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SF 1230™ Fire Protection Fluid Technical Data Sheet

PRODUCT DESCRIPTION

We have raised the STANDARD in chemical fluids by utilizing ISO 9001-certified facilities capable of meeting the most stringent requirements. We provide high-quality materials to any number of industries, including fire suppression, semiconductor, industrial, transportation, telecommunications, marine, oil & gas, and energy. SF 1230 fluid is a clean agent for fire suppression as defined by the NFPA 2001 and ISO 14520 based on Fluoroketone chemistry with excellent performance, environmental profile and a large margin of safety.

Chemical name: dodecafluoro-2-methylpentan-3-one.

ASHRAE nomenclature: FK-5-1-12 (as designated in NFPA 2001 and ISO 14520 clean agent standards).

PRODUCT FEATURES

SF 1230 fluid is colorless, odorless, water-insoluble, thermally stable, zero ODP- no damage to the ozone layer, low GWP - low greenhouse effect value, low surface tension, low viscosity, small latent heat of evaporation, excellent material compatibility and fire performance, with a high margin of safety.

PRODUCT ADVANTAGES

SF 1230 fluid has excellent environmental protection performance: the most stringent international environmental regulations; High fire-extinguishing efficiency: minimum extinguishing concentration: 3.5% for Type A fire, 4.5% for Type B fire, safe to use as the extinguishing concentration is much lower than (NOAEL); Excellent electrical insulation: dielectric strength which is nearly 2.3 times that of dry air; No residue after use: evaporating upon discharge, which will not cause damage to precision instruments, antique media and art.

PHYSICAL PROPERTIES

SF 1230 fluid is discharged as a gas, however, it's liquid at room temperature. It is electrically non-conducting in both the liquid and gaseous state.

The breakdown voltage of SF 1230 fluid vapor under saturated conditions at 1 atm, 21°C over a 2.7 mm electrode gap is 15.6kV. The breakdown voltage of liquid SF 1230 fluid under the same conditions is 48 kV. The boiling point of SF 1230 fluid is 49.2°C, meaning this product has a much lower vapor pressure than other clean agents which are gaseous at ambient conditions.

SF 1230™ Fire Protection Fluid has a very low heat of vaporization, approximately 25 times less than that of water. This, along with a vapor pressure 12 times higher than water, causes SF 1230 fluid to evaporate more than 50 times faster than water, allowing it to transition from liquid to gaseous state very rapidly. When discharged through a nozzle from a properly designed system, SF 1230 fluid will rapidly vaporize and evenly distribute throughout the protected space.

Properties Description

All properties at 25 °C as applicable unless noted otherwise.

Appearance	Colorless, Transparent
Odor	Odorless
Molecular mass	316.04
Boiling point (1atm, oC)	49.2
Flash Point	No
Critical temperature	168.7°C
Vapor Pressure	44.4 kPa
Kinematic viscosity	0.4014 cSt
Specific Heat	1.013 J/g- K
Gas density	0.0136 g/mL
Liquid Density	1.601 g/mL
Freezing Point	-108°C
Ignition Point	No
Critical pressure	1865 kPa
Insulating property (110 kV)	3.8 mA
Latent Heat of Vaporization	84.55 kJ/kg
Dielectric Strength(3 mm)	>40 kV
Solubility of water	<0.001 wt%
Atmospheric lifetime (day)	5
ODP	0
GWP	<1.0

MAIN APPLICATIONS

Widely used for fire protection systems in total flooding, local flooding applications and portable fire protection. SF 1230 fluid is especially applicable to data centers, electronic control centers, computer rooms, transformer rooms, power distribution cabinets, wind power equipment rooms, energy storage rooms, high precision instruments, museums, ship control rooms, new energy vehicle lithium battery protection and other special applications in fire protection.

STORAGE AND TRANSPORTATION

SF 1230 fluid should be stored in a clean and dry warehouse, protected from high temperatures, away from heat sources, acids, strong alkalis, oxidants.

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As SF 1230 fluid is a non-hazardous liquid at ambient temperature, it can be transported by road, rail, ocean or air.

SF 1230 fluid is volatile, so attention must be paid to the seal of the containers during storage and transportation. To maintain the integrity of the enclosure seals, containers should not be stored or stacked upside down.



SAFETY AND PRECAUTION

The safety of SF 1230 fluid has been thoroughly evaluated through both acute and repeat dose toxicity testing. A full series of toxicological tests has been completed using this compound. In each case, SF 1230 fluid has been demonstrated to be very low in toxicity and to have a large margin of safety in use as a clean extinguishing agent.

Key testing of SF 1230 fluid was conducted at independent laboratories, as shown below.

Properties	SF 1230
4-hour Acute Inhalation	Practically Non-Toxic (LC50 > 100,000 ppm)
Cardiac Sensitization	Not a Sensitizer (NOAEL = 100,000 ppm)
Acute Dermal Toxicity	Low Toxicity (LD50 > 2000 mg/kg) Ames Assay
Primary Skin Irritation	Non-Irritating
Primary Eye Irritation	Minimally Irritating
Acute Oral Toxicity	Low Toxicity (LD50 > 2000 mg/kg)
Skin Sensitization	Not a Skin Sensitizer
28-Day Inhalation Study	NOAEL of this study: 4,000 ppm
Chromosomal Aberration	Negative



For SF 1230™ Fire Protection Fluid, the no observable adverse effect level (NOAEL) for acute toxicity has been determined to be 10 volume percent (100,000 ppmv) in air. With a NOAEL of 10%, the consensus is that SF 1230 fluid is safe for its intended end use, and it provides a large margin of safety relative to the typical design concentrations of fire protection systems.

As typical design concentrations range between 4.5 to 5.9 volume percent, the resulting safety margins are between 69% and 122%.

Thermal Decomposition

Most fire protection applications with halocarbon agents like SF 1230 fluid, protect Class A assets like computer and telecommunication facilities whose operational continuity is of utmost importance and are extremely sensitive to excessive heat, more so an actual fire. As such, fire protection systems must be designed to detect and a fire be extinguished at its smallest size.

Industry practice over the last decade has demonstrated that fire extinguishing systems using halogenated halon alternatives can be designed to minimize thermal decomposition product formation and avoid adding to the potential toxic threat of a fire event (the hazards created by the combustion products of the fire).

Nevertheless, it's a known, documented, and accepted fact that after the extinguished fire, some minimal levels of HF are produced. HF is produced from fires extinguished by SF 1230 fluid, similar to those involving other physically acting halocarbon agents. Industry standards recommend that fire combustion products and any potential agent decomposition products be exhausted from the protected space following extinguishment of a fire.

Industry Approvals

Component recognition has been attained from Underwriters Laboratories (UL) and Factory Mutual (FM). Fire suppression systems containing SF 1230 fluid are commercially available. The most updated list of Globally recognized system listings and approvals, with SF 1230 fluid as a component, are included on our website: www.standardfluids.com.

SF 1230 fluid is included in NFPA 2001, Standard on Clean Agent Fire Extinguishing Systems and ISO 14520, Gaseous Media Fire Extinguishing Systems referenced by the ASHRAE nomenclature of FK-5-1-12.

Commercial Availability

Original Equipment Manufacturers (OEMs) have the approvals to commercialize total flooding systems with SF 1230 fluid. Information for these OEMs can be accessed at the Standard Fluids website at www.standardfluids.com.

Total flooding system development has been our OEMs' main and general clean agent application. They have thoroughly invested in testing their systems against recognized test protocols and commercialized their products. Recent developments have expanded into Extended Discharge systems, aerospace industry, military clean agent applications, and portable extinguishers.

USE OF SF 1230™ FIRE PROTECTION FLUID

SF 1230 fluid as a commercial product is supplied by Standard Fluids with the expressed intent and purpose for use in fire protection systems designed for its use as a clean extinguishing agent in total flooding and streaming applications. Considered a sustainable halon replacement alternative to HCFCs and HFCs, it is a specialty chemical uniquely designed for use in the highly regulated fire suppression market to help protect critical assets needing such high-performance protection. As reviewed and approved by the US Environmental Protection Agency, SF 1230 fluid is manufactured, supplied, supported and approved specifically for such use only. It is not approved for use in any other non-fire protection/suppression applications. SF 1230 fluid is not approved for battery immersion applications.

USE OF SF 1230 FLUID – SYSTEMS USING LITHIUM-ION BATTERIES

SF 1230 fluid in a gaseous overhead fire suppression system, designed and installed following NFPA 2001 or ISO 14520 standards, can extinguish Class A, B and C hazard fires. In spaces where lithium-ion batteries are present or used, system owners can choose a fire suppression system using SF 1230 fluid to suppress ancillary fires that are external to the battery. Extinguishing the ancillary Class A, B and C fuel fires in areas near the lithium-ion batteries may help prevent a battery from overheating due to an external fire.

In addition, lithium-ion batteries may leak electrolytes contained within the battery, which may be combustible. System owners may choose a fire extinguishing system using SF 1230 fluid to suppress fires external to the battery that are caused by electrolyte leakage, which are Class B hazards.

SF 1230 fluid, utilized in total flooding fire suppression systems designed for Class A, B and C hazard fires, cannot stop thermal runaway once initiated. Any additional benefit of a fire suppression mechanism, device, or delivery system using SF 1230 fluid to prevent a cascading lithium-ion battery thermal runaway event is highly dependent on the battery properties and the system itself, which include factors outside of Standard Fluids' knowledge or control, including battery design, state of battery charge, and SF 1230 fluid concentration levels, as a few illustrative examples.

Accordingly, the fire suppression system manufacturer is solely responsible for ensuring that any claim regarding the ability of the system to prevent a cascading lithium-ion battery thermal runaway event is true and accurate.

PACKAGING AND AVAILABILITY

SF 1230 fluid is currently available in 20,000 kg (44,092 lb) ISO Containers, 1100 kg (2425 lb) intermediate bulk containers (IBCs), 300 kg (661 lb) drums and 5 kg (11 lb) glass sample jugs. Also, because it is packaged in IBCs and drums, it can be air freighted without the restrictions of gaseous alternatives.

SF 1230™ FIRE PROTECTION FLUID

SF 1230 fluid is supported by global sales, technical and customer service resources, with technical service support in the U.S., Europe, Japan, Latin America and Southeast Asia. Users benefit from Standard Fluids' technology base and continuing product development, with performance, safety and the environment in mind.

Extensive OEM policies and equipment design guidelines have been prepared for system retrofit, installers and equipment manufacturers in support of SF 1230 fluid.

For additional technical information on SF 1230 fluid in the United States, or for the name of a local authorized distributor, call Standard Fluids at 888-322-1248 or visit our website at www.standardfluids.com.

In addition, this product should not be used in the manufacture of medical supplies or intermediate products of medical supplies, or in the production of food-grade products or cosmetics, you must contact the company in advance to obtain permission to sell the above-mentioned products. However, the purchaser of the product must decide whether the product is suitable to produce medical products or intermediate products of medical equipment, whether it is suitable for the production of "food contact" products or cosmetics and must not rely on any representations made by the company.



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