

Introduction

Mosafe HFC-227ea

Mosafe HFC-227ea is a clean, safe fire-fighting agent for use in total flooding automatic extinguishing systems. HFC-227ea is rated as Zero Ozone Depletion (ODP), is electrically non-conductive, clean, and leaves no residue.

Mosafe HFC-227ea extinguishing systems are 'engineered'. Engineered systems for example can consist of several HFC-227ea containers, manifolded together and connected via a pipe network to a number of discharge nozzles.

Systems may be activated mechanically or electrically. Mechanical manual actuation is via a handle attached to the container valve. Electrical actuation is via a removable solenoid. Actuator the solenoid actuator can be energised automatically by a signal from a fire detection and alarm control panel.

Approvals And Standards

Mosafe manufactured clean agent system equipment and the HFC-227ea agent, have acquired comprehensive approvals and listings providing further support to the overall product.

HFC-227ea Agent

- Underwriters Laboratories Inc. (UL) Recognised Component
- NFPA 2001 Clean Agent Fire Extinguishing Systems (Listed Alternative)
- FK5-1-12 UL/FM (approval pending)

Mosafe Manufactured Systems

- Underwriters Laboratories Inc. (UL Listed)

Mosafe HFC-227ea Extinguishing Systems are to be designed, installed, inspected, maintained, tested and recharged by qualified, trained personnel in accordance with NFPA2001, Standard on Clean Agent Fire Extinguishing Systems, and to be used in accordance with Environmental Protection Agency (EPA) Significant New Alternatives Program (SNAP).

HFC-227ea Agent Characteristics

HFC-227ea systems are suitable for use in normal commercial and industrial environments. Typical areas that can be protected by an HFC-227ea system

are detailed below; the list is by no means exhaustive:

HFC-227ea is a clean, gaseous agent containing no particles or oily residues. It is produced under ISO 9002 guidelines to strict manufacturing specifications ensuring product purity. HFC-227ea leaves no residue or oily deposits on delicate electronic equipment, and can be removed from the protected space by ventilation.

HFC-227ea is thermally and chemically stable, but without the extremely long atmospheric lifetimes associated with other proposed halon replacements.

Bank Vaults
Libraries
Rare Book Stores
Electronic Data Processing
Telephone Exchanges Studios
Communication Centre
Transformer and Switch rooms
Control Rooms
Test Laboratories
Flammable Liquid Stores



Complete suppression using HFC-227ea has the following advantages:

- The low concentration of HFC-227ea required means less visual obscuration and minimal risk to personnel.
- The small quantity of agent discharged minimises over-pressurisation of the protected area.
- Maximum safety for personnel due to low toxicity.
- Most effective when used with automatic detection to introduce HFC-227ea With a 10 second discharge.
- The ability to prevent re-ignition as long as concentration levels are maintained.

Two kind of working pressure system are available (25 bar / 360psi and 42 bar /600 psi),make the system has superior economy

WARNING

HFC-227ea shall not be used on fires involving the following materials unless they have been tested to the satisfaction of the authority having jurisdiction:

- Certain chemicals or mixtures of chemicals, such as cellulose nitrate and gunpowder, that are capable of rapid oxidation in the absence of air.
- Reactive metals such as lithium, sodium, potassium, magnesium, titanium, zirconium, uranium and plutonium.
- Metal hydrides.
- Chemicals capable of undergoing autothermal decomposition, such as certain organic peroxidase and hydrazine.

Caution

HFC-227ea is not effective on the following:

- Class A Deep seated fires.
- Class D Combustible metals.
- Chemicals capable of auto-thermal recombination.
- Chemicals capable of rapid oxidation.
- Enclosures with hot surfaces >400°C (752 °F)

Agent Physical Properties

Table 1

Agent Physical Properties	HFC-227ea
Chemical structure	CF ₃ CHF ₂ CF ₃
Chemical name	Heptafluoropropane
Molecular weight	170.03
Boiling point	-16.4°C (1.9°F)
Freezing point	-131.1°C (-204°F)
Critical temperature	101.7°C (214°F)
Critical pressure	2912kPa(422psi)
Critical volume	274cc/mole(.0258cuft./lb.)
Critical density	621kg/m ³ (38.76lb./ft ³)
Saturated vapour density@20°C (68°F)	31.18kg/m ³ (1.95lb./ft ³)

Table 2

Pressurized Gas Physical Properties	
Chemical structure	N ₂
Chemical name	Nitrogen
Molecular weight	28
Boiling point	-195.8°C (-320.4°F)
Freezing point	-210.0°C (-346°F)
Critical temperature	-146.9°C (-232.4°F)
Critical pressure	3399kPa(492.9psi)

Table 3

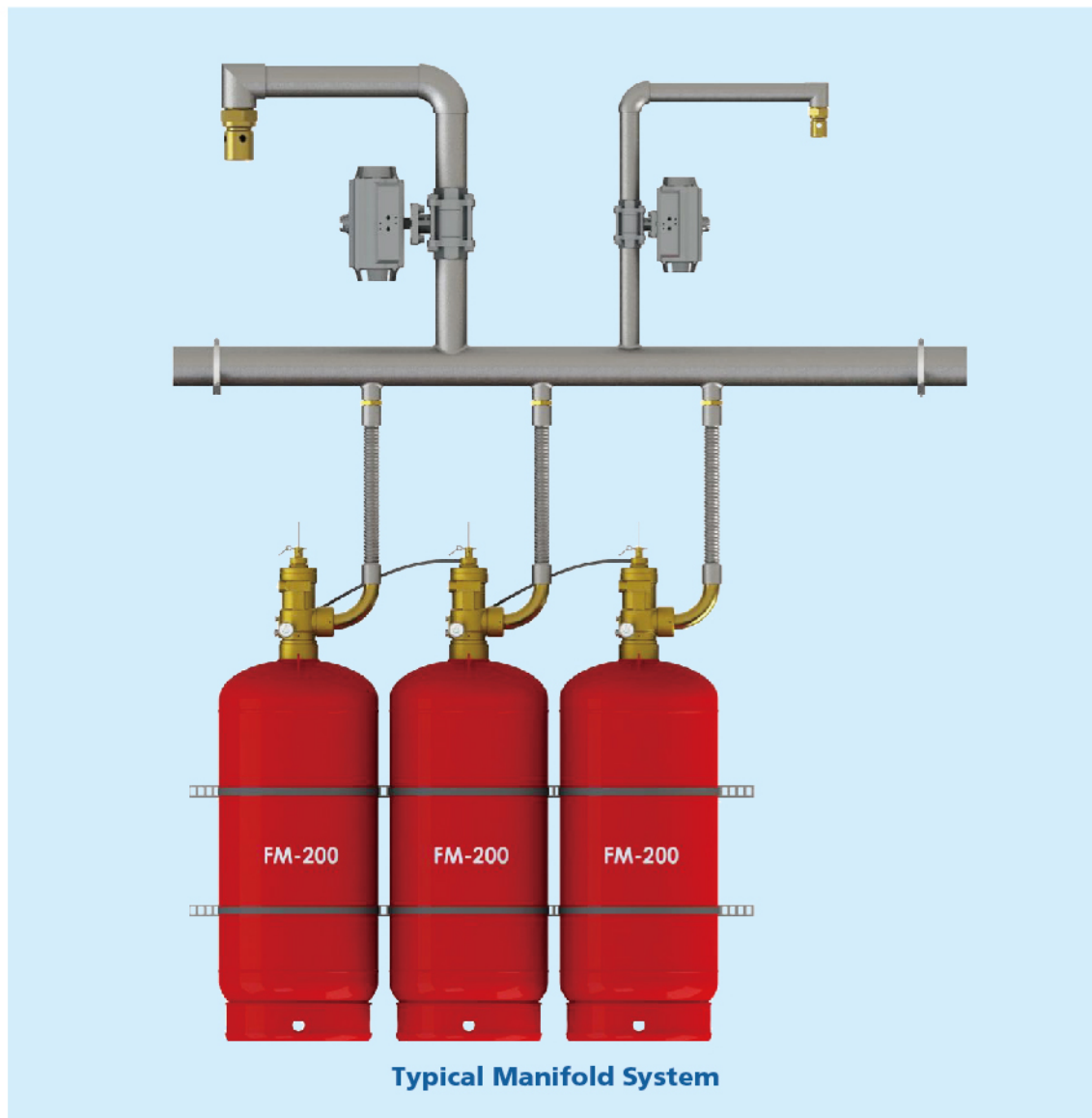
Environmental /Toxicology of	HFC-227ea
Environmental	
Ozone Depletion(ODP)	0
Atmospheric Life time(yrs)	36.5
Toxicology	
Acute ExposureLC50	>80%
Cardiac Sensitization	
No Observed Adverse Effect Level(NOEL)	9.00%
Lowest Observed Adverse Effect Level(LOEL)	>10.5%



Mosafe System Component

A typical manifold system of Mosafe HFC-227ea gas fire extinguishing system includes the cylinder kit, manual release device, pilot hose, discharge hose, check valve, manifold, relief device or distributor manifold, direction valve, pressure operating switch, pipe ware and nozzle which connected to the automatic alarm system.

Some items are optional depending on the application



Technical Information

The 40,50, 60, 70, 80, 90, 100, 120, 150 & 180L containers are manufactured in accordance with TPED.

Material		TPED	
Carbon %	0.200% max	Hydraulic test pressure:	69.0 bar (1000 psi)
Manganese %	1.500% max	Working Pressure:	34.5 bar (500 psi)
Phosphorus %	0.025% max	Hydraulic test pressure:	138.0 bar (2000 psi)
Sulphur %	0.025% max	Working Pressure:	69.0 bar (1000 psi)
		Paint Specification:	Red polyester powder coated

HFC-227ea Container

The agent storage vessel consists of a container fitted with a valve and internal syphon tube, factory filled with HFC-227ea, and super-pressurised with dry nitrogen to 25 bar @ 21 °C (360 psi @ 70 °F) and 42 bar @ 21 °C (600 psi @ 70 °F).

Containers sharing the same manifold shall be equal in size and fill density. Containers are finished in red and are available in various sizes .

A nameplate is adhered to the container displaying the agent weight, tare weight, gross weight, fill density and charge date.



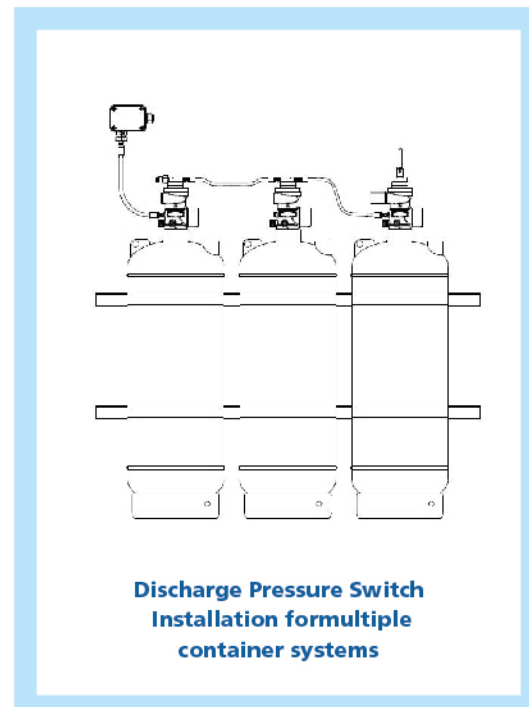
Container Details

Volume (L)	Fill Capacity (kg)		Outlet Size (mm)	Height (mm)	Diameter (mm)	Empty Weight (kg)
	Minimum	Maximum				
40	19.2	44.8	33/49	830	324	42.0
50	24.0	56.0	33/49	950	324	43.6
60	28.8	67.2	33/49	1100	324	49.9
70	33.6	78.4	49	1250	324	56.2
80	38.4	89.6	49	1400	324	62.6
90	43.2	100.8	49	1200	406	68.4
100	48.0	112.0	49	1310	406	72.4
120	57.6	134.4	49	1245	406	96.2
150	72.0	168.0	49	1495	406	113.1
180	86.4	201.6	49	1745	462	130.2

System Design Procedure

The following procedure must be followed when designing HFC-227ea systems.

- Determine hazard material and required design concentration.
- Identify individual enclosure volumes and deduct any impermeable volumes where appropriate.
- Determine hazard altitude and correction factor.
- Calculate quantity of HFC-227ea per enclosure, at minimum design temperature.
- Determine container size and fill density.
- Select nozzle type and location.
- Design pipe network.
- Calculate quantity of HFC-227ea per nozzle.
- Check percentage agent split at tee's.
- Identify all pipe lengths, rises, falls and nozzle reference numbers.



Engineered Systems Flow calculation

Mosafe Engineered systems are based on special hydraulic flow program-Mosafe protection flow calculation software. The software predicts the two phase flow of HFC-227ea and nitrogen through a pipe network. Information detailing the enclosure is entered and the program calculates the required pipe sizes, nozzle drill sizes, average nozzle pressures and discharge time. The software calculation results are in accordance with the actual situation.

As system design calculations are critical to the success of the extinguishing system, only Mosafe trained personnel are permitted to perform system calculations. If in the future, companies other than Mosafe wish to use the program, representatives will be required to attend a formal training session. All system calculations are conducted either 'in house' by Mosafe or authorised suppliers.

NOTE: The calculation method has been designed for specific types of fittings, pipes, and pipe inside diameter. When these limitations are not maintained, there is a risk that the system will not supply the required quantity of extinguishing agent.

