



FIRE SUPPRESSION SYSTEMS ASSOCIATION

Shaping the Future of Fire Protection

CLEAN AGENTS THE NEXT GENERATION OF FIRE PROTECTION

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The focus of fire protection has always been to limit the damage a fire can cause. Originally, the goal was to confine a fire to a city block. Today's conventional water systems can confine a fire to a building, a floor and even a single room.

With today's technical sophistication, however, containing fire to a single area is not always enough. Critical facilities require an even higher level of fire protection. You must protect not only the building, but its contents as well -- from real assets such as people and equipment, to virtual assets such as data vital to the business.

Fortunately, there are fire protection tools that are up to the task. Clean agent suppression systems not only protect an enclosure from fire, but its contents as well. That means people, documents and equipment. Clean agent systems work on class A, B and C fires, and react quickly to extinguish fires at their earliest stages. Using early detection and rapid extinguishment, clean agent systems eliminate the fire, reduce the damage to equipment and increase the safety of the people in the fire area.

“Recently, in a New York City hospital, a circuit board in an MRI console caught fire while the machine was in use on a patient,” relates Cal Clemons, CAE, CMP, executive director of the Fire Suppression Systems Association in Baltimore, Md. “As alarms sounded, the technicians were unable to release the patient using the MRI controls. Before they could reach the machine, the clean agent fire suppression system discharged and eliminated the hazard.”

“The fire was detected and suppressed so quickly that damage was limited to that single circuit board. The patient was unharmed. The MRI unit was repaired and tested, and began operation again in less than 24 hours,” he continues. “That's the value clean agents bring to the fire protection equation.”



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Clean agents extinguish fire as a gas, which allows them to permeate into cabinets and obstructed areas. It also makes them uniquely suited to protect the electronics hidden inside a piece of equipment – a likely place for a fire to start.

By thoroughly flooding an area with a gaseous fire fighting agent, even obscured or hard-to-reach fires are quickly extinguished, usually long before they are seen. After extinguishment, the agents are readily vented from the room along with any by-products of the fire. Unlike water, these fire fighting agents are non-conductive and non-corrosive, making them safe to use on and around live electrical equipment. There is no residue to clean up, no lingering materials to slowly degrade equipment, and no need for an expensive disaster recovery process. Operations are back online and productive in a very short time.

Clean agents are also ideal for applications requiring protection of irreplaceable objects of historic or cultural significance.

“Earlier this year, a sprinkler system discharged in a National Archives storage center just outside Washington, D.C.,” says Clemons. “The center stores more than 3.7 million cubic feet of irreplaceable artifacts and government records. Damage from the discharge was limited to a 300 cubic foot area -- which contained 700,000 documents. That’s how much damage can occur in a relatively small space.”

“According to newspaper reports, government employees were working around the clock using blotting paper to dry the documents,” he continues. “If this were a business, the clean-up effort alone could shut the business down for weeks. That’s just not acceptable in today’s 24 x 7 society.”

Clean agents are safe to use in occupied areas. They have undergone extensive toxicity testing to prove they are compatible with people. While NFPA recommends always exiting the hazard area in the event of a fire, it is important that people not be harmed by the extinguishing system.

Today’s clean agents are also non-ozone depleting and safe for the environment.

Halon Sets the Standard

The advent of Halon 1211 and Halon 1301 opened a new era in fire protection. Halon is a clean agent which effectively attacks certain fire situations with astonishing success. Fires are extinguished without harming the surrounding area.

However, Halon contains chlorofluorocarbons, or CFCs. When CFCs were linked to ozone depletion, Halon was found to have one of the highest ozone depletion potentials, so the fire protection industry changed again.



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Under the Clean Air Act of 1990, the United States severely restricted the production and import of virgin Halons 1211, 1301 and 2402 beginning January 1, 1994. This was done in compliance with the Montreal Protocol on Substances that Deplete the Ozone Layer.

Though Halon systems are still in use today, the only sources of supply are recycled Halon and inventories produced before 1994. This limited supply drove the need for new, environmentally friendly clean agents.

SNAP

Also in 1990, the United States' Environmental Protection Agency introduced its Significant New Alternatives Policy, or SNAP, as part of the Clean Air Act. Under SNAP, the EPA evaluated substitute chemicals and alternative technologies to ensure that they wouldn't cause greater damage to human health or the environment than the potential ozone depleters that were being replaced.

In assessing the toxicity of halocarbon alternatives, the EPA is primarily concerned with human exposure during a fire. The principal guideline is cardiac sensitization, which is defined as increased susceptibility of the heart to adrenaline that might lead to potentially fatal heart arrhythmias.

As far as environmental concerns, the EPA looks at the agent's ozone depleting potential, global warming potential and its atmospheric lifetime. Today's clean agents are non-ozone depleting, are not harmful to people and are not harmful to the environment.

Industry Standards

The fire protection industry itself has also developed standards for clean agent systems. NFPA 2001 is the technical standard that addresses the design, installation, testing, inspection, operation and maintenance of clean agent fire suppression systems. It also specifies components for clean agent systems, including agent supply, distribution and detection, actuation and control systems. Information and minimum requirements are included for all SNAP-approved clean agents.

The Next Generation

To date, the next generation of clean agents consists primarily of three commercially available products developed in compliance with EPA's SNAP policy. While other agents are recognized by EPA's SNAP, those with the greatest market acceptance are INERGEN, FM-200 and FE-13.

INERGEN

One of the first clean agents approved for use by the EPA is INERGEN, manufactured by Ansul. INERGEN is composed of three inerting, or oxygen diluting gases. Its make-up is 52 percent nitrogen, 40 percent argon and eight percent carbon dioxide. INERGEN



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extinguishes fire by lowering the oxygen content below the level that supports combustion.

INERGEN reduces oxygen content to about 12.5 percent -- safely below the 15 percent level required for ordinary combustibles to burn, yet above the 10 percent level required by the EPA for human safety.

When INERGEN is discharged into a room, it introduces the proper mixture of gases that still allows a person to breathe in a reduced oxygen atmosphere. The increase in the carbon dioxide content increases a person's respiration rate and the body's ability to absorb oxygen.

INERGEN is suitable for Class A, B and C fires. It exhibits no ozone depleting potential and does not contribute to global warming.

FM-200

Great Lakes Chemical Corporation's answer to the Halon challenge is FM-200. Chemically known as Heptafluoropropane, FM-200 is a compound of carbon, fluorine and hydrogen that will completely extinguish Class A, B and C fires in seconds.

FM-200 works by physically cooling the fire at the molecular level. It belongs to the same class of compounds used in refrigeration and, as such, is an effective heat transfer agent. FM-200 literally removes heat from the fire to the extent that the combustion reaction cannot sustain itself.

FM-200 is colorless, odorless and electrically non-conductive. Like all clean agents, it leaves no residue, eliminating costly, after-fire clean-up and keeping down-time to a minimum. It is considered safe for use in total flooding situations according to NFPA 2001 and the EPA.

FE-13

FE-13, or trifluoromethane, is DuPont's response to the phaseout of Halon. Originally developed as a chemical refrigerant, FE-13 works by raising the total heat capacity of the environment. Its molecules at the flame front absorb heat from a fire -- much the same way a sponge absorbs liquid -- until the atmosphere will not support combustion.

FE-13 is a gaseous agent, leaving no residue behind to damage sensitive equipment. It also does not require labor-intensive clean-up operations. It is chemically and biologically unreactive, and safe for use in occupied areas.

FE-13 is a high pressure agent that quickly floods large volumes, even when released from 25 feet up. It can be safely used in excessive concentrations if very rapid extinguishment is required. Also, its low boiling point and high vapor pressure make FE-13 effective down to minus 40 degrees Fahrenheit.



FIRE SUPPRESSION SYSTEMS ASSOCIATION

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FE-13 has an ozone depletion potential of zero. It is listed in NFPA 2001 and, like FM-200, is a carbon-hydrogen-fluorine compound.

Why Clean Agents?

When it's time to make a fire protection decision, here are some facts to remember.

- Clean agent systems save lives.
- Clean agent systems act in seconds to detect and extinguish a fire. Because of this quick action, damage is often limited to the specific piece of equipment, or even the component within that piece of equipment, that caused the fire. Minimal damage means minimal down time.
- Clean agent systems are non-corrosive, so the agents themselves do not damage valuable equipment.
- Clean agents disburse as gases, so there is no clean-up, no residue and no additional down time.
- Clean agent systems are safe for people.
- Clean agent systems are safe for the environment.

Finally, these systems protect irreplaceable assets that can't be exposed to water or corrosive chemicals. Today's new business environment requires a new generation of fire protection.

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