	1269	6.55
55	1037.33	1243	6.44
60	1173.12	1214	6.34
65	1322.02	1184	6.24
70	1484.92	1151	6.14
75	1662.81	1116	6.05
80	1856.72	1076	5.96
85	2067.78	1031	5.87
90	2297.22	977	5.78
95	2546.34	907	5.70
100	2816.57	792	5.62

Table 2b
Vapor Pressure and Density of HFC-227ea (English)

Temperature, °F	Saturated Vapor Pressure, psia	Liquid Density at Saturation, lb/ft³	Vapor Density at 1 atm, lb/ft³
–10	10.68	97.86	NA
0	13.72	96.68	NA
10	17.40	95.47	0.52
20	21.82	94.23	0.507
30	27.05	92.96	0.495
40	33.20	91.67	0.484
50	40.38	90.33	0.473
60	48.68	88.96	0.463
70	58.22	87.55	0.453
80	69.11	86.08	0.444
90	81.47	84.56	0.435
100	95.43	82.98	0.426
110	111.12	81.33	0.418
120	128.67	79.60	0.410
130	148.25	77.76	0.403
140	170.01	75.80	0.396
150	194.10	73.70	0.389
160	220.73	71.41	0.382
170	250.07	68.86	0.376
180	282.35	65.97	0.369
190	317.79	62.56	0.363
200	356.65	58.23	0.358
212	408.17	NA	NA

Figure 1. Vapor Pressure of HFC-227ea

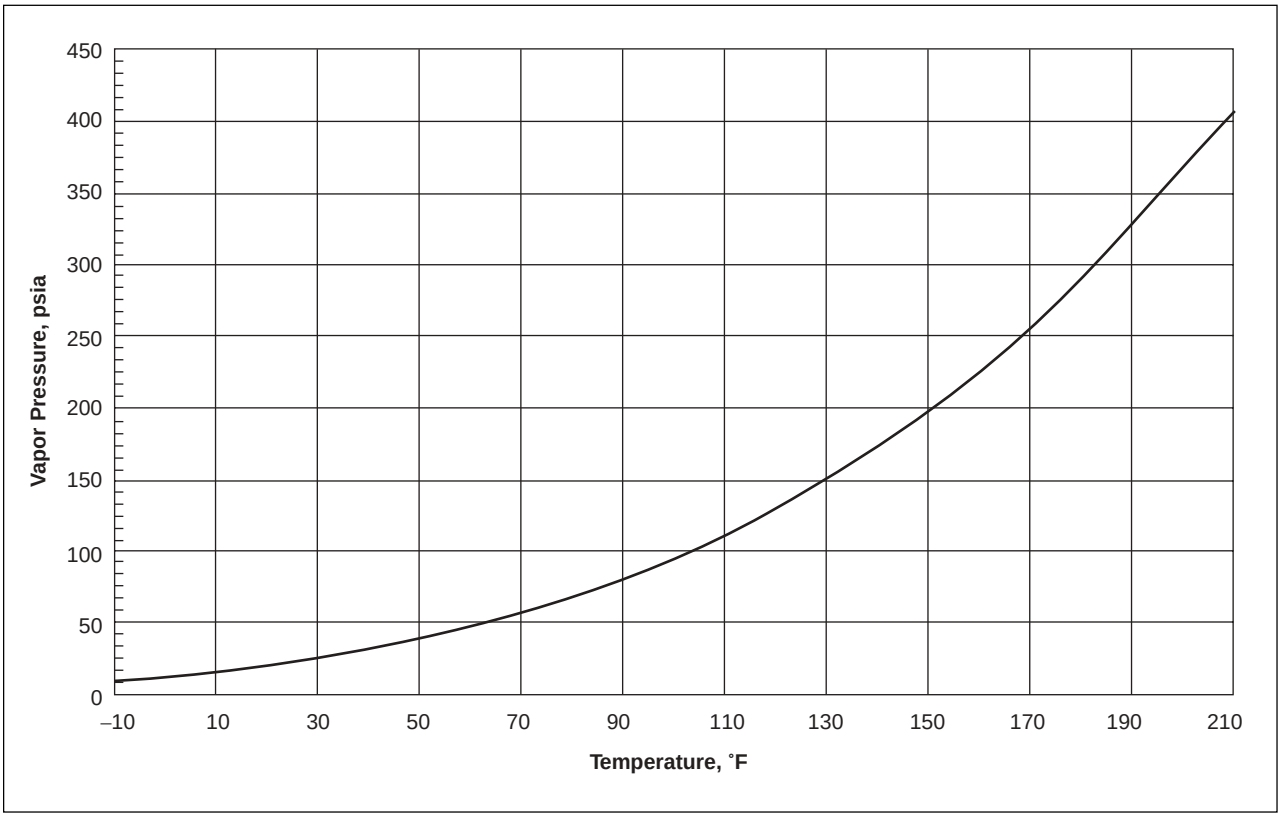
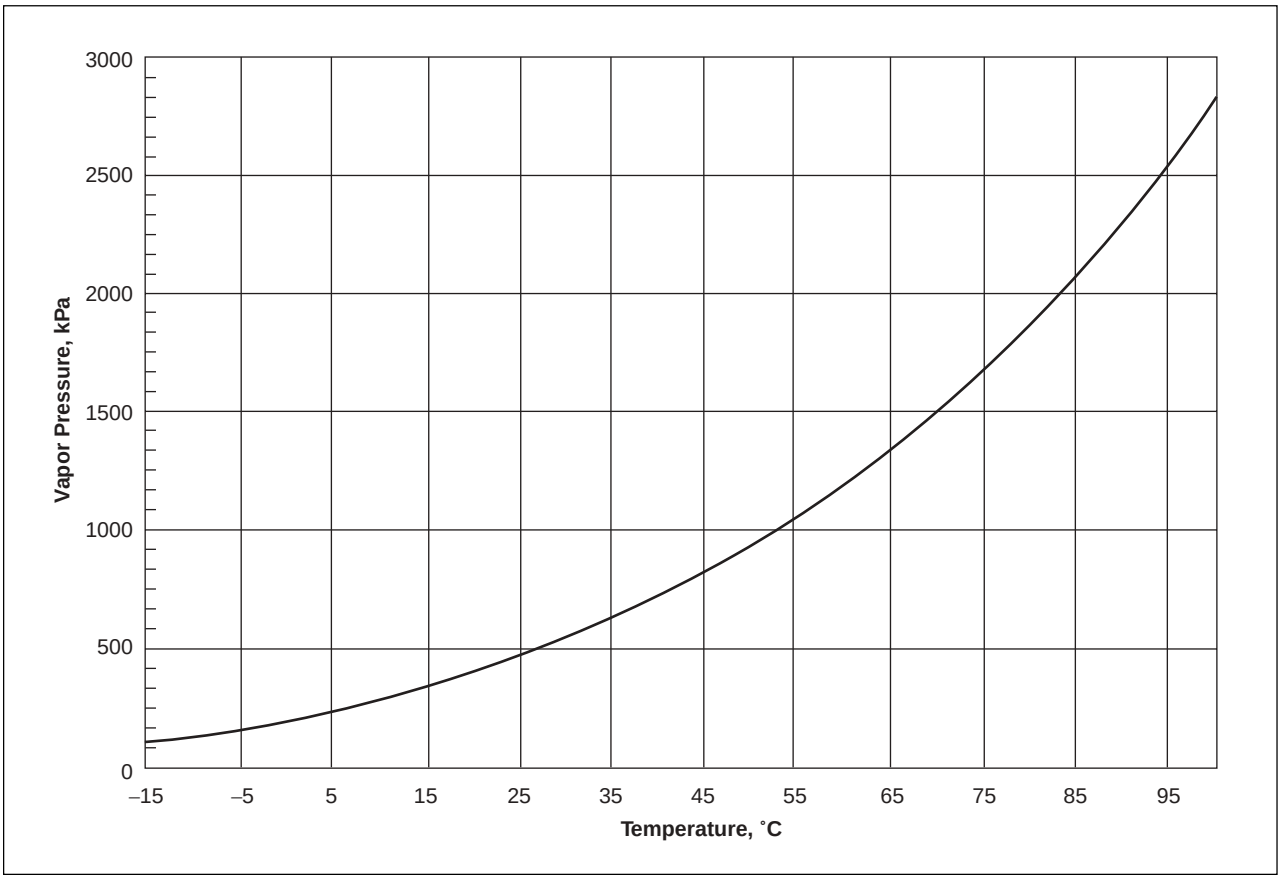


Figure 2. Vapor Pressure of HFC-227ea



Materials Compatibility

Because HFC-227ea can be used in a variety of applications, it is important to review the materials of construction for compatibility when designing new equipment, retrofitting existing equipment, or preparing storage and handling facilities. The following are general tests. To determine the compatibility of the specific materials being considered for use in a particular system, additional tests should be conducted with these materials at the conditions of that system.

Stability with Metals

Most of the commonly used metals such as steel, cast iron, brass, copper, tin, lead, and aluminum can be used satisfactorily with HFC-227ea under normal conditions of use. High temperature stability tests were conducted with HFC-227ea and commonly used metals at 175°C for two weeks, and HFC-227ea was found to be very stable. At temperatures above 175°C, depending on specific conditions, some metals may act as catalysts for the breakdown of HFC-227ea. These conditions include: presence of moisture or other contaminants, type of metal, metal surface area, contact with liquid or vapor agent, as well as time and temperature of contact.

Halocarbons may react violently with highly reactive metals such as the alkali and alkaline earth metals, sodium, potassium, and barium, in their free metallic form. Materials become more reactive when finely ground or powdered, and in this state magnesium and aluminum may react, especially at higher temperatures. Highly reactive materials should not be brought into contact with HFC-227ea until a careful study is made and appropriate safety precautions are taken.

Compatibility with Elastomers

Compatibility tests were performed with several commonly used elastomers. Elastomer coupons were 50% immersed in liquid HFC-227ea for two weeks at room temperature (23°C [74°F]). This test indicates that eight out of the nine common elastomers exhibit negligible swelling, weight gain, or hardness change after exposure. Results are summarized in **Table 3a**.

Compatibility with Plastics

Compatibility tests were also performed with several commonly used plastics. The plastics were evaluated in the same manner as the elastomers. Six of the plastics showed negligable effect (weight gain and surface condition). Results are summarized in **Table 3b.**

Table 3a
Elastomer Compatibility

Elastomer	Linear swell, %	Weight Gain, %	Hardness Change, units
Butyl	0	0.37	0
Nordel® EPDM	0.20	1.44	1.6
Neoprene W	0.05	0.66	0
NBR	0	1.86	4.0
Hypalon® CSM	0.19	1.41	2.4
Viton® A	9.49	26.83	–44.0
Epichlorohydrin homopolymer	0.15	0.08	5.5
FA polysulfide	0.05	0.06	6.9
Hytrel® TPE	1.33	5.71	4.6

Table 3b
Plastic Compatibility

Plastic	Weight Gain, %	Surface Condition
High-density polyethylene (HDPE)	0.11	No Change
Polystyrene (PS)	–0.03	No Change
Polypropylene (PP)	0.06	No Change
Acrylonitrile-butadiene-styrene (ABS)	–0.03	No Change
Polycarbonate (PC)	–0.10	No Change
Polymethyl methacrylate (PMMA)	*	*
Nylon	–0.17	No Change
Teflon® PTFE	5.23	No Change

* Partly dissolved, deformed, and destroyed

Safety

Users of HFC-227ea should read and understand the DuPont Material Safety Data Sheet (MSDS). Copies of the HFC-227ea MSDS can be obtained from DuPont Customer Service or International Offices (see last page of this document for locations, telephone numbers, and Web site).

Inhalation Toxicity

HFC-227ea poses no acute or chronic hazard when it is handled in accordance with DuPont recommendations and when the exposure is maintained below the recommended exposure limits. DuPont has established the Allowable Exposure Limit (AEL) for HFC-227ea at 1000 ppm, 8-hr and 12-hr TWA.

However, inhaling high concentrations of HFC-227ea vapor may cause 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. Intentional misuse or deliberate inhalation may cause death without warning.

If a person is experiencing any of the initial symptoms, they should be moved to fresh air and kept calm. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention.

Cardiac Sensitization

If vapors are inhaled at a concentration of 105,000 ppm and higher, the heart may become sensitized to adrenaline, leading to cardiac irregularities and, possibly, cardiac arrest. Similar effects are observed with many hydrocarbons and halocarbons at high concentrations. The likelihood of these cardiac problems increases if the person is under physical or emotional stress.

Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be considered only as a last resort in life-threatening emergencies.

The threshold cardiac sensitization, lowest observed adverse effect level (LOAEL) for HFC-227ea is 105,000 ppm (10.5%) and the no observed adverse effect level (NOAEL) is 90,000 ppm (9%) as determined in epinephrine-challenged dogs.

Skin and Eye Contact

At room temperature, HFC-227ea vapors have little or no effect on the skin or eyes. However, in the liquid form, HFC-227ea can freeze the skin or eyes on contact, causing frostbite. If contact with liquid does occur, soak the exposed area in lukewarm 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 HFC-227ea. Where splashing of HFC-227ea may occur, always wear eye protection and a face shield.

Spills or Leaks

If a large release of vapors occurs, such as from a large leak or spill, the vapors may concentrate near the floor or in subfloor areas and displace the oxygen available for breathing, causing suffocation.

Evacuate everyone until the area has been well ventilated. Use blowers or fans to circulate the air at floor level. Do not re-enter the affected area without self-contained breathing apparatus or unless the area has been monitored to indicate that that the concentration of HFC-227ea vapors in the area is below the AEL of 1000 ppm.

Always use self-contained breathing apparatus or a supplied air mask when entering tanks or other enclosures where vapors might exist. Use the buddy system and a lifeline. Refer to the HFC-227ea MSDS for more information.

HFC-227ea vapors have virtually no odor. Therefore, frequent leak checks or the installation of area monitors are necessary in enclosed areas where leaks can occur.

To ensure safety when working with halocarbons in confined areas:

1. Route relief and purge vent piping (if used) outdoors, away from air intakes.
2. Make certain the area is well ventilated, using auxiliary ventilation, if necessary, to move vapors.
3. Make sure the area is clear of vapors prior to beginning work.
4. Utilize monitoring equipment to detect leaks.

Storage and Handling

Shipping Information for the United States

HFC-227ea is a liquefied compressed gas. According to the U.S. Department of Transportation (DOT), a gas is a material that has a vapor pressure of >43.5 psia at 50°C or is completely vapor at 20°C and 14.7 psia (49 CFR-171.8). A liquefied compressed gas is defined as a gas which, in a package under the charged pressure, is partially liquid at 20°C (49 CFR-173.115). The appropriate DOT designation for HFC-227ea is as follows:

Proper shipping name:	Heptafluoropropane
Hazards class:	2.2
UN No.:	3296
DOT/IMO Labels:	Nonflammable Liquefied Compressed Gas

Containers

Three types of containers are being used globally for shipping FE-227™. Specifications for the containers and tank trailers are provided in **Table 4**.

The **68 kg (150-lb) size cylinder** of FE-227™ is a freestanding, upright returnable cylinder, equipped with a nonrefillable liquid/vapor valve. With this two-way valve, FE-227™ can be removed from the cylinder as either vapor or liquid through the single outlet without inverting the cylinder. The outlet is designed for a CGA-660 connection. The handhweel for discharging liquid is on the top of the valve. A dip tube, which extends to the bottom of the cylinder, is attached to the valve's liquid port. The handwheel for discharging vapor is located on the side of the valve. A diagram of this cylinder is shown in **Figure 3**. A diagram of the liquid/vapor valve used on the 68-kg size cylinder is shown in **Figure 4**. The 68 kg size cylinders are usually shipped on a pallet, stacked on their side and shrink-wrapped in plastic.

The **544 kg (1,200-lb) size cylinder** is a freestanding, upright returnable cylinder equipped with a forklift lifting attachment incorporated into the foot ring. These cylinders use the same nonrefillable liquid/vapor valve that is used on the 68 kg size cylinders; this valve, designed for a CGA 660 connection, is shown in **Figure 4**. A diagram for this cylinder is shown in **Figure 5**.

ISO containers are used for export shipments of FE-227™. The overall ISO container dimensions shown in **Table 4** represent the frame in which the container is shipped. The tank itself is approximately 19 feet (5.8 meters) long, and has an outside diameter of approximately 86 inches (2.2 meters). Individual valves for liquid and vapor discharge are provided. These valves are designed for CGA-660 connection. A diagram of a typical ISO tank is shown in **Figure 6**.

Bulk Storage Systems

DuPont sells bulk storage systems to its FE-227™ customers. The systems are prefabricated, tested, and ready to install onsite. The units are designed to optimize economy, efficiency, and safety in the storage and dispensing of FE-227™. The delivered systems include all components, such as storage tanks, pumps, piping, valves, motors, and gauges, as an integrated unit. All systems are equipped with the DuPont Fluorochemical Emissions Elimination Delivery (FEED) System to prevent emissions during deliveries and with dual pumps to provide an installed spare. The units are skid-mounted and require only placement on a concrete pad and connection to electrical and process systems.

A typical bulk storage system is shown in **Figure 7**.

Your DuPont Marketing Representative can arrange for guidance on site selection, purchase, installation, startup, and maintenance.

Table 4
Specifications for FE-227™ Shipping Containers

Type	Dimensions	DOT Specification	Net Weight, lb FE-227™	Net Weight, kg FE-227™
123-lb (56-kg) Water Capacity Returnable Cylinder	55"H x 10"OD	4BW300	150	68
1000-lb (454-kg) Water Capacity Returnable Cylinder	60"H x 30"OD	4BW260	1,200	544
ISO Container	8' x 8' x 20' (frame)	51	37,000	16,784
Tank Trailer	8,927 L (5,000 gal)	MC-330 or -331	37,000	16,784

Transfer of HFC-227ea From the Container

The preferred method for transfer of liquid HFC-227ea from the cylinder is to use a suitable pump. There are several industrial pumps suitable for the transfer of HFC-227ea. Contact an industrial pump manufacturer for the recommended pump.

The receiving container should be evacuated to eliminate contamination by air and to facilitate transfer of HFC-227ea.

If a pump is not available the chilled transfer line method will facilitate transfer of HFC-227ea to the receiving container. This method chills the HFC-227ea as it passes through the transfer line, reducing the pressure in the receiver to induce transfer by pressure differential. A coil of compatible metal tubing of sufficient pressure rating is positioned in the transfer line between the supply and the receiver. The coil is placed in a cold bath, such as water ice or carbon ice.

Leak Detection

Whenever a system is assembled or serviced, it should be checked for leaks. There are many commercially available leak detectors. These devises are readily available through a refrigeration supply house.

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

Handling Precautions for HFC-227ea Shipping Containers

The following rules for handling HFC-227ea containers are strongly recommended:

- Use personal protective equipment, such as side-shield glasses, gloves, and safety shoes, when handling containers.
- Avoid skin contact with liquid HFC-227ea; it can cause frostbite.
- Never heat a container to a temperature higher than 52°C (125°F).
- Never refill returnable cylinders without DuPont consent. DOT regulations forbid transportation of returnable cylinders refilled without DuPont's authorization.
- Never use a magnet or sling (rope or chain) to lift containers. Lifting may be accomplished by the use of a safe cradle or platform basket that holds the container.
- Never use containers as rollers, supports, or any other purpose than to contain HFC-227ea.
- Protect containers from any objects 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 container.
- Never attempt to repair or alter containers or valves.
- Never force connections that do not fit. Make sure the threads on the regulator or other auxiliary equipment are the same as those on the valve outlets.
- Keep valves tightly closed, with valve caps and hoods in place when the container is not in use.
- When storing containers outside, store under a roof and protect from weather extremes.
- Use a vapor recovery system to collect HFC-227ea vapors from lines after unloading.

Figure 3. 68 kg (150-lb) Size Cylinder

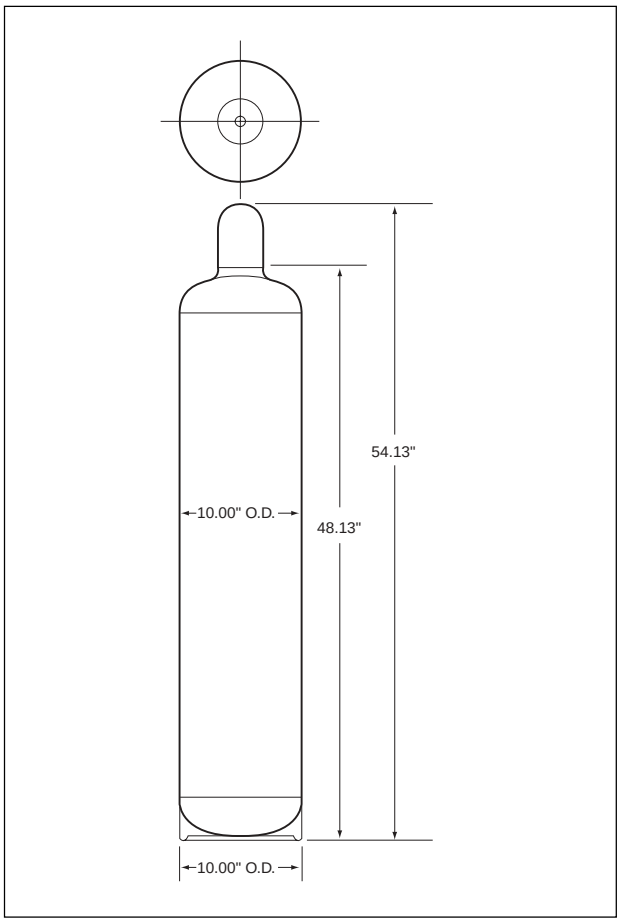


Figure 5. 544 kg (1,200-lb) Size Cylinder

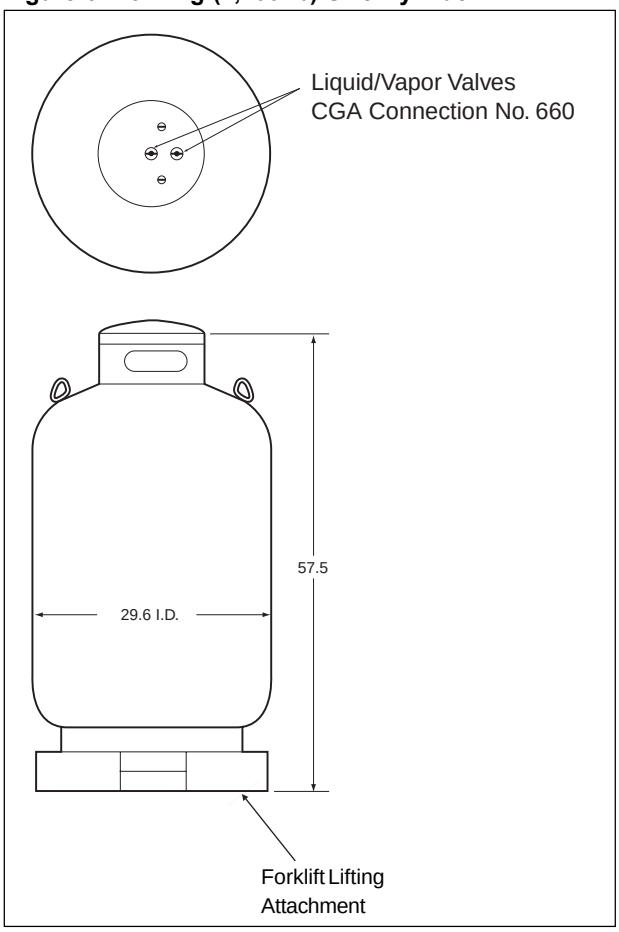


Figure 4. Liquid/Vapor Valve

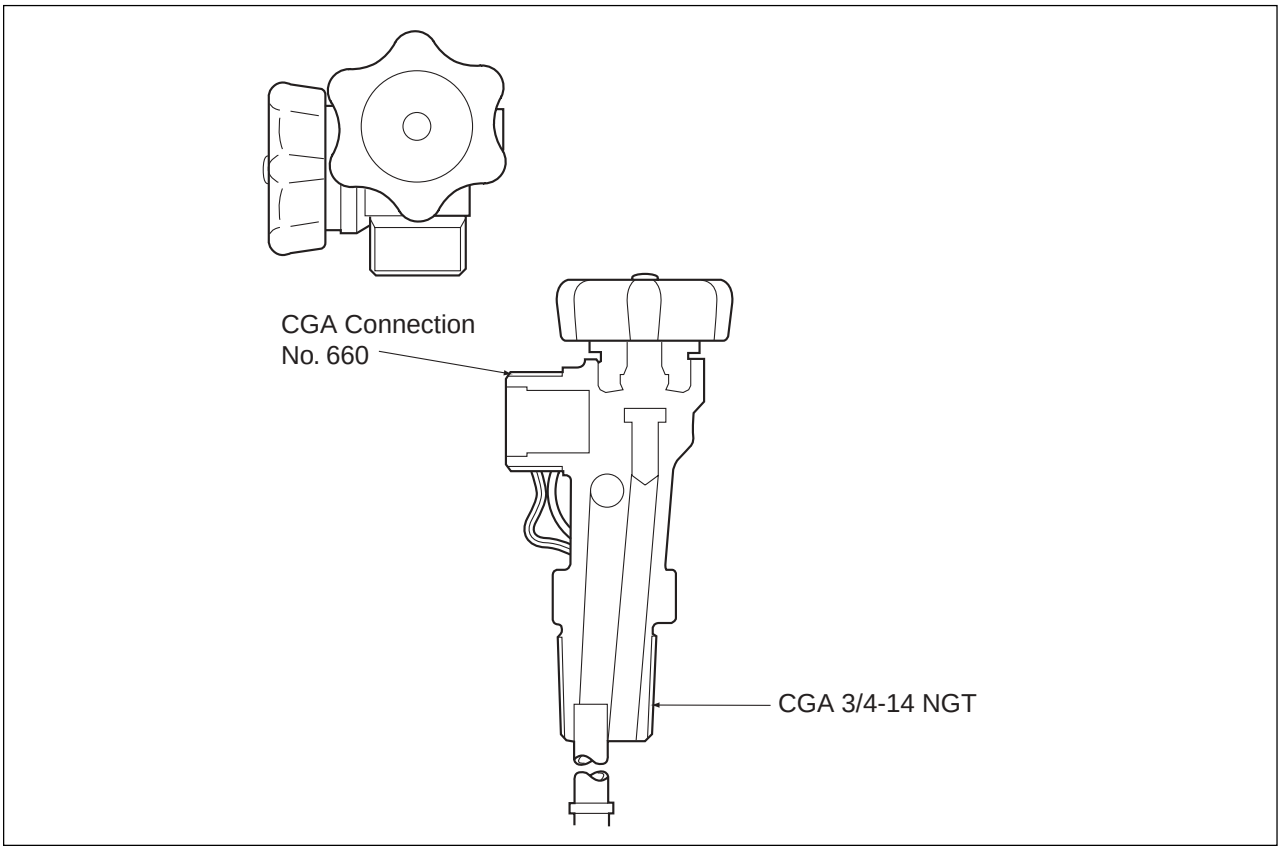


Figure 6. Typical ISO Tank

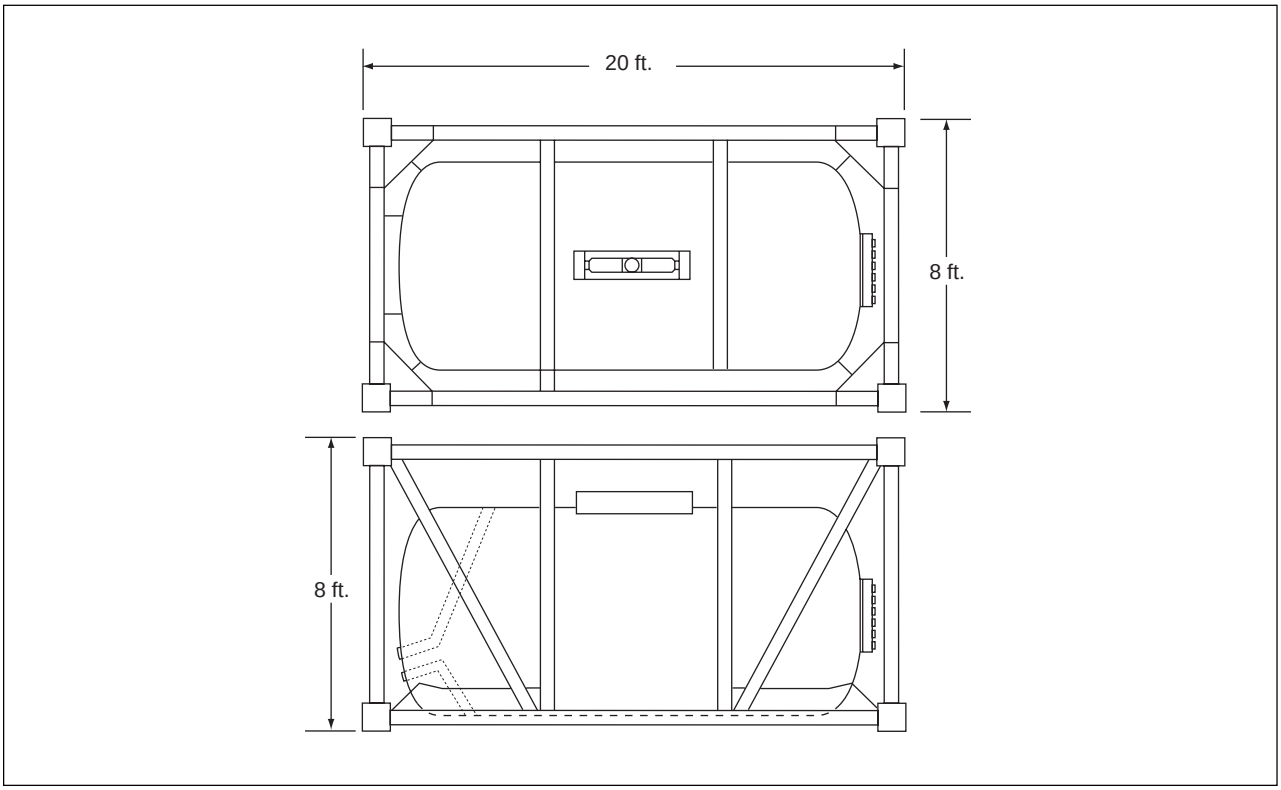
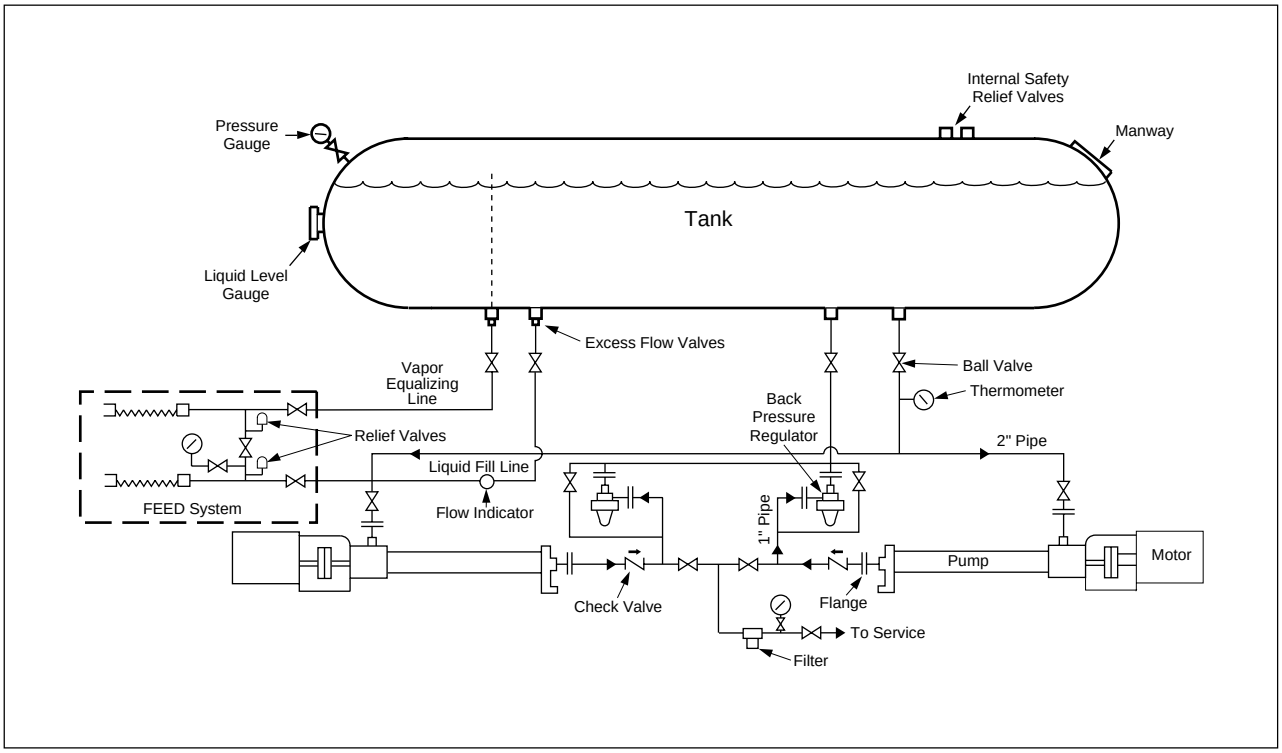


Figure 7. Typical Bulk Storage Tank



Nitrogen Superpressurization of DuPont™ FE-227™

FE-227™ is shipped in cylinders that contain essentially pure FE-227™. These containers are evacuated before filling to remove air, and the FE-227™ contains less than 1.2 % (vol.) non-condensible gases (air, nitrogen, etc.) in the vapor space. The pressure in these cylinders is therefore due to the vapor pressure of FE-227™ alone.

In fire suppression applications, it is often desirable to increase the available pressure above the vapor pressure of FE-227™. In these cases, nitrogen is added to the FE-227™ after transfer to accomplish this pressure increase and is called "superpressurization." Superpressurization may be for one or more of the following purposes:

- To increase the total pressure available for flow from the container through down-stream piping systems.
- To provide a "pressure-pad" for the liquid in order to keep the liquid "compressed" in the liquid phase during flow-through piping systems. This prevents a two-phase flashing flow situation, and simplifies calculation of flows in pipelines.
- To stabilize the container pressure over a wide temperature range or, specifically, to maintain significant storage pressures at low temperatures.

To determine the amount of nitrogen required for superpressurization of FE-227™ at various fill densities, it is necessary to understand the solubility relationship of nitrogen and FE-227™. Extensive experimental work was conducted by DuPont's Central Research and Development group to develop this information. The Peng-Robinson Equation of State (PREOS) was then used to calculate the following:

- Weights of nitrogen required for superpressurization
- Isometric diagrams
- Henry's Law Constants

Tables 5a and **5b** provide the weight of nitrogen required to pressurize a given amount of FE-227™ to 360 psig (2500 kPa) and 600 psig (4150 kPa). Isometric diagrams of FE-227™ superpressurization to 360 psig and 600 psig at 70° are shown in **Figures 8** and **9**. **Figures 10** and **11** show the isometric diagrams of FE-227™ superpressurized to 2500 kPa and 4150 kPa at 21°C.

Table 5a
Weight of Nitrogen Required for Superpressurization of DuPont™ FE-227™

Weight of nitrogen per lb of FE-227™ at 70°F		
Fill Density lb/ft³	**Amount of Superpressure 360 psig**	**Amount of Superpressure 600 psig**
	oz	**oz**
40	0.534	0.944
45	0.463	0.819
50	0.407	0.718
55	0.361	0.636
60	0.323	0.568
65	0.291	0.511
70	0.263	0.461
75	0.239	0.418

Table 5b
Weight of Nitrogen Required for Superpressurization of DuPont™ FE-227™

Weight of nitrogen per kg of FE-227™ at 21°C		
Fill Density kg/m³	**Amount of Superpressure 2500 kPa (gauge)**	**Amount of Superpressure 4150 kPa (gauge)**
	g	**g**
600	36.4	63.8
700	30.3	53.1
800	25.7	45.1
900	22.2	38.8
1000	19.3	33.8
1100	17.0	29.7
1200	15.1	26.3

Figure 8. Isometric Diagram – DuPont™ FE-227™ Pressurized with Nitrogen to 360 psig at 70°F

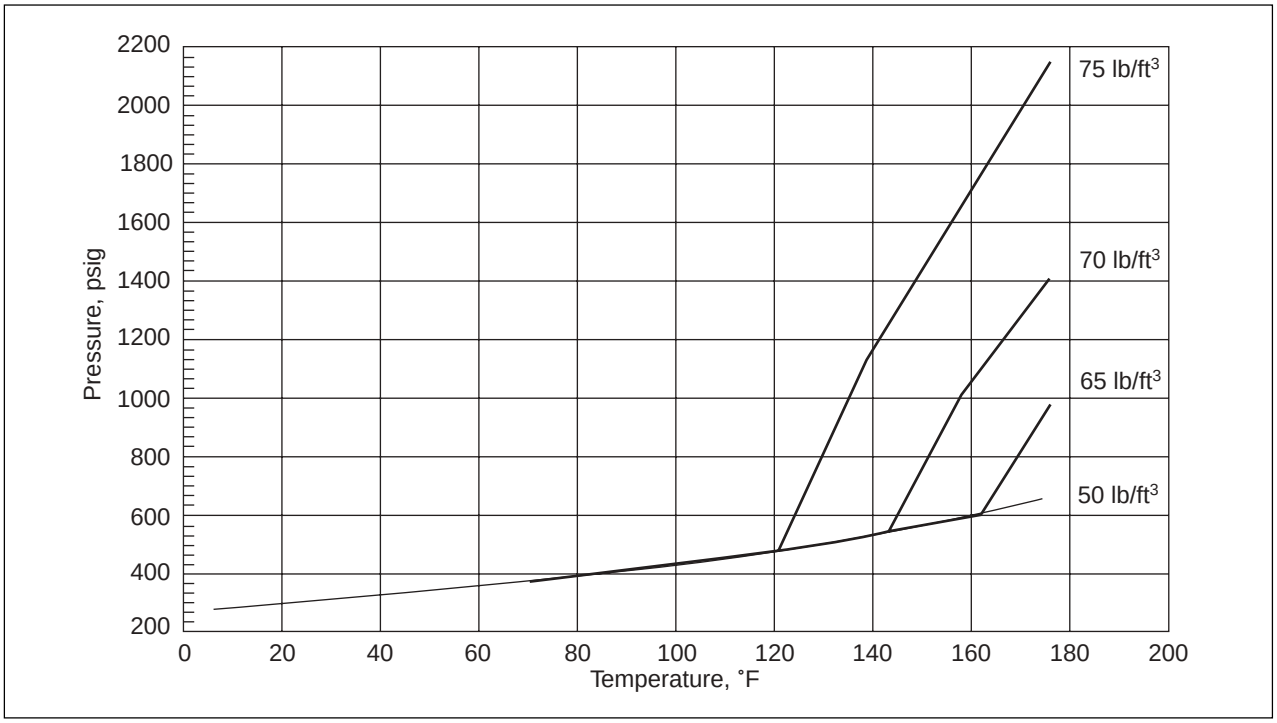


Figure 9. Isometric Diagram – DuPont™ FE-227™ Pressurized with Nitrogen to 600 psig at 70°F

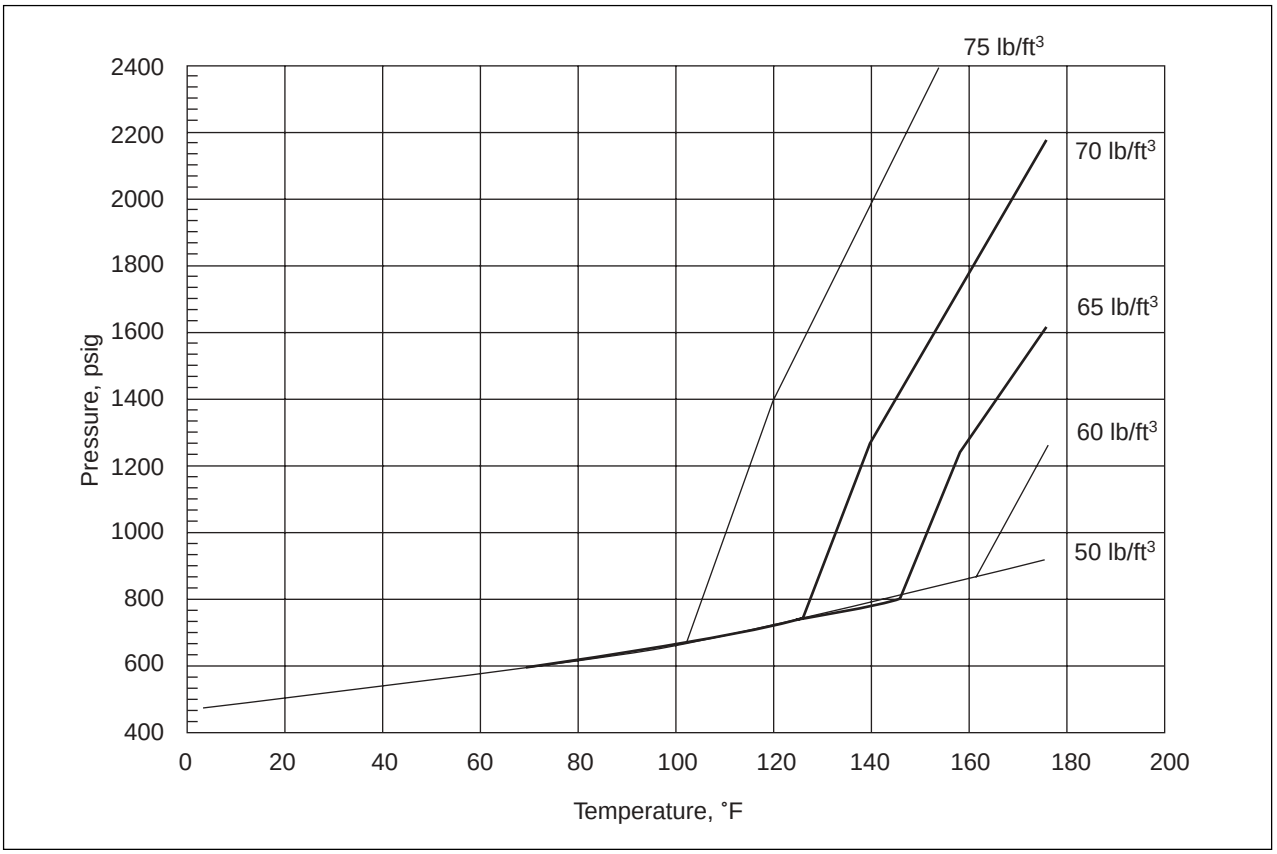


Figure 10. Isometric Diagram – DuPont™ FE-227™ Pressurized with Nitrogen to 2500 kPa at 21°C

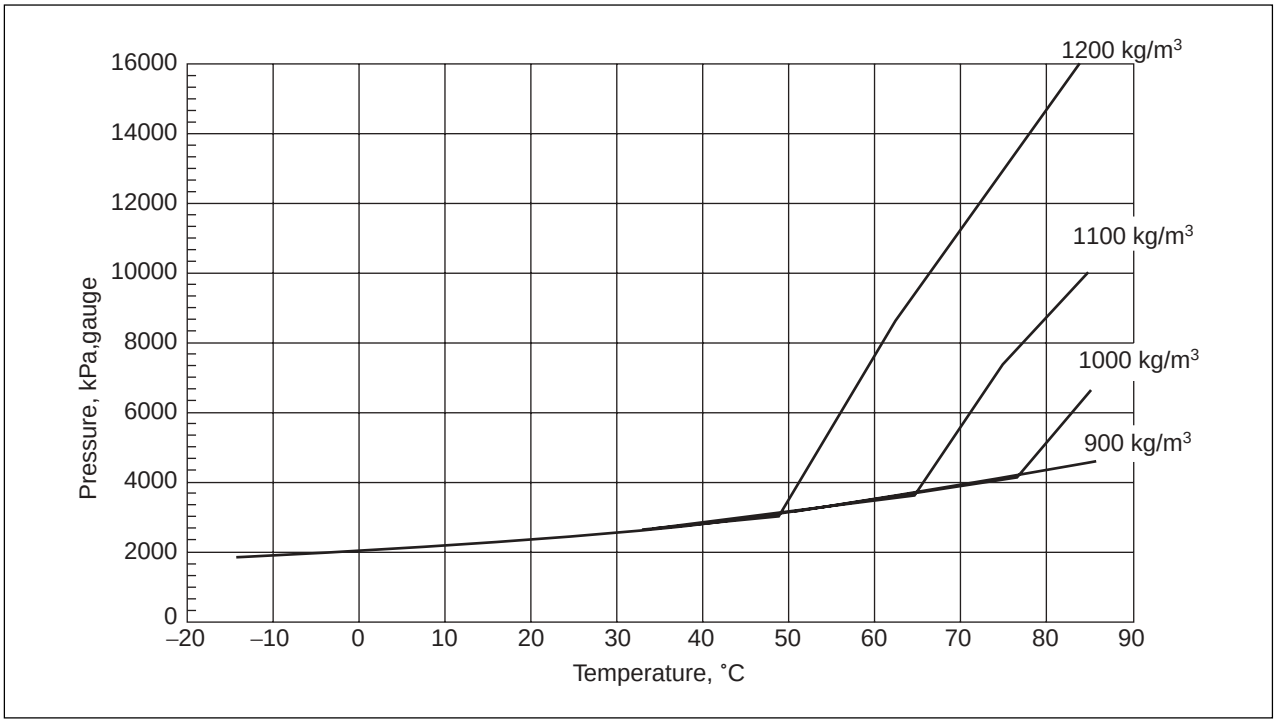
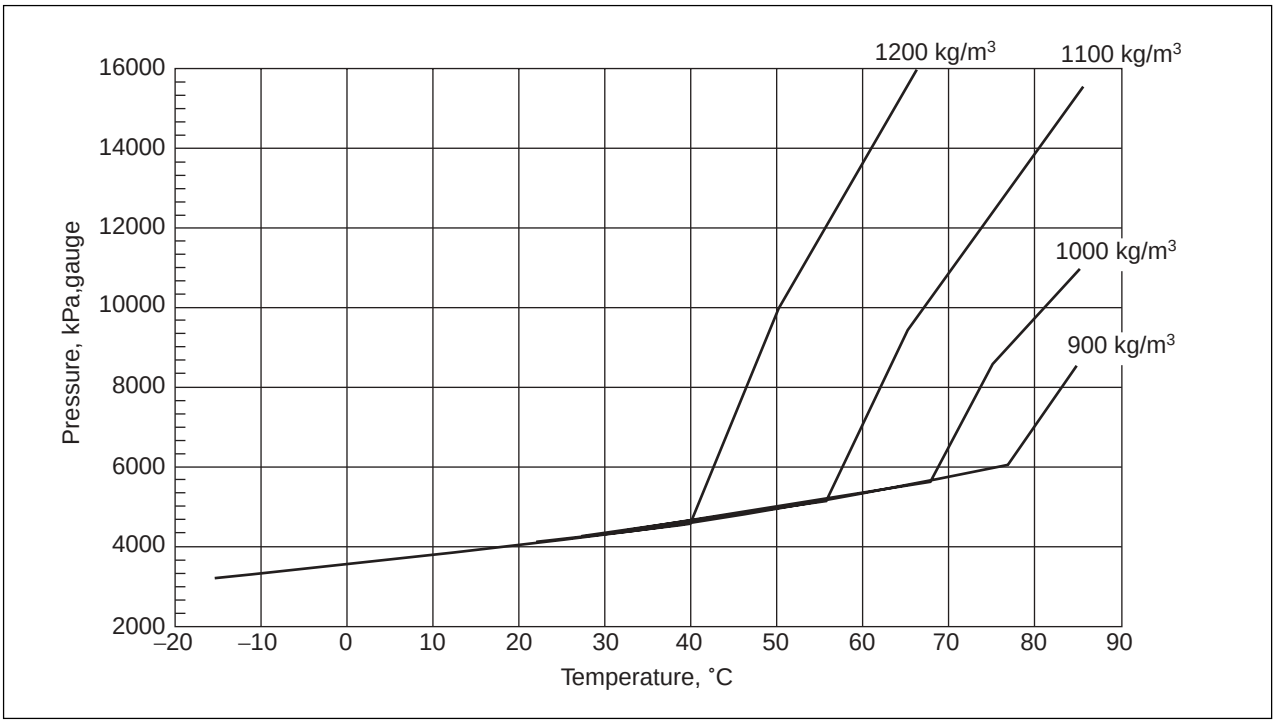


Figure 11. Isometric Diagram – DuPont™ FE-227™ Pressurized with Nitrogen to 4150 kPa at 21°C



Henry's Law Constants

PREOS was also used to calculate the Henry's Law Constants as shown in **Figure 12** (ENG units) and **Figure 13** (SI units).

Figure 12. Henry's Law Constant for Nitrogen Solubility in DuPont™ FE-227™ (ENG Units)

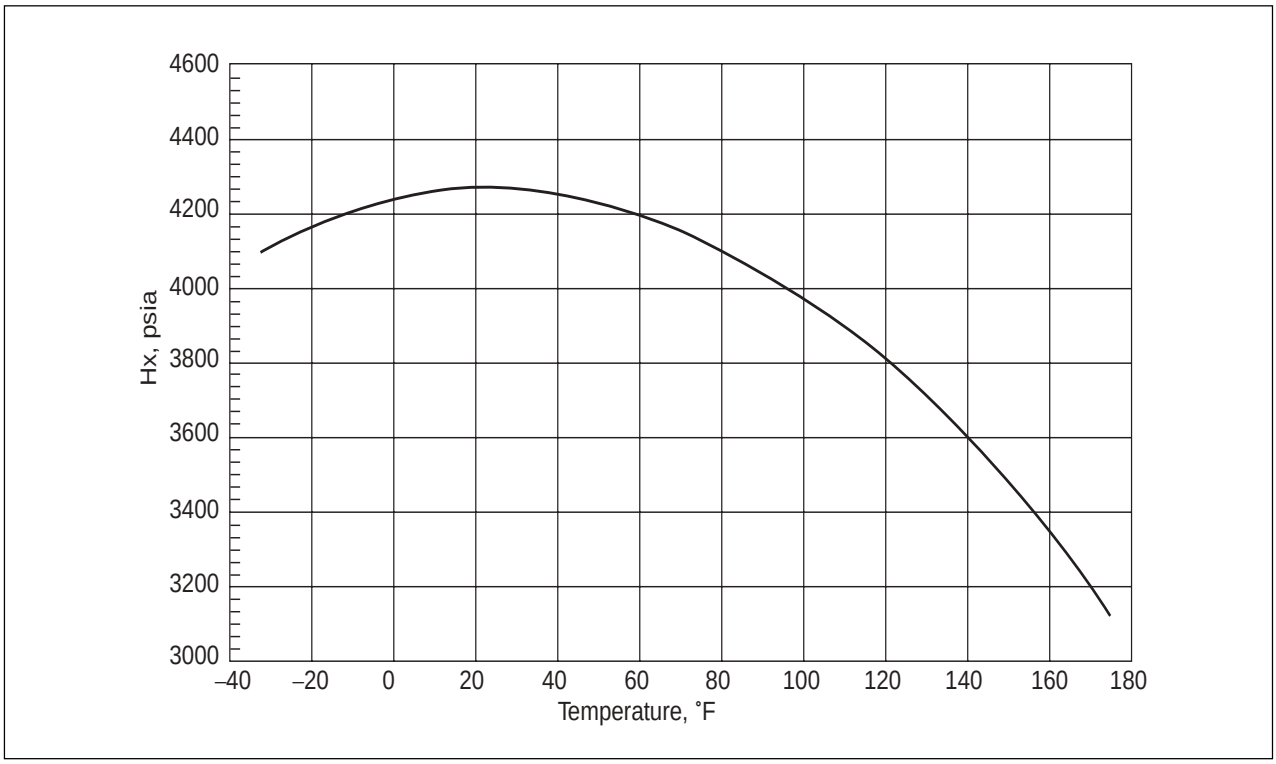
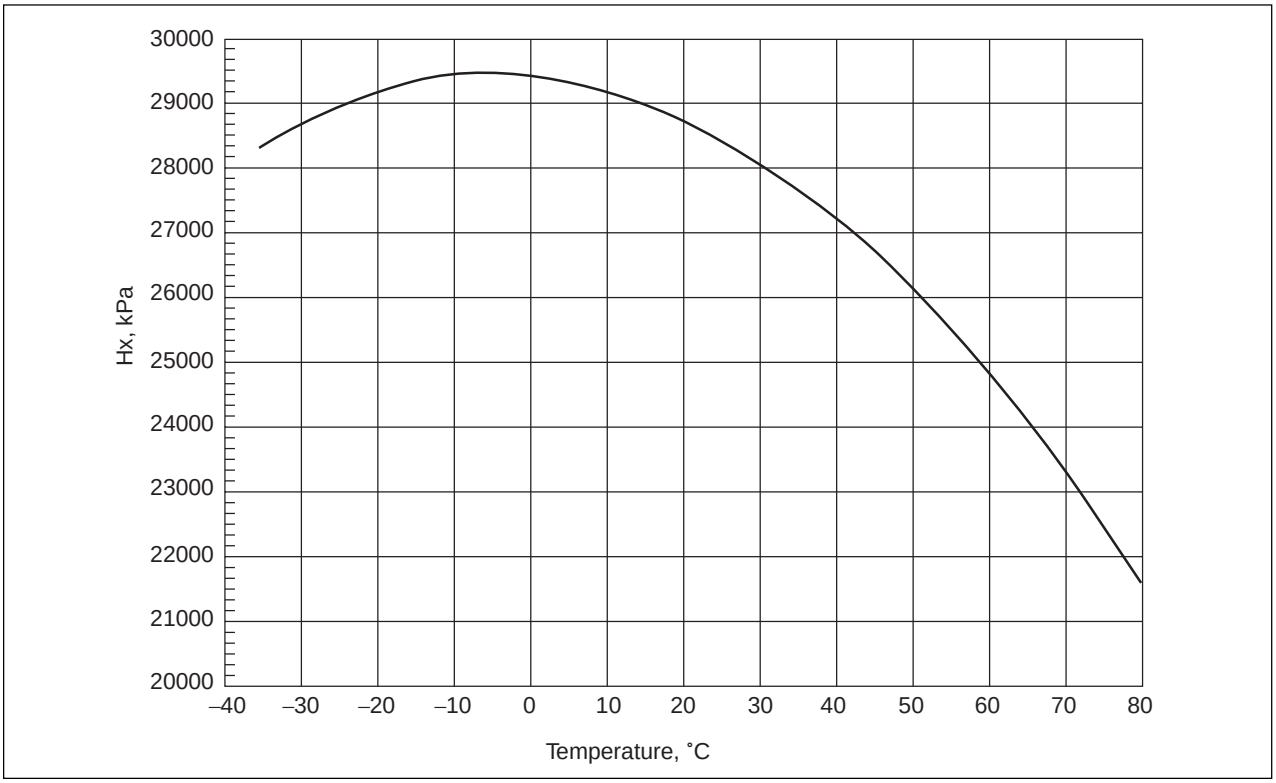


Figure 13. Henry's Law Constant for Nitrogen Solubility in DuPont™ FE-227™ (SI Units)



Recovery, Recycle, Reclamation, and Disposal

Responsible use of HFC-227ea requires that the product be recovered for reuse or disposal whenever possible. Recovery and reuse makes sense from an environmental and economic standpoint.

Recovery

Recovery refers to the removal of HFC-227ea from equipment and collection in an appropriate external container. Recovery does not involve processing or analytical testing. But if the system contains nitrogen or other pressurizing gas, it must be identified on the label. Recovery is normally performed when a system must undergo maintenance and the HFC-227ea is then returned to the system after completion. There are a number of recovery devices on the market. These devices contain a compressor and an air-cooled condenser, and may be used for liquid and vapor recovery. Before purchasing a specific recovery unit, check with the manufacturer to be sure that it contains the elastomeric seals and compressor oil compatible with HFC-227ea.

Reclamation

Reclamation refers to the reprocessing of HFC-227ea recovered from a system to new product specifications. Quality of the reclaimed product is verified by chemical analysis. In the United States HFC-227ea is included in DuPont's reclamation program. Contact DuPont for further information.

Disposal

Disposal refers to the destruction of used HFC-227ea. Disposal may be necessary when HFC-227ea has become contaminated with other materials and no longer meets the acceptable specifications of DuPont or other reclaimer. DuPont does not presently accept severely contaminated HFC-227ea for disposal; licensed waste disposal firms are available. Be sure to check the qualifications of any firm before sending them used HFC-227ea.

DuPont ... A Tradition in Safety

For further information regarding DuPont™ Fire Extinguishants, contact:

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Chestnut Run Plaza 702-1274E
P.O. Box 80702
Wilmington, DE 19880-0702
(800) 473-7790
Fax: (302) 999-4727
www.dupont.com/fire

Europe/Middle East/Africa

DuPont de Nemours International S.A.
DuPont Fire Extinguishants
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CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement," H-50102.

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