

SAPPHIRE® Clean-Agent Fire Suppression Systems

Features

- UL/ULC Listed
- FM Approved
- Effective total flooding for Class A, B, and C fires
- Clean agent suitable for protection of high-value assets
- Long-term, sustainable alternative to halon, HFCs, and PFCs

Application

The ANSUL® SAPPHIRE® Clean-Agent Fire Suppression System utilizes 3M Novec™ 1230 Fire Protection Fluid as the suppression agent. Novec 1230 fluid can effectively be applied in total flooding fire suppression applications in the following areas:

- Data Processing Centers
- Tape Storage
- Vaults
- All normally occupied or unoccupied electronic areas where equipment is either very sensitive or irreplaceable
- Telecommunications including Cellular Sites and Switching Centers
- Military Systems including Combat Vehicles and Marine Engine Rooms
- Transportation including Merchant Marine Vessels and Mass Transit Vehicles
- Recreation including Pleasure Craft and Race Cars

Environmental Impact

The SAPPHIRE Suppression System utilizes Novec 1230 fluid. This fluid has 0.0 ozone depletion potential, an atmospheric lifetime of just five days, and a global warming potential of 1.0. Novec 1230 fluid is registered with the U.S. EPA under TSCA and European ELINCS. It has met the requirements of registration under SNAP (Significant New Alternatives Policy) and is approved for use as an alternative to Halon 1301 for total flooding applications in occupied spaces.

Description

The SAPPHIRE Suppression System is an automatic, fixed nozzle, fire suppression system using Novec 1230 fluid for Class A, B, and C fires.

The system is designed and installed in accordance with the National Fire Protection Association (NFPA) Standard 2001, "Clean Agent Fire Extinguishing Systems." It is listed by Underwriters Laboratories, Inc. (UL), Underwriters of Canada (ULC), and approved by Factory Mutual (FM).



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The system is capable of automatic detection and actuation and/or remote manual actuation.

The detection portion of the fire suppression system allows for automatic detection by means of the AUTOPULSE Detection and Control System. Several different detection options are available such as smoke or air sampling.

Exposure to Novec 1230 fluid at design concentrations up to 10% (NOAEL) is not hazardous to health. Refer to NFPA 2001 for exposure requirements. As with Halons, the EPA and the National Fire Protection Association recommend that unnecessary exposure to any agent be avoided and that personnel evacuate protected areas as quickly as possible to avoid the decomposition products of the fire.

A system installation and maintenance manual is available containing information on system components and procedures concerning design, operation, inspection, maintenance, and recharge.

The system is installed and serviced by authorized distributors that are trained by the manufacturer.

Description (Continued)

Basic Use – The SAPPHIRE Suppression System is particularly useful for suppressing fires in hazards where an electrically non-conductive medium is essential or desirable, where clean up of other agents presents a problem, or where the hazard is normally occupied and requires a non-toxic agent.

Composition and Material – The basic system consists of extinguishing agent stored in steel containers. Various types of actuators, pneumatic and electric, are available for release of agent into the hazard area. The agent is distributed and discharged into the hazard area through a network of pipe and nozzles. Each nozzle is drilled with a fixed number of orifices designed to deliver a uniform discharge to the protected area. On large hazards, where two or more tanks are required, actuation design can be utilized to actuate multiple tanks.

Additional Equipment Includes – AUTOPULSE detection and control panels, releasing devices and alarms, strobes and warning signs. All or some are required when designing a total system.

3M Novec 1230 Fire Protection Fluid – Novec 1230 fluid, referenced as FK-5-1-12 in NFPA 2001 and ISO 14250, is a fluorinated ketone (or fluoroketone) with a chemical structure of $\text{CF}_3\text{CF}_2\text{C}(\text{O})\text{CF}(\text{CF}_3)_2$. It is a clear, colorless, odorless liquid that is super-pressurized with nitrogen and stored in high-pressure tanks as part of the total SAPPHIRE Suppression System. Although stored in liquid form, Novec 1230 fluid will turn to a gas upon discharge, making it an effective total flooding agent for a variety of hazards. As a clean agent, it leaves no residue behind and will not affect sensitive high-value electronics. Refer to 3M Novec 1230 Fire Protection Fluid Data Sheet (Form No. F-2003127) for more detailed information.

Tank Assembly – The agent storage tanks are manufactured in accordance with DOT4BW450 and consist of a tank fitted with a valve and internal siphon tube. Tanks are available in eight sizes. Agent quantities are available in 1 lb fill increments. A nameplate is adhered to the tank displaying the agent weight and gross weight.

Electric Actuator – The 24 VDC electric actuator is required to electrically actuate the tank valve. An electric signal is received from the AUTOPULSE Control Panel which operates the solenoid in the actuator. This causes the actuator to open the tank valve and discharge the agent. On multiple tank systems, only one electric actuator is required on the master tank valve. The remaining tanks will be actuated pneumatically through 1/4 in. stainless steel hose installed between each pilot pressure port.

Pneumatic Actuator – The pneumatic actuator is required to pneumatically actuate the agent tanks. The actuator operates from the pressure from the nitrogen cartridge located in the AUTOMAN II-C release. When the pneumatic actuator is pressurized, the internal actuator piston pushes down on the valve stem, opening the tank valve, and allows the agent to discharge.

AUTOPULSE Detection and Control System – The AUTOPULSE detection and control system is designed to monitor fixed fire hazards. The control system can automatically actuate the fire suppression system after receiving an input signal from one or more initiating devices, such as a manual pull station or detector. The control system incorporates an internal power supply, in-line emergency batteries, and solid state electronics.

AUTOMAN II-C Releasing Device – AUTOMAN II-C releasing device consists of a metal enclosure which contains a spring-loaded puncture pin release mechanism, an actuation cartridge, electrical circuitry, and an input/output terminal strip for making electrical connections. The AUTOMAN II-C releasing device provides automatic pneumatic actuation of the SAPPHIRE Suppression System. When wired to an AUTOPULSE control system, it provides supervised electric detection and release. It also provides manual actuation using the strike button on the release enclosure.

Nozzles – Six sizes of discharge nozzles are available. Nozzles are designed to discharge agent in a 360° or 180° pattern. Nozzle sizes and orifice sizes are determined by the Hydraulic Flow Calculation Program.

Hydraulic Flow Calculation Program – SAPPHIRE Suppression Systems are based on a Hydraulic Flow Calculation Program. The program predicts the two-phase flow of Novec 1230 agent 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 times. As system design calculations are critical to the success of the suppression system, only factory-trained personnel are authorized to perform system calculations.

Technical Data

Applicable Standards – The SAPPHIRE Suppression System complies with the NFPA Standard 2001, “Standard for Clean Agent Fire Extinguishing Systems,” and EPA Program SNAP (Significant New Alternate Policy).

The system is listed by Underwriters Laboratories, Inc. (UL), Underwriters Laboratories of Canada (ULC), and approved by Factory Mutual (FM).

Installations

All system components and accessories must be installed by personnel trained by the manufacturer. All installations must be performed according to the guidelines stated in the manufacturer’s design, installation, operation, inspection, recharge, and maintenance manual.

Availability and Cost

Availability – SAPPHIRE Suppression Systems are sold and serviced through a network of independent distributors located in most states and many countries.

Cost – Cost varies with type of system specified, size, and design.

Technical Services

For information on the proper design and installation, contact a local authorized SAPPHIRE Suppression System distributor. The applications engineering department is also available to answer design and installation questions.

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