FE-36™

Fire Extinguishing Agent

Properties, Uses, Storage, and Handling

Chemours™

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Introduction

Chemours has developed environmentally preferred agents, such as hydrofluorocarbon (HFC) 236fa, to protect critical facilities against fires, as HFCs offer unique properties. They are low in toxicity, nonflammable, non-corrosive, and compatible with other materials. In addition, they have thermodynamic and physical properties that make them ideal for a variety of uses. One high value use of these compounds is as fire extinguishants and explosion suppressants. They are used in hand-held portable extinguishers, total flooding systems, and local application systems. The bromofluorocarbons and bromochlorofluorocarbons (halons), which were developed in the 1930s, were linked to depletion of the earth's protective ozone layer. As a result, these halon compounds have been phased out of production, and fire extinguishing agents, such as HFC-236fa (FE-36), have stepped in to take their place.

FE-36™ Fire Extinguishing Agent

As a fire extinguishing agent, HFC-236fa is referred to as FE-36™, a trademark of Chemours. It is intended to replace Halon 1211 in portable fire extinguishers and local application flooding applications. FE-36™ is a safe, clean, and electrically nonconductive agent. It is suited for use in all streaming applications, because it has a boiling point (–1.4 °C [29.4 °F]) that is similar to Halon 1211 (–3.4 °C [26 °F]). FE-36™ also has utility as a total flooding and explosion suppression agent.

Table 1 gives the chemical and product information for FE-36™.

A comparison of the key fire extinguishing properties of FE-36™ and Halon 1211 are shown in **Table 2**. The physical properties of FE-36™ are listed in **Table 3**.

Table 1. Product Information

Chemical Name	1,1,1,3,3,3-Hexafluoropropane
Molecular Formula	$CF_3CH_2CF_3$
Molecular Weight	152.04
CAS Registry Number	690-39-1
ASHRAE Designation	HFC-236fa

Applications

Portable Fire Extinguishers

FE-36™ is the ideal replacement for Halon 1211 in portable fire extinguishers. FE-36™ is non-corrosive, electrically non-conductive, free of residue, low in toxicity, has an ozone depletion potential (ODP) of zero, and is very effective. FE-36™ discharges as a liquid and provides an effective discharge range up to 16 ft (4.9 m). It is the agent of choice for protection of high value equipment or irreplaceable assets that would be damaged or destroyed by water, foam, carbon dioxide, or dry chemical. Typical applications are communication facilities, computer rooms, control rooms, data/document storage areas, electronic manufacturing, museums, art galleries, laboratories, and aircraft.

The low acute inhalation toxicity of FE-36™ is well suited for portable fire extinguishers onboard aircraft. The FAA has published a Minimum Performance Standard (MPS) for clean agent portables for use onboard civilian transport aircraft (DOT/FAA/AR-01/37). HFC-236fa (FE-36™) has passed this requirement and is listed in the document as a suitable replacement for Halon 1211 portables. Aircraft are a confined space, so it is important to consider the acute inhalation toxicity of the agent used in the clean agent portables. FE-36™ has the best properties of any of the alternatives for this application.

FE-36™ is listed as an acceptable streaming agent for replacement of Halon 1211 in the EPA SNAP Program.

Table 2. Comparison of FE-36™ to Halon 1211

Property	FE-36™	Halon 1211
Chemical Formula	$CF_3CH_2CF_3$	CF_2ClBr
Ozone Depletion Potential (ODP)	0	4
Molecular Weight	152.04	165.4
Boiling Point, °C (°F)	–1.4 (29.4)	–3.4 (26)
Critical Temperature, °C (°F)	124.9 (256.9)	153.8 (308.8)
Liquid Density at 25 °C (77 °F), kg/m³ (lb/ft³)	1360 (84.89)	1797 (112.2)
Vapor Pressure at 25 °C (77 °F), kPa (psia)	272.4 (39.5)	275.8 (40.0)
Heat of Vaporization at BP, kJ/kg (Btu/lb)	160 (69)	131 (57)
Extinguishing Concentration, n-heptane, cup burner, % by volume	6.4	4.1
Acute Toxicity, LC50 Rats, 4 hr, ppm	>457,000	85,000–100,000*

*Estimated value

Total Flooding and Local Application

FE-36™ is listed as an acceptable Halon replacement in the EPA SNAP Program for total flooding of enclosures (fixed fire extinguishing systems) and local application systems. FE-36™ is non-corrosive, electrically non-conductive, free of residue, and has an ozone depletion potential (ODP) of zero. It is ideally suited for protection of high value equipment such as in computer rooms, telecommunication facilities, and aircraft.

Total Flooding application with FE-36™ can be used in applications where people are normally present (normally occupied spaces). Class-A fire hazards represent greater than 90% of all commercial protection scenarios. Examples of applications where FE-36™ would be an excellent choice for a total flood fire suppression system where people are present are: computer rooms, telecommunication switch stations and facilities, semi-conductor manufacturing facilities, data processing centers, clean rooms, industrial process control rooms, museums, libraries, and historical sites. FE-36™ can also be used to suppress Class-B fire hazards. Examples of these applications would include: engine compartments, petrochemical facilities, chemical storage rooms, paint lockers, and other areas where hydrocarbon-based materials are stored or handled.

Local application systems are a flooding system where there is not a complete enclosure around the hazard. In this type of system, it is important to establish the fire extinguishing concentration at a specific location as quickly as possible. This is accomplished using FE-36™, because of the streaming characteristic. FE-36™ discharges from the nozzle as a liquid and then vaporizes. This allows for directing the agent concentration to the hazard site quickly and maintains the extinguishing concentration in the area of the hazard longer. This type of application is used for high value machining equipment and areas where high value assets are in a large open area.

FE-36™ also has application as an explosion suppression agent.

The heptane cup burner extinguishing concentration for FE-36™ in air is 6.4% (volume).

Physical Properties

Physical properties of FE-36™ are shown in **Table 3**. Saturated Vapor Pressure and Density are given in **Table 4**. Saturated Vapor Pressure vs Temperature is shown in **Figures 1** and **2**. Thermodynamic properties in ENG and SI units are available from Chemours.

Table 3. General Property Information for FE-36™

Physical Property	
Molecular Weight	152.04
Boiling Point at 1 atm, °C (°F)	-1.4 (29.4)
Freezing Point, °C (°F)	-103 (-153)
Critical Temperature, °C (°F)	124.9 (256.9)
Critical Pressure, kPa (psia)	3200 (464)
Critical Density, kg/m³ (lb/ft³)	551 (34.42)
Liquid Density at 25 °C (77 °F), kg/m³ (lb/ft³)	1360 (84.89)
Vapor Density at 25 °C (77 °F) and 1 atm, kg/m³ (lb/ft³)	6.481 (0.4001)
Specific Heat, Liquid at 25 °C (77 °F), kJ/kg°C (Btu/lb°F)	1.265 (0.3022)
Specific Heat, Vapor at 25 °C (77 °F) and 1 atm, kJ/kg°C (Btu/lb°F)	0.8403 (0.2007)
Vapor Pressure, Saturated at 25 °C (77 °F), kPa (psia)	272.4 (39.5)
Heat of Vaporization at BP, kJ/kg (Btu/lb)	160.4 (68.97)
Thermal Conductivity, Liquid at 25 °C (77 °F), W/m-°C (Btu/hr-ft°F)	0.0729 (0.1421)
Thermal Conductivity, Vapor at 25 °C (77 °F), W/m-°C (Btu/hr-ft°F)	0.0127 (0.0074)
Viscosity, Liquid at 25 °C (77 °F), cP (lb/ft-hr)	0.285 (0.0691)
Relative Dielectric Strength at 1 atm at 760 mm Hg, 25 °C (77 °F) (N_2=1)	1.0166
Solubility of Water in FE-36™ at 20 °C (68 °F), ppm	720
Solubility of FE-36™ in Water at 20 °C (68 °F), ppm	2100
Ozone Depletion Potential (ODP)	0.0
Global Warming Potential (GWP) (100 yr ITH. for CO_2, GWP = 1)	6300
TSCA Inventory Status	Reported, Included
European Classification Number (ELINCS)	EC-No.: 425-320-1
SNAP Status	Listed
Inhalation Exposure Limit (8- and 12-hr TWA)	AEL=1000 ppm (v/v)

Table 4. Vapor Pressure and Density of FE-36™

Temperature		Saturated Vapor Pressure		Density			
				Liquid at Saturation		Vapor at 1 atm	
°C	°F	kPa	psia	kg/m³	lb/ft³	kg/m³	lb/ft³
0	32	107.6	15.6	1440	89.91	7.0994	0.4432
5	41	131.6	19.1	1425	88.94	6.9493	0.4338
10	50	159.7	23.2	1409	87.95	6.8067	0.4249
15	59	192.2	27.9	1393	86.95	6.6711	0.4165
20	68	229.6	33.3	1376	85.93	6.5418	0.4084
25	77	272.4	39.5	1360	84.89	6.4182	0.4007
30	86	321.0	46.6	1343	83.83	6.3000	0.3933
35	95	376.0	54.5	1325	82.74	6.1867	0.3862
40	104	437.8	63.5	1308	81.63	6.0779	0.3794
45	113	507.0	73.5	1289	80.48	5.9733	0.3729
50	122	584.2	84.7	1270	79.30	5.8727	0.3666
55	131	669.9	97.2	1251	78.08	5.7758	0.3606
60	140	764.7	111	1230	76.80	5.6823	0.3547
65	149	869.4	126	1209	75.47	5.5921	0.3491
70	158	984.5	143	1187	74.07	5.5049	0.3437
75	167	1111	161	1163	72.60	5.4207	0.3384
80	176	1249	181	1138	71.02	5.3391	0.3333
85	185	1400	203	1111	69.34	5.2602	0.3284
90	194	1565	227	1081	67.51	5.1837	0.3236
95	203	1744	253	1049	65.50	5.1095	0.3190
100	212	1940	281	1014	63.27	5.0376	0.3145

Figure 1. Saturated Vapor Pressure, ENG Units

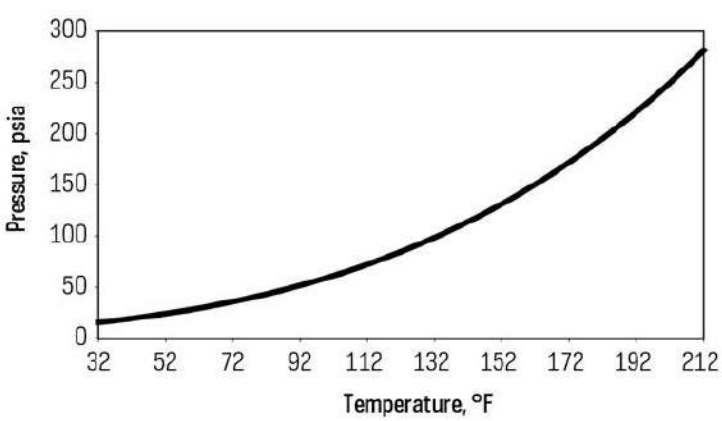
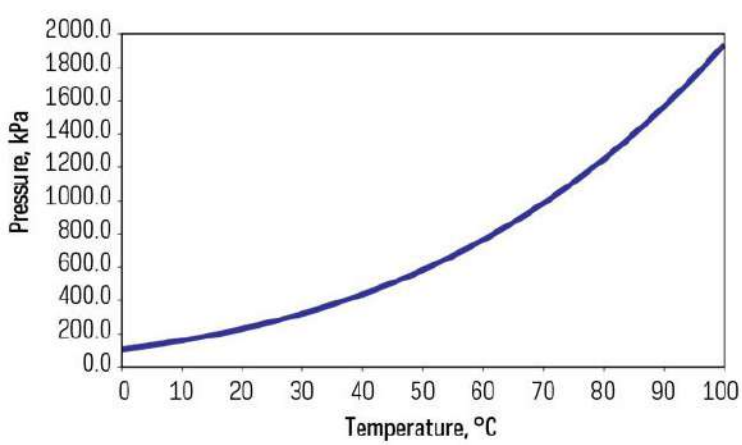


Figure 2. Saturated Vapor Pressure, SI Units



Materials Compatibility

It is important to review the materials of construction for compatibility when designing new equipment, retrofitting existing equipment, or preparing storage and handling facilities.

Metals

Stability tests were conducted in heavy walled glass tubes in accordance with ASHRAE 97. The tests were conducted with copper, aluminum, and iron strips immersed 50% in liquid FE-36™ and then aged for 14 days at 175 °C (347 °F). Visual ratings were obtained on both the liquid and metals after the exposure. There were no changes in the color of the liquid or the condition of the metals at the conclusion of this test.

FE-36™ like other halocarbons may react violently with highly reactive metals, such as the alkali and alkaline earth metals, sodium, potassium and barium, in the free metallic form. Some metals become more reactive when finely ground or powdered; in this state, magnesium and aluminum may react—especially at higher temperatures. Highly reactive metals should not be brought into contact with FE-36™ until a careful study is made and appropriate safety precautions are taken.

Compatibility with Elastomers

Compatibility tests with elastomers were performed similar to the metals stability test, except the aging was done at room temperature (23 °C [74 °F]) for 2 weeks. This test indicates that nine out of the ten common elastomers exhibit negligible swelling, weight gain, or hardness change after exposure (**Table 5**).

Compatibility with Plastics

Compatibility tests with plastics were performed to determine if FE-36™ would damage plastics if in direct path of a discharge from a fire suppression system. In this test, plastic surfaces were sprayed with FE-36™ liquid. Other pieces of plastics were placed in an atmosphere of 20% (volume) FE-36™ for 168 hr (7 days) at atmospheric pressure and 23 °C (74 °F). This test indicates that all of the common plastics that were tested exhibited negligible weight gain or surface change after exposure (**Table 5a**).

Compatibility tests performed by the National Institute of Standards and Technology (NIST) at elevated temperatures (150 °C [302 °F]) has identified compatible combinations of metals, elastomers, and plastics. They are available in NIST publications.

Table 5. Elastomer Compatibility

Elastomer	Linear Swell, %	Weight Gain, %	Hardness Change, units
Butyl	0	1	0
Nordel EPDM	1	2	–2
Neoprene CR	–1	1	3
NBR	1	3	–4
Hypalon CSM	–1	1	–1
Viton™ A	15	51	–13
Epichlorohydrin homopolymer	–1	1	0
FA polysulfide	–1	1	–1
Hytrel TPE	2	7	1
Teflon™ PTFE	—	2	—

Table 5a. Plastic Compatibility

Plastic	Weight Gain, %	Surface Condition
High-density polyethylene (HDPE)	<1	No Change
Polystyrene (PS)	<1	No Change
Polypropylene (PP)	<1	No Change
Acrylonitrile-butadiene-styrene (ABS)	<1	No Change
Polycarbonate (PC)	<1	No Change
Polymethyl methacrylate (PMMA)	<1	No Change
Nylon 66	<1	No Change
Polyimide (PI)	<1	No Change
Polyethylene terephthalate (PET)	<1	No Change
Polybutylene terephthalate (PBT)	<1	No Change

Desiccants

Driers filled with desiccant are typically used in halocarbon recycle systems and bulk storage facilities. A common molecular sieve desiccant used with CFC-114, UOP's 4A-XH-5, is not compatible with FE-36™. However, manufacturers have developed other molecular sieve desiccants that perform well with FE-36™. UOP XH-7 and XH-9 or Grace MS 592 and MS 594 desiccants may be used in loose filled driers. Compacted bead dryers, in which the desiccant is compacted by mechanical pressure, may use XH-6 in addition to the desiccants listed above.

Safety

Users of FE-36™ should read and understand the Chemours Safety Data Sheet (SDS). Copies of the FE-36™ SDS can be obtained from Chemours Customer Service or International Offices.

Inhalation Toxicity

FE-36™ poses no acute or chronic hazard when it is handled in accordance with Chemours recommendations and the exposure is maintained below the recommended exposure limits. The Chemours Acceptable Exposure Limit (AEL) is 1000 ppm (8- or 12-hr time weighted average [TWA]).

However, inhaling high concentrations of FE-36™ 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 150,000 ppm or greater, which is well above the AEL, 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 actual exposure level (LOAEL) for FE-36™ is 150,000 ppm (15%) and the no observed actual exposure level (NOAEL) is 100,000 ppm (10%).

Skin and Eye Contact

At room temperature, FE-36™ vapors have little or no effect on the skin or eyes. However, in the liquid form, FE-36™ 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 FE-36™. Where splashing of FE-36™ 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 low elevation 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 the concentration of FE-36™ vapors in the area is below the AEL.

Always use self-contained breathing apparatus or a supplied air mask when entering tanks or other areas where vapors might exist. Use the buddy system and a lifeline. Refer to the FE-36™ SDS for more information.

FE-36™ 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 Containers in the United States

FE-36™ 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 psi at 50 °C (122 °F) or completely vapor at 20 °C (68 °F). A liquefied gas is defined as a gas, which in a packaging under the charged pressure is partially liquid at 20 °C (68 °F). The appropriate DOT designation is as follows:

DOT Proper Shipping Name:	Hexafluoropropane
Hazard Class:	Not Regulated
UN Number::	
DOT/IMO Labels:	Not Regulated

FE-36™ is shipped in 1,000-lb containers. A description of the container is provided in **Table 6**.

The 1000-lb water capacity cylinder is designed for fire extinguishant and refrigerant applications. This is a palletized cylinder that can contain up to 1200 lb of FE-36™. These cylinders are equipped with two (2) liquid/vapor valves with a CGA-660 connector. This valve body allows liquid to be removed without inverting the cylinder. The handwheel for liquid removal is on the side of the valve. The liquid valve port is attached to a dip tube, which extends to the bottom of the cylinder. Vapor is removed through the same fitting by using the vapor handwheel on the top of the valve.

Bulk Storage Systems

Chemours sells bulk storage systems to its FE-36™ 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-36™. 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 Chemours 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.

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

Table 6. Specifications of Shipping Containers for FE-36™

Water Capacity, lb (kg)	Dimensions	DOT Specification	Net Weight, lb (kg)
1000 (454)	50" H × 30' OD	4BW260	1200 (544)
Tank Trailer	8,927 L (5,000 gal)	MC-330 or -331	37,000 (16,784)

Transfer of FE-36™ from the Container

The preferred method for transfer of liquid FE-36™ from the cylinder is to use a suitable pump. There are several industrial pumps suitable for the transfer of FE-36™. 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 FE-36™.

If a pump is not available, the chilled transfer line method will facilitate transfer of FE-36™ to the receiving container. This method chills the transfer line as the material flows from the supply container to the receiver. A coil of copper refrigeration tubing is placed 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 contractor or service store.

A detailed discussion of leak detection is available from Chemours.

Handling Precautions for FE-36™ Shipping Containers

The following rules for handling FE-36™ 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 FE-36™; it can cause frostbite.
- Never heat a container to a temperature higher than 52 °C (125 °F).
- Never refill returnable cylinders without Chemours consent. DOT regulations forbid transportation of returnable cylinders refilled without Chemours 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 FE-36™.
- 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.
- Store containers under a roof to protect them from weather extremes.
- Use a vapor recovery system to collect FE-36™ vapors from lines after unloading.

Nitrogen Superpressurization of FE-36™

FE-36™ is shipped in cylinders that contain essentially pure FE36™. These containers are evacuated before filling to remove air, and the FE-36™ contains less than 1.2% (vol.) noncondensible gases (air, nitrogen, etc.) in the vapor space. The pressure in these cylinders is therefore due to the vapor pressure of FE-36™ alone. In fire suppression applications, it is often desirable to increase the available pressure above the vapor pressure of FE-36™. In these cases, nitrogen is added to the FE-36™ 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-36™ at various fill densities, it is necessary to understand the solubility relationship of nitrogen and FE-36™. Extensive experimental work was conducted by Chemours 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 7a and **7b** provide the weight of nitrogen required to pressurize a given amount of FE-36™ to 360 psig (2500 kPa, gauge) and 600 psig (4150 kPa, gauge). Isometric diagrams of FE-36™ superpressurization to 360 psig and 600 psig at 70 °F are shown in **Figures 3** and **4**. **Figures 5** and **6** show the isometric diagrams of FE-36™ superpressurized to 2500 kPa, gauge and 4150 kPa, gauge at 21 °C.

Table 7a. Weight of Nitrogen Required for Superpressurization of FE-36™ (ENG Units)

Weight of nitrogen per lb of FE-36™ at 70 °F		
Fill Density, lb/ft³	Amount of Superpressure 360 psig, oz	Amount of Superpressure 600 psig, oz
40	0.528	0.899
45	0.452	0.770
50	0.392	0.666
55	0.342	0.581
60	0.301	0.511
65	0.266	0.451
70	0.236	0.400
75	0.211	0.355
80	0.188	0.316

Table 7b. Weight of Nitrogen Required for Superpressurization of FE-36™ (SI Units)

Weight of nitrogen per kg of FE-36™ at 21 °C		
Fill Density, kg/m³	Amount of Superpressure 2500 kPa (gauge), g	Amount of Superpressure 4150 kPa (gauge), g
600	36.15	61.390
700	29.62	50.230
800	24.73	41.860
900	20.92	35.350
1000	17.87	30.150
1100	15.38	25.880
1200	13.30	22.330
1300	11.54	19.330

Figure 3. Isometric Diagram – FE-36™ Pressurized with Nitrogen to 360 psig at 70 °F

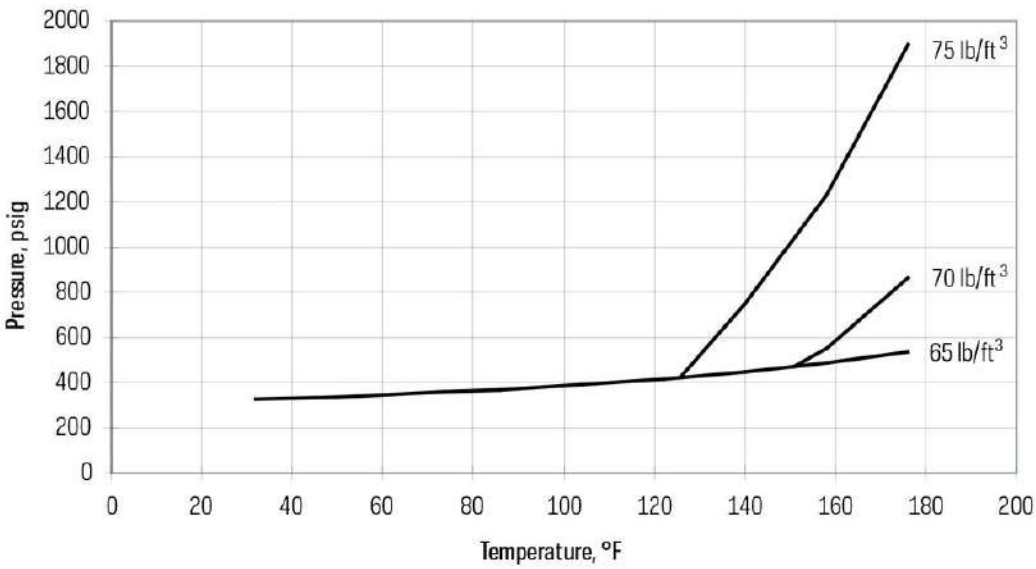


Figure 4. Isometric Diagram – FE-36™ Pressurized with Nitrogen to 600 psig at 70 °F

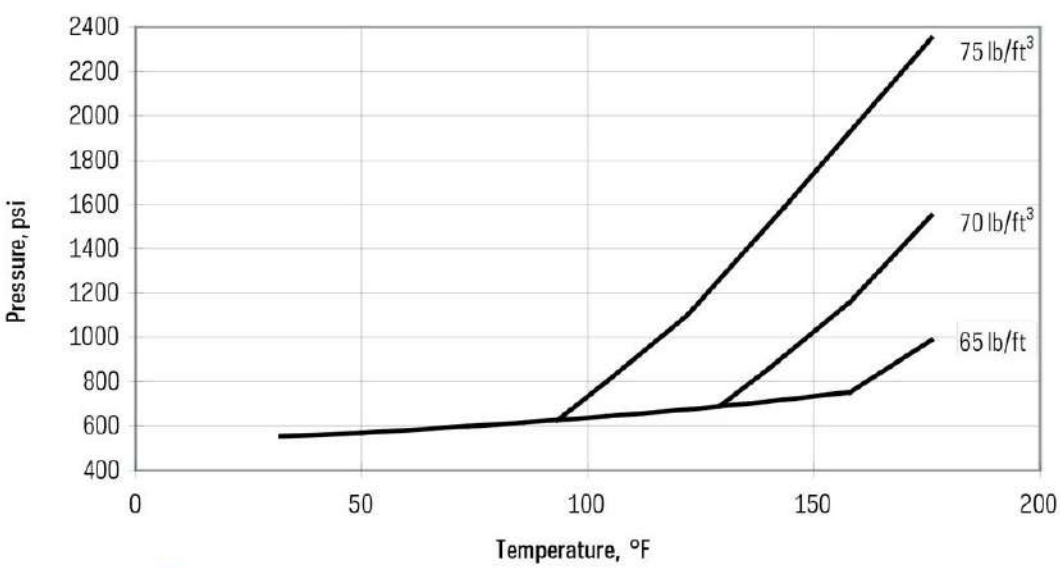


Figure 5. Isometric Diagram – FE-36™ Pressurized with Nitrogen to 2500 kPa at 21 °C

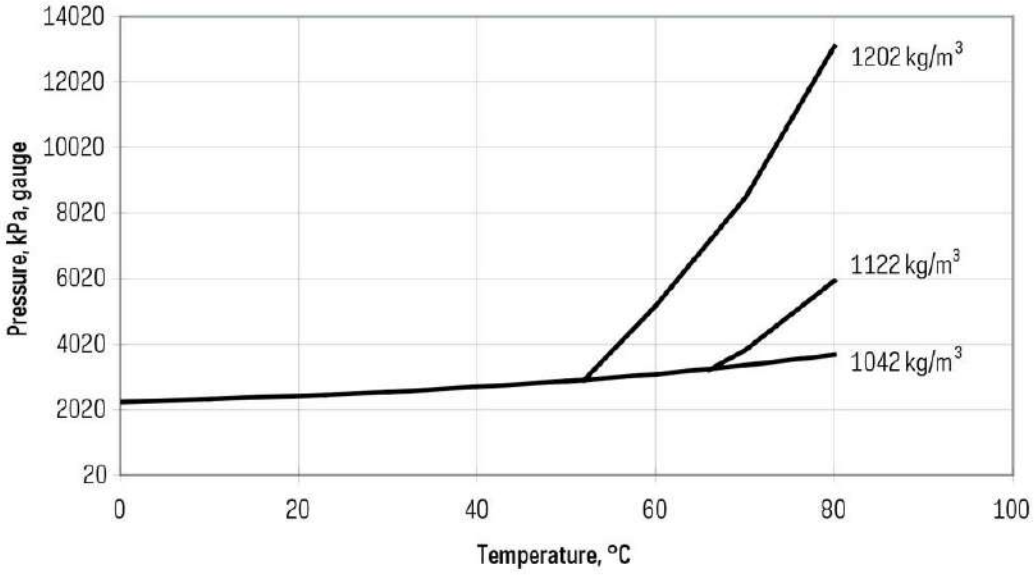
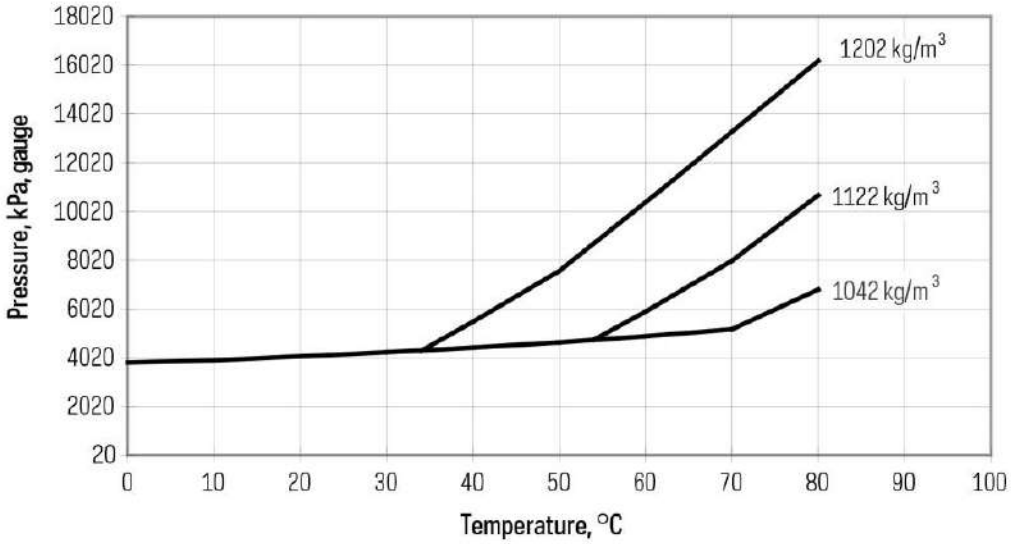


Figure 6. Isometric Diagram – FE-36™ Pressurized with Nitrogen to 4150 kPa at 21 °C



Henry's Law Constants

PREOS was also used to calculate the Henry's Law Constants as shown in **Figure 7** (ENG units) and **Figure 8** (SI units).

Figure 7. Henry's Law Constant for Nitrogen Solubility in FE-36™ (ENG Units)

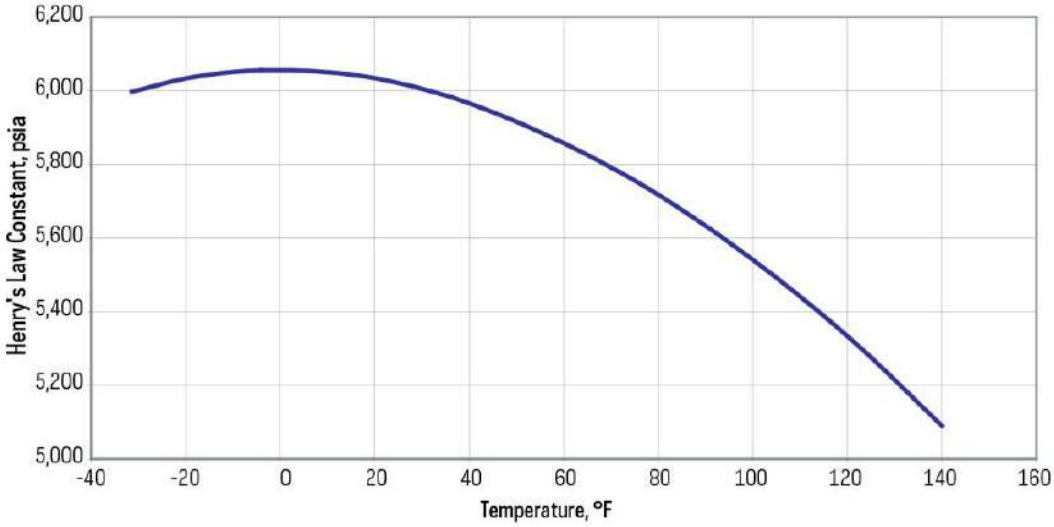
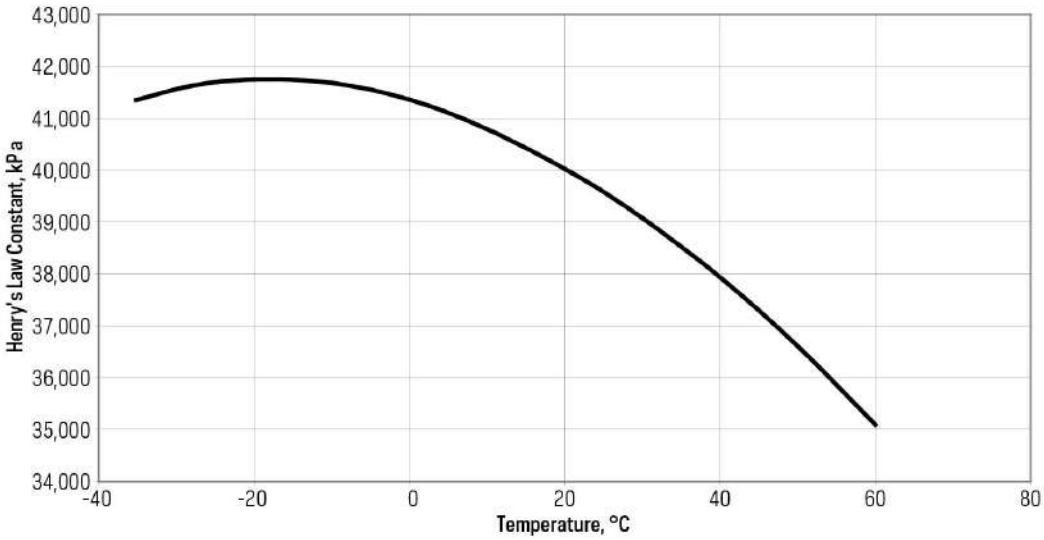


Figure 8. Henry's Law Constant for Nitrogen Solubility in FE-36™ (SI Units)



Recovery, Recycle, Reclamation, and Disposal

Responsible use of FE-36™ 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 FE-36™ 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 gas to superpressurize, it must be identified on the label. This is normally performed when a system must undergo maintenance and the FE-36™ returned to the system after completion. There are a number of recovery devices on the market. These devises contain a compressor and an air cooled condenser and may be used for liquid or vapor recovery. At the end of the recovery, the system is evacuated to remove vapors. Before purchasing a specific recovery unit, check with the manufacturer to be sure that it contains the elastomeric seals and compressor oil compatible with FE-36™.

Reclamation

Reclamation refers to the reprocessing of FE-36™ recovered from a system to new product specifications. Quality of the reclaimed product is verified by chemical analysis. In the United States, FE-36™ is included in Chemours reclamation program. Contact Chemours or one of its authorized distributors for further information.

Disposal

Disposal refers to the destruction of used FE-36™. Disposal may be necessary when FE-36™ has become contaminated with other materials and no longer meets the acceptable specifications of Chemours or other reclaimers. Chemours does not presently accept severely contaminated FE-36™ for disposal; licensed waste disposal firms are available. Be sure to check the qualifications of any firm before sending them used FE-36™.

For more information on FE-36™, please visit cleanagents.chemours.com or call (800) 473-7790

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