Integrating Clean Agent Fire Suppression Systems into Your Business

As the value of information technology continues to grow, the need for clean agent fire extinguishing systems is also expanding. Companies want to protect their valuable IT infrastructure in a way that won’t harm equipment, will minimize downtime, and avoid costly disruptions to their business. A solution is quick acting, waterless, gas-based systems that provide a first line of defense against fire. While automatic fire sprinklers supply the overall property protection, the critical nature of today’s computer systems demand very early intervention and suppression, well before a sprinkler system activates.

For the sprinkler contractor, clean agent systems represent another potential source of revenue. When both a sprinkler system and clean agent system are present, the two systems are often interlinked. If your company installed the preaction sprinkler system, but not the clean agent system, then a significant business opportunity may have been missed. Whether you already install clean agent systems, or you are interested in learning more, a review of some of the basics is worthwhile.

The typical clean agent system must activate and flood the protected area with a predetermined concentration of gas within 10 seconds. Although the percentage of clean agent required varies by system type, the overall premise remains the same. Since these systems act quickly to extinguish the fire, it is important that the operation sequence, including alarms and supervisory signals, be coordinated with the overlaying automatic sprinkler protection. This is also the reason that the sprinkler contractor is often the first to be involved with these types of opportunities.

The Standard on Clean Agent Fire Extinguishing Systems is NFPA 2001, which was organized in 1991 to address various clean agents being developed to replace the Halon family of products. Halons, which by the early 1980s were used in a wide variety of applications, were discovered to have a significant damaging effect on the ozone layer. As a result, the 1987 Montreal Protocol on Ozone Depleting Substances effectively banned the future use of Halon gases in fire protection.

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Several alternatives to Halon were developed, the most popular of which were hydrofluorocarbons, or HFCs. HFC-227, which is marketed today under brand names such as FM-200® (Dupont) and Solkaflam® 227 (Solvay Fluor), is effective at fire suppression and, like Halon, does not damage electronics or other protected assets. While HFCs cause minimal damage to the ozone layer, they unfortunately have a large global warming potential. Although not banned from use in fire protection, HFCs were identified by the 1997 Kyoto Protocol on Greenhouse Gas Emissions for their negative environmental impact.

To address the need for a more environmentally friendly extinguishing agent, 3M® pioneered the fluorokeytone, and developed this new clean agent under the brand name Novec™ 1230. Novec 1230 has proven to be highly effective at fire suppression, has low toxicity, zero ozone depletion, and minimal global warming potential. 3M is so confident in the environmental profile of Novec 1230 that they offer a “Blue Sky Warranty,” which guarantees that the product will not be banned or restricted due to ozone depletion or global warming potential for a period of 20 years.

Novec 1230 will not damage electronics and leaves behind no residue, which dramatically reduces clean-up time and minimizes the downtime of critical IT infrastructure. Novec 1230 works by absorbing heat prior to the generation of a flame, thus interfering with the combustion process in its earliest stages. A unique feature of Novec 1230 is that it is actually a fluid that rapidly changes to a gas when discharged from a nozzle. As a result, it can more easily be transported, filled, stored, and dispersed. It also has a higher safety margin than other clean agents, making it safer for people working in the protected area.

Manufacturers such as Viking, Tyco, and UTC offer integrated systems to discharge Novec 1230, and other clean agents such as FM-200. Applications for clean agent systems are not limited to only data centers, server rooms, and IT equipment. These systems also have widespread use in cultural properties, museums, and historical structures, as well applications in the aviation, marine, and telecommunications industries.

Each clean agent fire suppression system is uniquely designed to match the specific needs of the protected area. This includes considerations for the type of detection, control panels, tank size/quantity, actuation devices, distribution piping, discharge nozzles, notification devices, and other components. While clean agent systems, such as Viking’s new VK-1230 system, do incorporate unique components, much of the hardware will be familiar to the sprinkler contractor.

- **Nozzle**: The type and size of discharge nozzles are determined during the design phase of the project. The nozzles, which are manufactured with the precise orifice size required for the system, are UL Listed and FM Approved specifically for clean agent systems.

- **Piping**: Schedule 40 seamless steel pipe is often used for connecting the nozzles to the clean agent cylinders. As with sprinkler systems, care must be taken to ream the pipe and clean it of any debris and cutting oils. The steel piping network is then connected to the tank by a flexible steel hose. Since discharge pressures can approach 360 - 720 psi, metallic piping is the material of choice.

- **Tank**: The tank holds the agent under pressure and ready for discharge. The basic components of clean agent tank assemblies include the cylinder, pressure gauge and switch, cylinder valve, release device, installation clamp/strap, and flexible hose connection. A protective halo is typically installed on top of the tank to protect the tank valve from damage, which could in turn release the clean agent and cause a safety issue for anyone in proximity. Additionally, tanks must be securely fastened with the installation clamp to prevent violent movement during operation.
• **Actuation:** The actuation system can come from a dedicated system with cross-zoned detection, a fire alarm panel, a pneumatic system, or a plethora of combinations. Typically there is at least one level of early warning with a mechanical abort option in the event trained personnel are in the vicinity. In addition, a variety of signals are communicated to provide alarms and shut-down procedures for the protected area. These signals may also be the initial alarm on the preaction system. The valve actuator threads onto the tank valve on top of the cylinder. On multi-tank systems, a typical arrangement employs an electric release on the master cylinder with a pneumatic releasing device on all additional cylinders. All tanks will then empty almost simultaneously. A small check valve is also used to prevent backflow to the adjacent tanks. Finally, in a multi-tank arrangement, an automatic vent is installed that allows any small leak to escape without activating the slave tanks.

• **Detection:** A multitude of detection options exist to meet specific system requirements. Heat and flame detectors, such as the Minimax’s UniVario line of industrial detectors, employ cutting-edge technology to detect a fire in its earliest stages, while also minimizing the potential for false activation from thunderstorms, bright sunlight, or a non-fire related heat source. Additionally, sophisticated aspirating smoke detection systems are frequently employed, such as the HELIOS system by Minimax, which can provide very early warning capabilities.

• **Control Panel:** Release control panels must be specifically UL Listed and FM Approved for use with clean agent systems. For maximum flexibility, the panel should be compatible with many different initiating devices including linear heat detection, smoke and heat detectors, water flow indicators, low air pressure switches, and manual pull stations, as well as other pneumatic and electric actuation methods.

• **Notification Devices:** Audible alarms and visual indicators, such as horns and strobe lights, are typically specified on clean agent systems. This includes pre-discharge alarms that provide warning of impending system activation. NFPA 2001 also includes specific information on instruction, safety, and warning signs.

Initial approval of a clean agent system, like an automatic sprinkler system, usually includes a detailed design review, inspection of mechanical components, and verification of operation by the AHJ. A room integrity test (i.e. fan test) is required for total flooding systems to identify any significant air leaks that could effect the required concentration of clean agent in the enclosure. Annex C of NFPA 2001 includes detailed specifications for the fan test. Additionally, system manufacturers, such as Viking, offer guidance and resources to assist the contractor in performing the required testing.

Like any new business venture, getting the proper training and committing the necessary resources to the opportunity is the best way to ensure long-term success. Viking offers detailed training programs on clean agent fire extinguishing systems. Attending a training session is a great first step toward developing a more thorough understanding of the design and installation requirements.

In today’s information age, companies need a solution for protecting their critical IT assets that is highly effective and will minimize costly downtime.
Licensing requirements vary widely across the U.S. In some states a separate license must be obtained, while other states combine the installation of automatic fire sprinkler systems and clean agent fire suppression systems into a single license. In these areas, if you are licensed to install sprinklers, then you can likely install clean agent fire suppression systems as well. Where a separate license is needed, the requirements may include attending manufacturer-provided training, passing an exam, or other methods for proving competence. For clean agent fire suppression systems, a certain NICET level is typically not a requirement for obtaining a license.

The design and layout of a clean agent system is a unique process that requires specific calculation software. It is not uncommon for an initial calculation to be performed before a project is awarded, followed by a final calculation before installation. This final calculation is meant to verify the impact of any changes from the original bid documents or changes to the room integrity (i.e. ability of the protected space to hold the required concentration of gas). It is critical that these final calculations and system drawings be followed exactly in the field. To assist the contractor in getting started, Viking provides detailed design assistance and bid preparation.

In today’s information age, companies need a solution for protecting their critical IT assets that is highly effective and will minimize costly downtime. This technology is being protected today by automatic fire sprinklers, but the need for supplemental, quick acting, environmentally friendly, suppression solutions is becoming more prevalent. Clean agent systems, with their capability to extinguish fires in the earliest stages without harming electronics, meet this critical need. If you are interested in expanding your capabilities, then adding clean agent systems to your business portfolio represents an opportunity to increase revenue, expand your market presence, and differentiate your company from the competition.