

Securing today. Building for the future.

**When more than 200 million
Americans rely on you, there
really is no time for downtime.**

An innovative fire protection system incorporating 3M™ Novec™ 1230 Fire Protection Fluid is helping a critical U.S. federal agency stay connected with taxpayers and beneficiaries, while complying with new Federal “green” initiatives.

Every day, the U.S. Government processes some 75 million transactions, affecting the tax payments and benefits of over 200 million Americans. Any downtime – even for a few minutes – can have serious and far-reaching consequences.

That’s why, when planning for the new, state-of-the-art data center began in 2009, particular attention was given to protecting the 300,000 square foot facility from fire.

The first line of defense

It was quickly established that the first line of fire defense for the facility should be a clean agent extinguishing system. Clean agents are electrically nonconductive and evaporate cleanly, without leaving

a residue. They are widely used in mission-critical facilities such as data centers because, unlike water or dry chemicals, they do not damage sensitive electronic equipment, data storage media or paper documents. Clean agents are designed to extinguish fires while they are still small, helping to prevent their spread, typically allowing the facility to remain in continuous operation, even during a fire event.

Although continuity of operations was a key concern of the agency in planning the facility, they also wanted to ensure that the new facility lived up to the Federal government’s pledge to reduce its environmental impact by using environmentally sustainable products. And in this regard, all clean agents are most definitely not alike.

Designed to allow continuity of operations in the event of a fire emergency, the fire protection system at a U.S. Federal agency facility, incorporating 3M™ Novec™ 1230 Fire Protection Fluid, is one of the largest total flooding clean agent systems in the world.



3M™ Novec™ 1230 Fire Protection Fluid is engineered as a more sustainable alternative to legacy first-generation halon replacements such as HFCs. Its unique properties also allow safe system design at higher pressures.

A new standard of sustainable design

The desire to incorporate sustainability in the design of the data center facility was underlined by President Obama's signing of Executive Order 13514 in October of 2009. This order sets sustainability goals for Federal agencies, focusing on improvements in their environmental, energy and economic performance. The following January, President Obama announced government-wide greenhouse gas emissions reduction targets for 2020. These targets called for a 28% reduction from 2008 levels of direct emissions. It was decided that the new facility was to be certified to the U.S. Green Building Council LEED Gold (version 3.0) standard – the first for a GSA (General Services Administration) data center. The GSA is a U.S. government agency responsible for managing federal property, including operating and maintaining buildings; supplies and transportation acquisition; and communications management.

In 2011, bids for supplying and installing the clean agent fire protection system were let. The successful bidder on the project, Harris Fire Protection of Baltimore, Maryland, knew it was facing a difficult design challenge. "NFPA regulations state that clean agent cylinders shall be located as close as possible to the hazards they protect," states Harris Fire's David Cieslak. "But because of the building's configuration, we had to locate the tanks on the ground floor, which is 20 feet below the protected area. This meant that we would have to use a system with longer pipe runs and higher discharge pressure in order to reach the hazard." Harris Fire looked at several options for the fire extinguishing agent in this system, but it quickly became apparent that

Novec 1230 fluid was the only viable choice, according to Cieslak. "It not only offers a more sustainable alternative than legacy first-generation halon replacements such as hydrofluorocarbons (HFCs), but it also offers superior capabilities in a high pressure application such as this."

For the hardware portion of the system, Harris settled on the new 500 psi/34.5bar Firetrace® E4 total flooding system, utilizing 3M™ Novec™ 1230 Fire Protection Fluid. The Firetrace E4 system was developed in conjunction with 3M, both to meet the agency's goals for an effective, sustainable solution and to take advantage of the unique high pressure properties of Novec 1230 fluid. According to Mark Cavanaugh of Firetrace International, "The E4 system provides significant improvements over traditional total flooding systems, delivering high-pressure performance even at three times the distance from cylinder to nozzle – with less piping and at less cost than traditional clean agent total flooding systems."

The high boiling point, high liquid density, lower vapor pressure and very low heat of vaporization of Novec 1230 fluid are the primary properties enabling safe system design at higher pressures. As Paul Rivers, 3M Senior Fire Protection Specialist explains, "With Novec 1230 fluid, a system can be designed to 500 psig (34.5 bar) pressure using the kind of welded cylinders typically used in 360 psig (25 bar) designs. An HFC system cannot be designed to this higher pressure because, unlike Novec 1230 fluid, the high vapor pressure of HFC agents would result in the system exceeding the working pressure limit and approved temperature range of the cylinders."

Novec 1230 fluid is a highly-effective clean extinguishing agent, designed to replace non-sustainable halons and first-generation halon replacements, such as hydrofluorocarbons (HFCs) and hydrochlorofluorocarbons (HCFCs). With zero ozone-depletion potential, a global warming potential of less than one and a short atmospheric lifetime, Novec 1230 fluid has an environmental profile that does not compromise its future availability – unlike HFCs, whose future availability is increasingly uncertain. Approved by the U.S. EPA in total flooding systems, Novec 1230 fluid's sustainability profile helped meet the environmental criteria for the Federal agency – reducing the global warming potential of its fire protection system by 99.5%, compared to the HFC alternatives that were considered.

Novec 1230 fluid's unique properties helped the fire protection system's designers meet all of the agency's criteria, including:

- Flexible system design
- Fast fire suppression while maintaining operations without disruption
- Reduce risk of damage to valuable assets, including electronic devices, paper and electronic storage media
- Provide a wide margin of safety for workers
- Enable easy maintenance and refilling of cylinders

A total of 128 Firetrace E4 clean agent cylinders, each capable of holding up to 1,300 lbs. of Novec 1230 fluid, were installed in the new facility. Deployed in 24 banks that protect 12 separate zones through the data center, it is one of the largest total flooding clean agent systems ever installed.

Conclusions

The data center, which was completed three months ahead of schedule, is the first LEED Gold certified data center to be constructed by the GSA, and has become a model for similar facilities in both the public and the private sector. Overall, this new building is an outstanding example of the Obama Climate Action Plan. It sets a clear example in the pursuit to combat climate change and drive international and domestic actions to reduce emissions – enabling the transitioning to safer and more sustainable solutions.

As the world becomes increasingly dependent on uninterrupted access to electronic data, the need to protect server and communications infrastructure from fire and other threats is more critical than at any time in our history. Thanks to technological advancements such as Novec 1230 fluid and the Firetrace E4 system, this mission can be carried out, while meeting the need to reduce our environmental footprint, ensure worker safety and control costs.

3M™ Novec™ 1230 Fire Protection Fluid is an advanced clean agent fire suppression material, based on a proprietary chemistry from 3M. It was designed to address industry needs for clean agent fire protection that is safe and effective, while offering a sustainable environmental profile that no other halocarbon agent can match. This includes: Zero ozone depletion potential; a 5-day atmospheric lifetime, and; a Global Warming Potential of 1. Because of these properties, Novec 1230 fluid is not targeted for phase-down or regulatory restrictions anywhere in the world. It is approved for use in total flooding fire suppression systems by the U.S. EPA and most major regulatory bodies. All of this makes Novec 1230 fluid today's sustainable choice for clean agent fire protection.

The 3M™ Novec™ Brand Family

The Novec brand is the hallmark for a variety of proprietary 3M products. Although each has its own unique formula and performance properties, all Novec products are designed in common to address the need for safe, effective, sustainable solutions in industry-specific applications. These include precision and electronics cleaning, heat transfer, fire protection, protective coatings, immersion cooling, advanced insulation media replacement solutions and several specialty chemical applications.

3M™ Novec™ Engineered Fluids • 3M™ Novec™ Aerosol Cleaners • 3M™ Novec™ 1230 Fire Protection Fluid • 3M™ Novec™ Electronic Grade Coatings • 3M™ Novec™ Electronic Surfactants • 3M™ Novec™ Dielectric Fluids

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