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Novec™

Brand

3M™ Novec™ 1230 Fire Protection Fluid

Case Studies and Customer Applications

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When you specify a system for fire protection, your choices could determine if a person, valuable asset or even an entire business survives a fire...

3M[™] Novec[™] 1230 Fire Protection Fluid helps give you the peace of mind that you've made **a smart, safe, sustainable choice.**

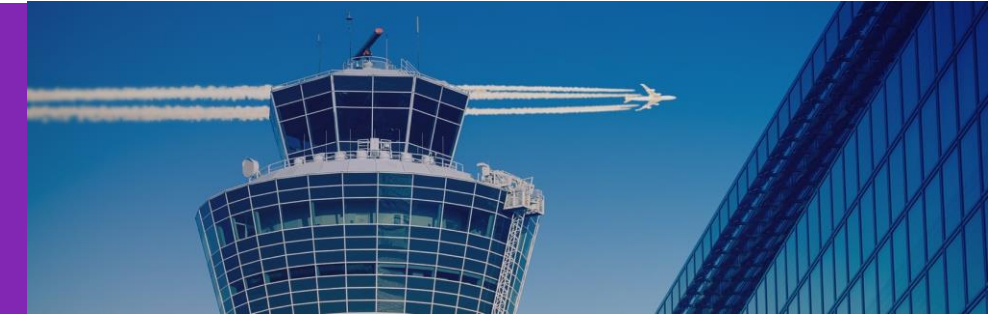
This case study book provides just a few examples from **over 50,000 Novec 1230 fluid installations in 90 countries.**

Contents



Data Centres

Aerospace, Military
& Transport



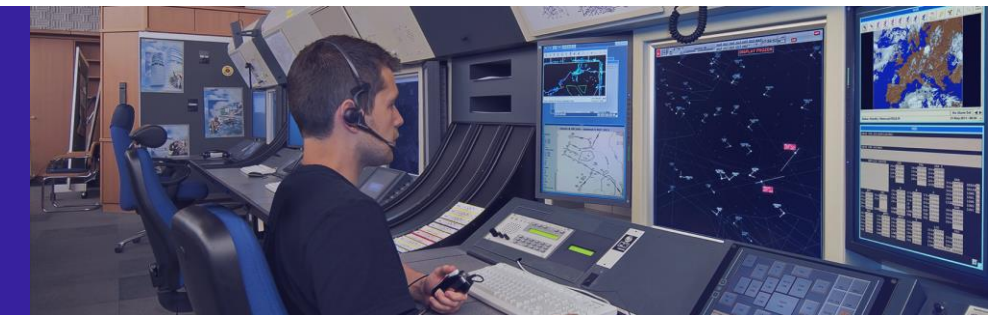
Museums/Archives
/Universities

Power Generation
& Utilities



Marine, Oil & Gas

Other markets



Data Centres

The demand for data is exploding and it isn't going to stop. Customers expect data centres to perform efficiently like utilities – always on, without interruption while minimising environmental impact.

3M™ Novec™ 1230 Fire Protection Fluid is designed to put out fires quickly and effectively without damaging what's being protected.

Minimising downtime costs and helping you get back to business quicker.



SAPPHIRE® system using 3M™ Novec™ 1230 protects UK's most powerful supercomputer at the University of Edinburgh

Customer

The University of Edinburgh (Scotland, UK) **hosts one of the most powerful supercomputers in the UK**. The £43m Advanced Research Computing High End Resource (ARCHER) system **is capable of 2.5 million billion calculations per second** and can carry out complex computations, providing high performance support for multiple research and industry projects in the UK. This world-class supercomputer is operated by EPCC, the supercomputing centre based at the University of Edinburgh.

Customer requirements

The University of Edinburgh had clear stipulations that the fire protection system must be sustainable, the ARCHER system itself is among the greenest computer centres in the world. **Space saving was also a key requirement** due to the limited free space available.

The system

Automatic Protection Ltd (APL), specialists in automatic fire extinguishing systems and an authorised distributor of HYGGOOD systems from Johnson Controls, was selected to supply and install a suitable fire suppression solution for the UK Research Data Facility. Due to its environmentally sustainable properties, a SAPPHIRE System from Johnson Controls using 3M™ Novec™ 1230 Fire Protection Fluid was chosen to protect the data centre room. **Once actuated, the HYGGOOD SAPPHIRE system delivers the Novec 1230 agent within 10 seconds**, which works to rapidly absorb heat to the point where combustion ceases, stopping fires from spreading.

In order to accommodate the limited free space available, the team at APL chose a modular design for the system. **This meant that the containers could be placed in between the air conditioning units at the side of the building.**

Stuart Harrison, Director at APL comments: "Selecting the SAPPHIRE system was the most effective due to its 'green' properties'. With SAPPHIRE we have the option to position the containers around the room in the spaces available. An inert system would just not offer this kind of flexibility".



Containers are placed in between air conditioning units to save space



The heat is off for GleSYS data centre in Sweden

Customer

An innovative culture is part of the company DNA at GleSYS data centre in Stockholm. In an agreement with Fortum, the largest power utility in Stockholm, **they sell heat produced from cooling their data centres back into the district heating system.** This ‘circular economy’ arrangement is a significant contributor to the 200 MW of power required to power Stockholm every year. GleSYS started back in 1999 as a web-hotel with a server located in the US, but soon moved into new data centre facilities in Falkenberg, Sweden. Today GleSYS offers hosting as well as co-location services for its customers internationally.

Customer requirements

Fire protection is of vital importance for GleSYS, to protect its critical assets and minimise downtime. Its modular data centre in Falkenberg features an inert gas system, which was already in place when the building was acquired in 2000. Since then, GleSYS has introduced fire extinguishing based on 3M™ Novec™ 1230 Fire Protection Fluid for its Stockholm facility. Joakim Jarstorp, Facility Manager for GleSYS comments: “We found Novec 1230 was the best fit for our facilities. **A Novec 1230 system did not force us to install large pressure relief vents and the size of the Novec 1230 system allowed us flexibility in installation.** The promise of rapid extinguishing was also a bonus, plus **Novec 1230 fluid is not known to have any issues with hard drive crashes when activated.**”

The system

Back in 2013, GleSYS opted to work with Exting AB as the installer of a Viking/ Minimax® MX 1230 fire extinguishing system using Novec 1230 fluid. This was installed in Zone 1 of their datacentre. In 2015 they added Zone 2, on the second floor of their building, where they again opted for Novec 1230. This time the supplier was DAFO AB, using the SAPPHIRE® system from Johnson Controls. In 2016 they decided to develop the Zone 1 MX 1230 system by transforming it to a multi-zone variant, covering several areas with one central bank of cylinders.

GleSYS is now working on expanding its data centre with a third zone, and intends to continue its district heating arrangement with Fortum as a net producer of heat. **Novec 1230 fluid is already selected for fire protection of Zone 3.** Joakim explains:

“The future for data centres is definitely sustainable, and I wouldn’t hesitate to recommend Novec 1230 systems for fire protection of data centres, based on my experience so far.”





New data centre for US Federal Agency is protected by 3M™ Novec™ 1230 Fire Protection Fluid

Customer

Designers of a new, state of the art, 300k square foot data centre for the US Federal Agency sought to fulfil **two key objectives in their fire protection system**. Firstly, **minimising downtime** in the event of a fire, and secondly **ensuring the facility lived up to the Federal Government's pledge to reduce its environmental impact**.

Customer requirements

Sustainability was a key driver for the new system, the new facility seeking certification to the US Green Building Council LEED Gold standard. But there were also **significant design challenges**, the tanks requiring location on the ground floor which is 20 feet below the protected area.

The system

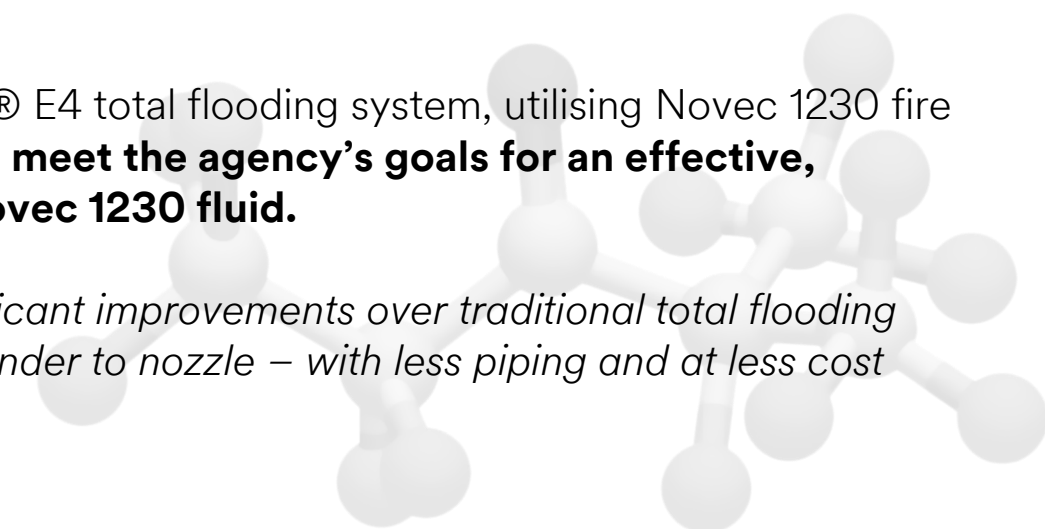
The successful bidder on the project, Harris Fire Protection of Baltimore, Maryland looked at several options for the fire extinguishing agent in this system, but it quickly became apparent that **Novec 1230 fluid was the only viable choice**, according to Harris Fire's David Cieslak:

"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, utilising 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."*

"Novec 1230 offers superior capabilities in a high pressure application"





3M™ Novec™ 1230 Fire Protection Fluid Chosen To Supply Fire Protection For Telegraph Media Group

Customer

The Telegraph Media project involved the provision of fire protection for the building's basement area, which houses uninterruptible power supplies, as well as the second floor where the servers and communications equipment are located.

Customer requirements

The client required **a fire extinguishing system that needed no venting and a relatively small amount of storage space** for the cylinders. **A strong environmental profile** was also an important requirement.

The system

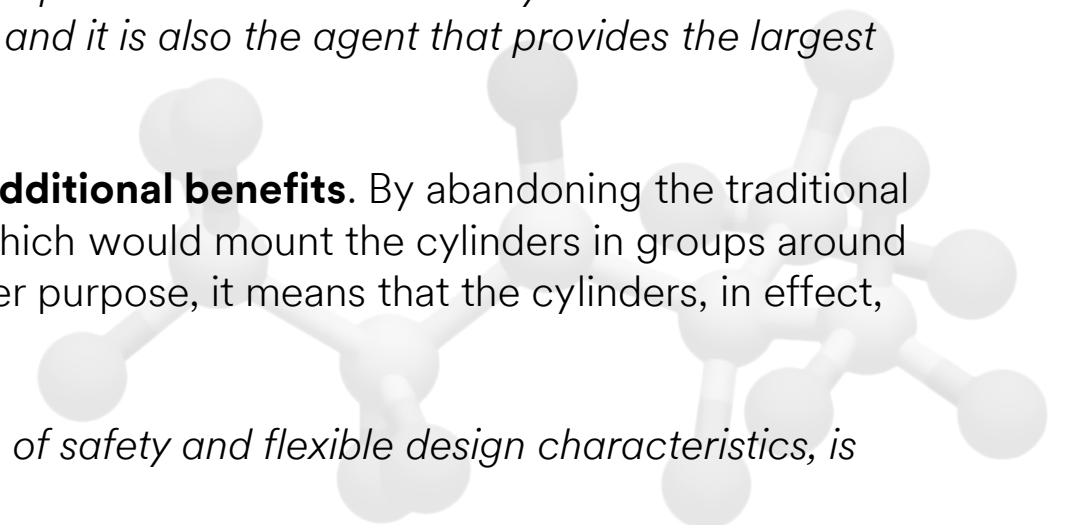
These considerations led Siemens Building Technologies, who had been appointed to design and install the system, to suggest the use of a chemical extinguishing agent. **The strong environmental profile of Novec 1230 fluid would effectively deliver Telegraph Media Group's environmental requirements.**

"Given our aim that the new system should be environmentally responsible," said Lorrie Dannecker, Services Director at Telegraph Media Group, "it didn't take long to see that Novec 1230 fluid was a very attractive option. In comparison with other currently available extinguishing agents, Novec 1230 fluid is the runaway winner on environmental grounds, and it is also the agent that provides the largest margin of safety for use in occupied spaces"

Mounting the cylinders in groups around the building's support columns ensure the cylinders occupy zero usable floor space

Siemens found that **adopting a system using Novec 1230 fluid made it possible to offer additional benefits.** By abandoning the traditional design approach used for chemical agent systems, Siemens was able to develop a solution which would mount the cylinders in groups around the building's support columns. Since this space around the columns is not useful for any other purpose, it means that the cylinders, in effect, occupy zero usable floor area.

"The extra cost for using an environmentally sustainable technology, with its wide margin of safety and flexible design characteristics, is money very well spent." continues Lorrie.





3M™ Novec™ 1230 Fire Protection Fluid chosen as ‘safest solution’ for HDC34 data centre in France

Customer

HDC34 is a data centre in Montpellier (France), specialising in **data storage for local small and medium sized companies**. The data centre was built in partnership with IBM® and Prosodie™, and can accommodate 30 racks in the 100m² IT room. The owner, Luc Vidal forecasts to double this with a 2nd IT room.

Customer requirements

Safety was a critical consideration in the design of the data centre, along with **protection of equipment, space-saving and sustainability**.

The system

Following consultation with several companies, Luc Vidal selected Novec 1230 fire protection fluid **as the clean agent in the automatic extinguishing system combined with a very early detection system**. Novec 1230 fluid is stored as a liquid in the cylinders and pressurised with nitrogen. **The total flooding takes place in <10 seconds**.

"We studied three solutions: water mist, inert gas and Novec 1230 fluid" explains Luc Vidal.

Water mist was initially eliminated, due to its cost. With the costs of the remaining solutions being comparable, several arguments helped him choose Novec 1230 fluid.

Firstly, human safety - Novec 1230 fluid presents a safety margin of 88% versus 7% for inert gas, and is therefore safe even if operators remain in the room longer than the timeout delay of 30 seconds.

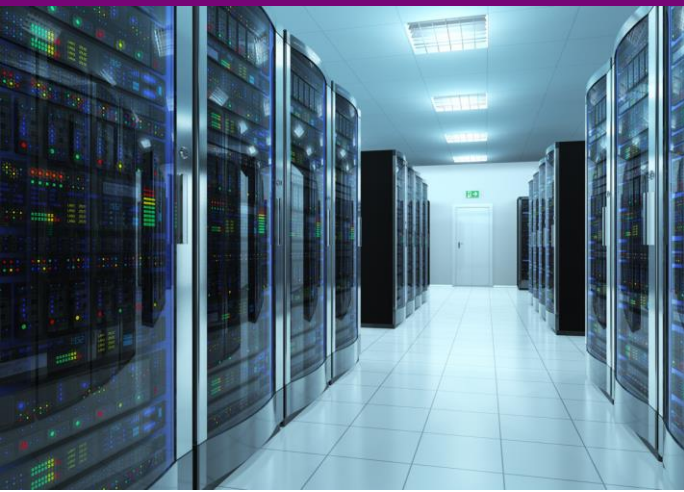
Secondly, protection of valuable assets – Novec 1230 fluid evaporate cleanly, without residue. Luc Vidal decided to combine the fluid with Siemens Sinorix™ silent nozzles, to reduce the noise level to around 90 decibels when discharged.

Finally, space-saving was a key consideration – only 6 cylinders of Novec 1230 fluid to store versus 18 with inert gas, and only one vent required to absorb the overpressure.



Pictured (l-r): Julie Boizot (3M), Luc Vidal

Only 6 cylinders of Novec 1230 were required versus 18 with inert gas



3M provides protection for the Middle East region's most sophisticated computing machine

Customer

The development of the Shaheen 16-rack IBM® Blue Gene/P system with 65,536 processor cores delivering 222 TFLOPS (trillion floating point operations per second) was a joint venture between IBM and the King Abdullah University of Science and Technology, and is part of the Centre for Deep Research project. The computer, which is ranked as **the most complex high performance computing (HPC) system in the Middle East** was built in the US at IBM's T.J. Watson Research Laboratory in Yorktown Heights, NY, before being moved to KAUST's campus near Jeddah before the university's official opening in 2013.

Customer requirements

Fire protection was required for KAUST's Data Centre building, which comprises ten rooms, and an **additional suite of six computer rooms containing ten of the largest computers available in the world today**. Additional protection was required for eight rooms at the campus's Super Computer Centre building.

The system

The entire project was supervised and managed by Saudi Aramco™, who recommended use of 3M™ Novec™ 1230 Fire Protection Fluid. **Novec 1230 fluid is ideal to protect data rooms, since it extinguishes fires quickly and cleanly, with no residue** to clean up so the system can remain operational.

Novec 1230 fluid also **has an outstanding environmental profile**, with an atmospheric lifetime of 5 days, zero Ozone Depletion Potential and a Global Warming Potential of just 1. This is in line with Saudi Arabia's halon replacement regulations.

"Our Novec 1230 Fire Protection Fluid is of great benefit to many industries in the region and is specifically designed for such projects as the KAUST's campus. At 3M we are experts in providing fire protection to such sophisticated machinery and technologies, and thanks to our expert partners within the Kingdom, we are confident of the utmost safety for the HPC machine," commented Kamal Abdelhamid Sghair from 3M.

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Museums / Archives Universities

Sprinklers, water mist and dry chemical systems can be as destructive to fragile, irreplaceable artefacts as fire itself.

Help safeguard precious art, archives and artefacts from both fire and water damage using **3M™ Novec™ 1230 Fire Protection Fluid.**

Safe for use on paper, canvas and film substrates, it leaves no residue and does not affect ink, paper, pencil dye, paint or any other media.



Protecting valuable artworks at Aberdeen Treasure Hub

Customer

Aberdeen Treasure Hub is a new publicly accessible museum collections store, built in one of the regeneration areas of Aberdeen, Scotland, to **house historical artefacts and artworks when they are not on display**. Instead of building a secure storage facility which was completely inaccessible to the public, Aberdeen City Council achieved a vision of creating an **open-access showcase for historical objects and artworks**, enabling the whole community to engage with arts and culture.

Customer requirements

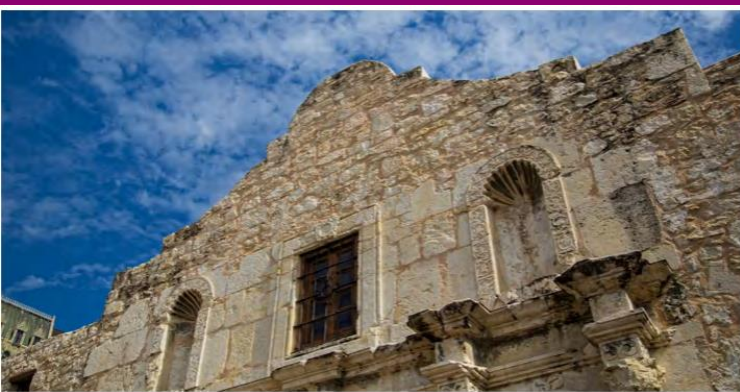
Protecting sensitive works of art from fire needs careful consideration. A clean fire extinguishing agent with a **compact storage footprint** was sought, in a building already crammed with other building services. **A high safety margin was vital**, to protect visitors and workers in the occupied space in the event of a system discharge. And with global warming and the environment front of mind, **another important consideration was sustainability**. With these defined requirements, the council, via the contractors, engaged Vipond Fire Protection, an approved third party accredited fire company to help design, install and commission the gas suppression systems.

The system

Vipond recommended a SAPPHIRE® Suppression System from Johnson Controls, featuring 3M™ Novec™ 1230 Fire Protection Fluid, which ticked all the boxes for the client's requirements. The green light for the fire protection system came relatively late in the construction programme and some interesting challenges were embraced by Vipond's experienced designers. Many of the other building services were already installed when the systems were given the go-ahead to proceed. Due to these space constraints, a 42 bar system utilising distribution valves was configured. In the large plant room, a bank of eight x 180 litre containers was installed, providing protection to four rooms, through the distribution valve system.

A further bank of six containers with distribution valves was fitted in a smaller plant room. To provide the quantity of Novec 1230 fluid needed for the multi-collection store protection, another twelve modular containers were installed in the large plant-room and multi-collection store. **The flexibility of design enabled the system to be configured around severe space constraints within the building**. All container banks operate simultaneously to provide the optimum amount of Novec 1230 to the room where the fire is detected. A further smaller room housing important assets has its own system. In all, a highly comprehensive fire suppression system which protects all spaces of Aberdeen Treasure Hub.





Future-proof Fire Protection – Protecting the Alamo

Customer

The over 7,000 members of the Daughters of the Republic of Texas are committed to preserving the memory and spirit of their ancestors who served the Republic of Texas before it became a U.S. state. **Their library, located in the original Alamo compound in San Antonio, TX, houses over 38,000 irreplaceable artefacts: books, art, photographs, documents and maps representing the cultural heritage and origins of Texas.**

Customer requirements

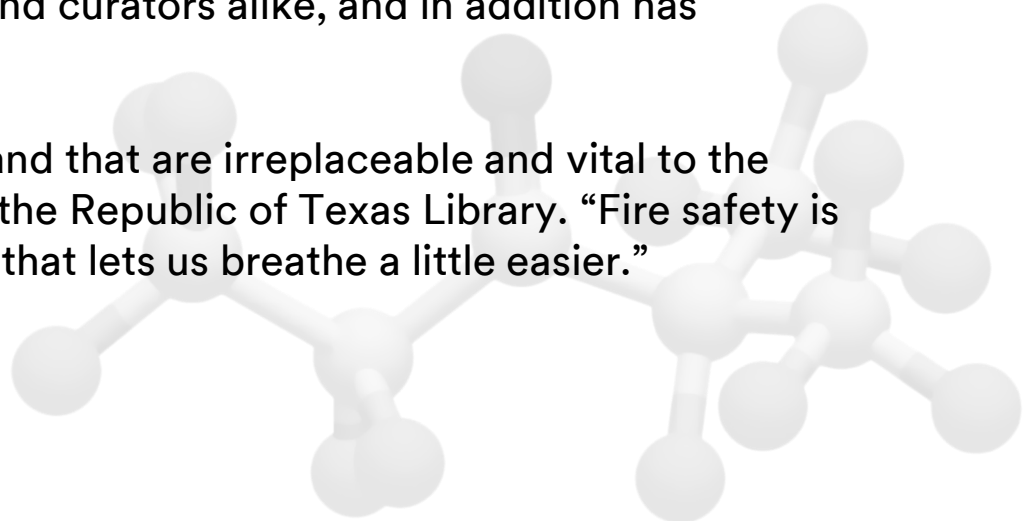
After the Daughters of The Republic of Texas Library suffered an accidental discharge of its outdated fire suppression system, the Daughters began to look for a replacement system. The solution needed to work within the existing space of the historical building on the Alamo compound, had to have a high margin of safety for the curators, researchers, tourists and other people using the space and had to be environmentally sustainable – all while remaining cost effective.

The system

The Daughters selected a SAPPHIRE® fire suppression system using 3M™ Novec™ 1230 Fire Protection Fluid. Because Novec 1230 fluid is stored as a liquid and discharged as a gas, **less space is needed for agent storage and architects and engineers have more flexibility when planning how to integrate a Novec 1230 fluid fire suppression system into an existing historic building. Plus, it offers the highest margin of safety for human occupancy of any clean agent, helping protect researchers, tourists, and curators alike, and in addition has exceptional environmental properties.**

“The library houses many one-of-a-kind pieces representing the cultural heritage of Texas and that are irreplaceable and vital to the education of future generations,” said Leslie Stapleton, library director at The Daughters of the Republic of Texas Library. “Fire safety is always a concern in a preservation setting and 3M Novec 1230 fluid is our insurance policy that lets us breathe a little easier.”

Since Novec 1230 is stored as a liquid, engineers have more flexibility when planning how to integrate the system into a historic building





National Museum of Scotland is protected using SAPPHIRE® system with 3M™ Novec™ 1230 Fire Protection Fluid

Customer

Housed within the walls of the Royal Museum of Scotland are **some of the most innovative inventions and discoveries of the last 300 years.**

Customer requirements

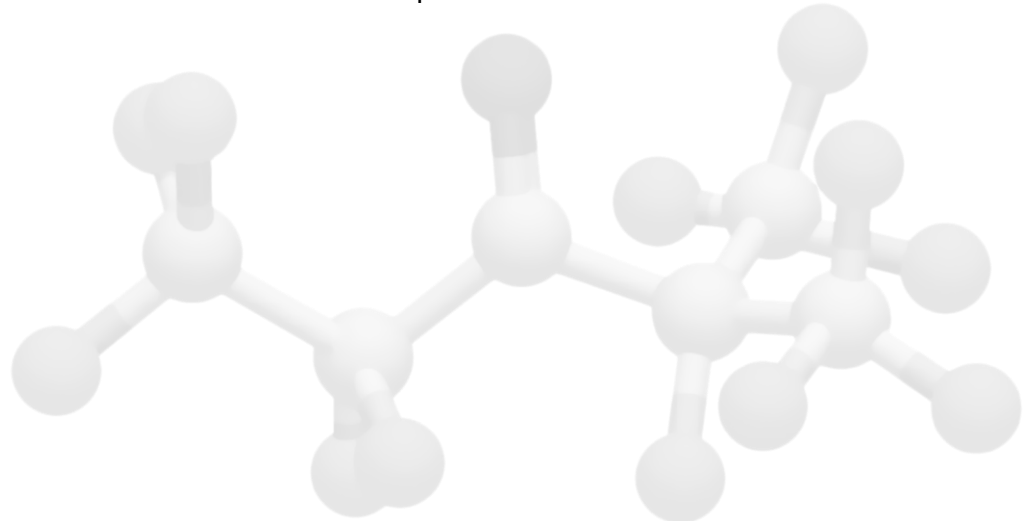
The system chosen to protect such **vital artefacts** needed **an impeccable environmental profile coupled with high safety margins.**

The system

SAPPHIRE® system, developed and distributed by Johnson Controls using Novec 1230 Fluid from 3M, provides the National Museum of Scotland with **an environmentally sound and future proof solution.**

The system credentials include **an atmospheric lifetime of 5 days** and a **Global Warming Potential of just 1.**

Together with compact storage and a fast acting profile, the National Museum of Scotland have the ideal solution to protect their valuable artefacts and vital computer systems.





Progressive fire suppression system secures critical data processing at Hochschule Niederrhein University

Customer

The Hochschule Niederrhein (HN) is one of the largest universities of applied sciences in Germany, with over 14600 students studying at over ten different faculties at campuses in Krefeld and Mönchengladbach. Established for over 150 years, the **Hochschule Niederrhein enjoys a strong national and international reputation, and is ranked the number one university in the lower Rhine region.**

Customer requirements

In planning for a new server room at the Mönchengladbach campus, several key drivers were identified for the right fire protection system. **Personal safety, ease of integration into the existing building structure and storage space were top of mind.** Stephan Böcker, head of workplace safety and fire protection officer at Hochschule Niederrhein comments: “It was essential the new server room was integrated into the existing building structure, with no option for renovation or building works to avoid inert gas leaking into adjacent rooms.”

The system

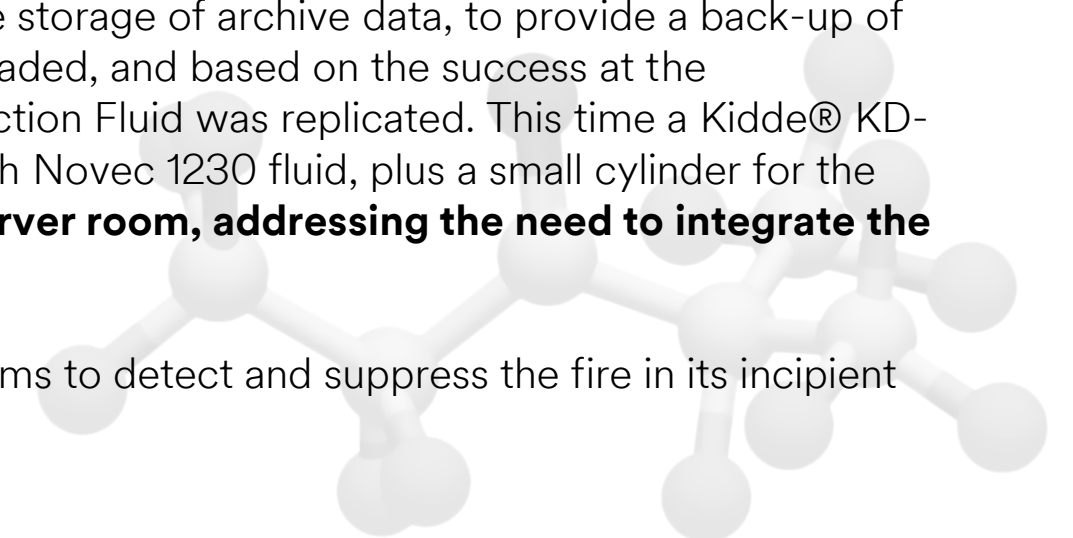
A Minimax® MX 1230 fire protection system (42 bar) was selected to protect the server room on the campus in Mönchengladbach. This first installation took place in 2005, **with just 2 gas cylinders (plus a small cylinder to protect the void floor space) required to protect a room of about 45m².**

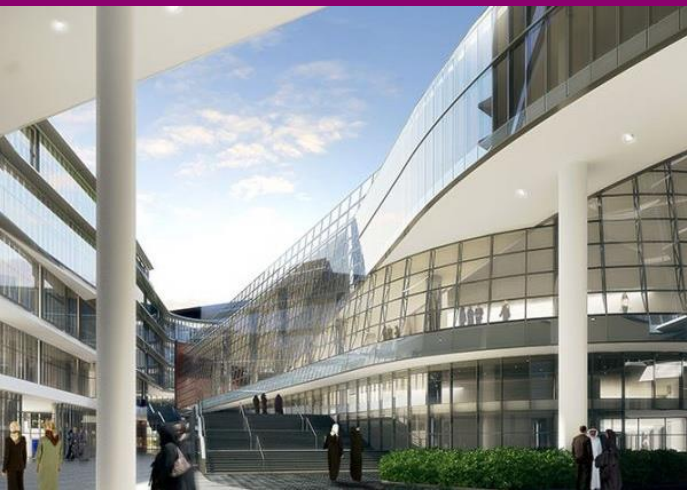
At the campus in Krefeld a second server room of approximately 120m² is in operation for the storage of archive data, to provide a back-up of data from both campuses at each location. In 2013, this server room was renovated and upgraded, and based on the success at the Mönchengladbach campus, the fire protection concept using 3M™ Novec™ 1230 Fire Protection Fluid was replicated. This time a Kidde® KD-1230 42 bar system was selected and the larger room space protected by 4 gas cylinders with Novec 1230 fluid, plus a small cylinder for the void floor space protection. As in Mönchengladbach, **the cylinders are stored inside the server room, addressing the need to integrate the fire protection system in the existing building with minimum storage requirements.**

Both server rooms use very early fire detection systems, coupled with fire extinguishing systems to detect and suppress the fire in its incipient stage, therefore minimising damage to server installations and downtime in an emergency.



Minimax MX 1230 fire protection system (42 bar) in the server room on the Mönchengladbach campus





3M™ Novec™ 1230 Fire Protection Fluid used to protect critical assets at Kuwait University

Customer

Kuwait University is one of the oldest educational institutions in Kuwait, yet has dynamic plans for development, and keeping its students at the cutting-edge of scientific advances. To **replace the existing halon fire suppression systems protecting its critical assets**, Kuwait University decided to upgrade to **a new, effective, and more sustainable technology**, while being ‘future proof’ against current and future regulations.

Customer requirements

Kuwait University evaluated the various fire suppression systems available in the market. **Selection criteria included extinguishing performance, maximum safety to occupants, sustainability and long term assurance about system validity.** The system also had to meet space consideration and minimise downtime of operations during both discharge and maintenance.

The system

After carefully evaluating the available agents in the market, Novec 1230 fire protection fluid was selected as the agent of choice. Novec 1230 fluid met all the criteria set by the client, **including limited footprint requirements, fast discharge within 10 seconds and fire extinguishing within 30 seconds after discharge.**

The 3M™ Blue Sky™ Warranty provided Kuwait University with a 20 year warranty against any future environmental regulations, helping ensure **long term peace of mind.**

A spokesperson from Kuwait University comments: “Kuwait University’s vision is to be a national pioneering university with outstanding qualifications in higher education and scientific research. We’re confident that through this upgrade we now have a fire suppression system which is similarly ‘state of the art’ and will provide long term protection of our students and campus.”





Valuable exhibits and dossiers protected with ‘state of the art’ fire prevention & electronic access system

Customer

The Italian client, (whom, for safety reasons must remain anonymous) wanted to **protect significant artefacts and sensitive information** in its archives and warehouses, from both fire and intruders.

Customer requirements

The system they chose **had to be future-proof, reliable, flexible and easy to install and maintain**. It also had to offer good value for the investment, in the short and long term.

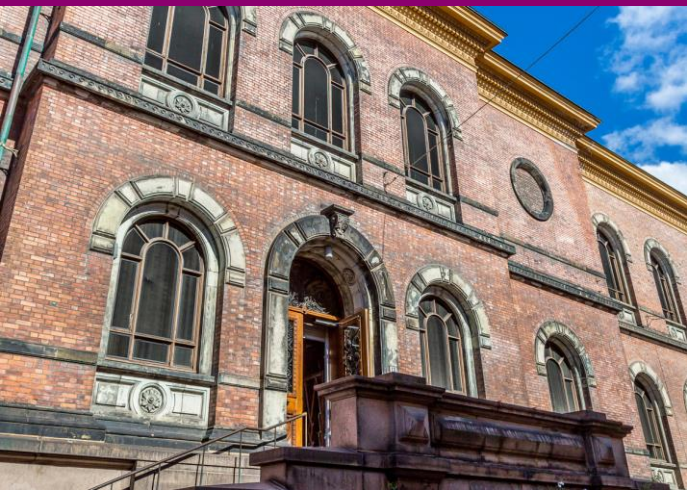
The system

Winning the challenge set by this customer was S.I.A.M. (Solutions for Identity Access Management) Ltd in Aosta. SIAM operates in security, in the field of access control (and in particular, biometrics), strong authentication and encryption data. The company uses technology partners that represent "state of the art" in their respective sectors. For the fire suppression element of this client system they opted for 3M™ Novec™ 1230 Fire Protection Fluid, **due to its strong environmental profile and because it doesn't damage sensitive equipment, media or paper documents**.

For automatic identification of users and control access in and out of the client building, the solution was designed and produced by Elex srl of Turin. The intelligent control system is connected via a LAN for each risk area, and card readers positioned near the archives and warehouses. RFID (Radio Frequency Identification) is used to determine access, and all movements are detected and reported in real time.

In event of fire the systems work in parallel. The access control system **ensures that doors and windows are closed**, enabling **safe and effective extinguishing by Novec 1230 fire protection fluid**, and readmission to the building is prevented until a safe time.





SAPPHIRE® Fire Protection Range including 3M™ Novec™ 1230 Fire Protection Fluid is showcased in 3 key installations in Norway

Customer

The National Gallery, The National Library and Edvard Munch Museum in Norway are home to **thousands of irreplaceable cultural artefacts**, dating as far back as the Middle Ages.

Customer requirements

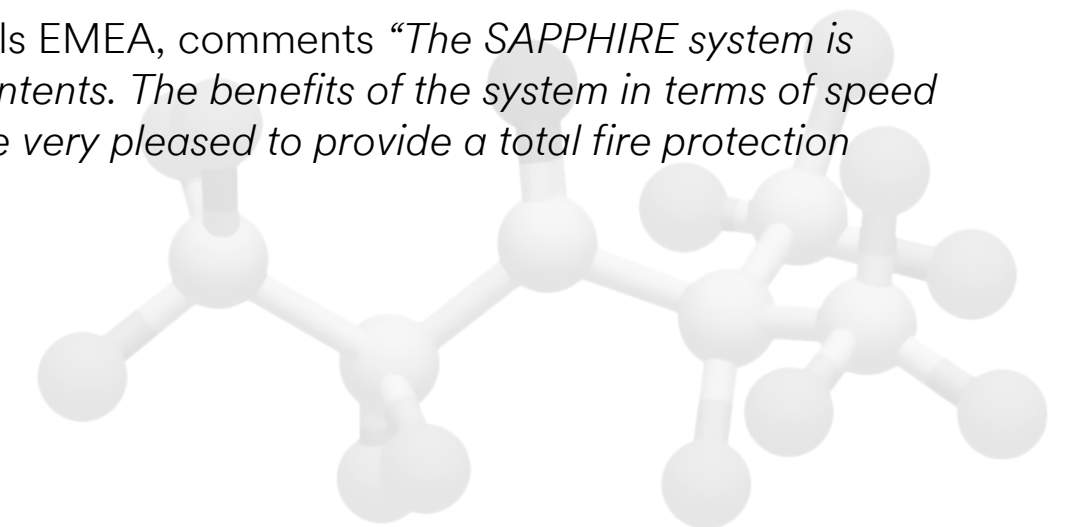
Key to the system specification was **effective protection without damage to building contents**. Speed of extinguishing, **selection of appropriate agent** and **a high safety margin** were also critical, as was sustainability and environmental credentials.

The system

In each project a SAPPHIRE® system from Johnson Controls was installed using Novec 1230 Fluid, **a colourless and odourless agent which behaves like water but evaporates on contact, leaving no residue or dampness**.

This ensures complete **protection for the fragile artefacts within the museums and gallery** which may otherwise have been destroyed or severely damaged by traditional water sprinkler systems.

Alan Elder, Sales Director Engineered and Pre-Engineered Systems, for Johnson Controls EMEA, comments *“The SAPPHIRE system is ideally suited to occupied spaces and buildings that contain valuable or irreplaceable contents. The benefits of the system in terms of speed of suppression, health and safety, sustainability and object protection are clear and we’re very pleased to provide a total fire protection solution for three renowned buildings for Norway’s art and culture.”*





Marine, Oil & Gas

Sustainable Solutions
for Dangerous Jobs.

3M™ Novec™ 1230 Fire Protection Fluid offers sustainability, air shipping, on-site refills and, unlike CO₂, safety in occupied spaces - earning certification by marine approval authorities around the world.



Fire safety assured on-board Viking river cruise line ships, using 3M™ Novec™ 1230 Fire Protection Fluid

Customer

Some 1.8 million Germans set sail on cruise ships each year, making Germany the world's second largest cruise market. Safety on board is critical, and is provided by, among others, Novec 1230 fire protection fluid. The fast-growing Viking river cruise line alone has already **equipped about 40 of its ships with the Minimax® MX 1230 Fire Extinguishing System, using Novec 1230 fluid**. And more new vessels in the Rostock-Warnemünde wharf are currently being planned.

Customer requirements

Safety on board was a vital pre-requisite. Complex technology operates round-the-clock below deck to ensure **the safe operation of the Viking ships**. Unlike CO₂, Novec 1230 fluid is **safe for occupied spaces** and also provides **the widest margin of safety** relative to other clean agents such as HFCs and inert gas systems. This makes it **an ideal solution for boats and ships** where exiting from a protected space may be challenging.

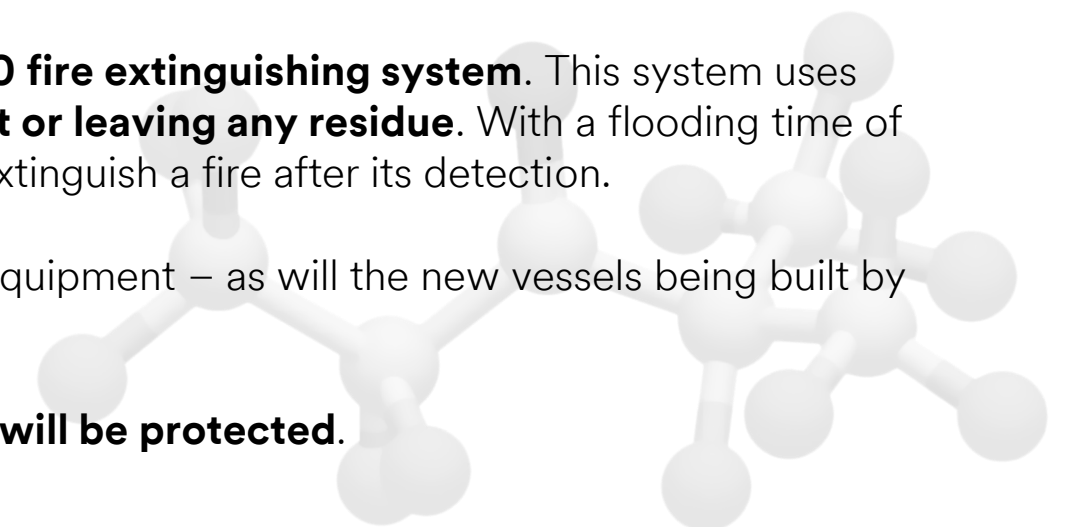
Storage was another consideration, Viking required space-saving in an already constricted engine room. Novec 1230 fluid is stored as a fluid and **requires only one-third of the space that a CO₂ system usually requires** on ships.

The system

As many as **three engine rooms of every river cruise liner are equipped with the MX 1230 fire extinguishing system**. This system uses Novec 1230 fluid which stops fires rapidly **without causing damage to sensitive equipment or leaving any residue**. With a flooding time of around ten seconds and high penetration capacity, the agent takes less than 40 seconds to extinguish a fire after its detection.

Today, Viking's river cruise liners include the MX 1230 fire extinguishing system as standard equipment – as will the new vessels being built by the fast-growing shipping company.

In the future, **not only the engine room, but also the communication and control centres will be protected.**





Costa Cruises upgrades its fire extinguishing system, switching CO₂ for 3M™ Novec™ 1230 Fire Protection Fluid

Customer

Costa Cruises has upgraded the fire extinguishing system on board its Costa Riviera vessels, **completely eliminating use of CO₂ in the process**. At over 48k tons, and standing 216 metres long, the impressive ships are now **protected with a state of the art fire protection system**, which has **a vastly improved environmental profile**.

Customer requirements

Paolo Rossi, Fire Proposal Engineer at Johnson Controls Integrated Fire & Security, managed the project for Costa Cruises and comments on the original customer need:

*“Since this is a ship **constantly in navigation and for long periods of time**, Costa Cruises wanted to install a system that had the minimal impact on both space, and normal customer service. We managed to complete the project **in record time, meaning that Costa Cruises caused no disruption to its passengers**. Unlike a system that uses CO₂ as the extinguishing agent, SAPPHIRE® uses Novec 1230 fluid that compared to carbon dioxide, has the advantage of being **totally safe for people, even if the space is occupied during system discharge**. Novec 1230 fluid is the only fire extinguishing agent not subject to the Regulation on Fluorinated greenhouse gases (F-Gas Regulation).”*

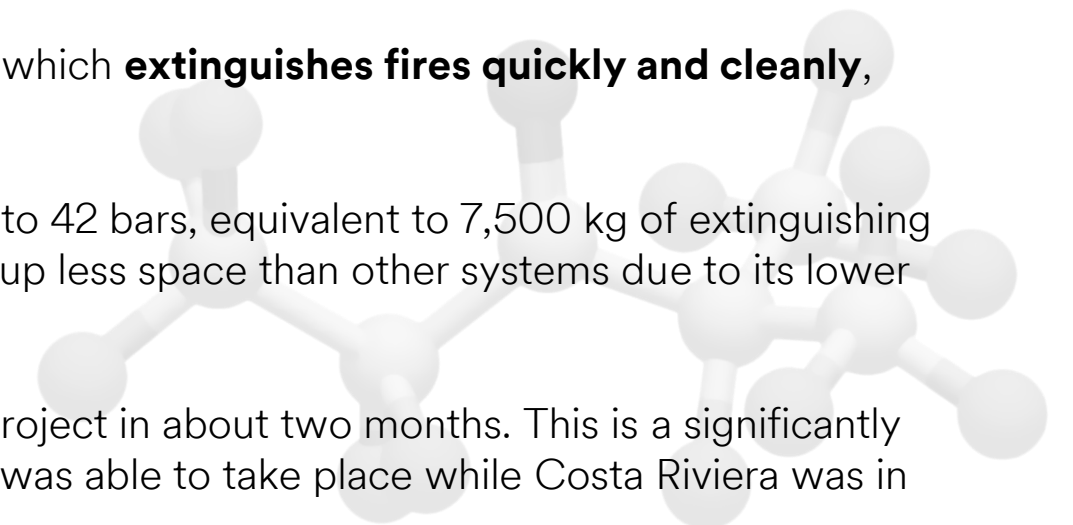
The system

The solution designed by Johnson Controls Integrated Fire & Security uses Novec 1230 fluid which **extinguishes fires quickly and cleanly**, with **no residue or damage to assets**.

The system consists of 65 cylinders with Novec 1230 fluid, with sizes from 147 and 180 litres to 42 bars, equivalent to 7,500 kg of extinguishing agent. The SAPPHIRE system is a bespoke, modular, lightweight design solution which takes up less space than other systems due to its lower pipe length and smaller pipe diameter.

The SAPPHIRE system was efficient and simple to install, Johnson Controls completing the project in about two months. This is a significantly reduced installation time compared to a traditional system, and in fact the system installation was able to take place while Costa Riviera was in navigation, with no disruption for passengers or crew alike.

System installation took only 2 months, and was completed whilst the Costa Riviera was in navigation



3M

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Brand

Aerospace, Military & Transport

3M Science. Applied to Life[™]

All secure. Enhance fire safety while reducing environmental impact.

3M™ Novec™ 1230 Fire Protection Fluid helps protect people and equipment from fire. Non-corrosive and non-conductive, it evaporates cleanly without leaving residue - helping reduce clean-up costs and return aircraft back to service faster.



Northern Ireland Railways puts safety first, while protecting valuable trackside equipment

Customer

Northern Ireland Railways (part of the Translink group) has further enhanced its excellent fire safety profile, by **installing fire suppression systems in 47 trackside signalling and communications rooms.**

Customer requirements

Northern Ireland Railways has relay rooms along its tracks that house all the electronics and electrical equipment **needed to ensure correct network operation: power, signalling, communications, telemetry and CCTV systems.** With an extremely high emphasis on health and safety, the company sought to improve its existing fire risk management and by doing so, set a new benchmark in fire safety within the UK rail industry. It has selected an approach which considers the environmental impact too.

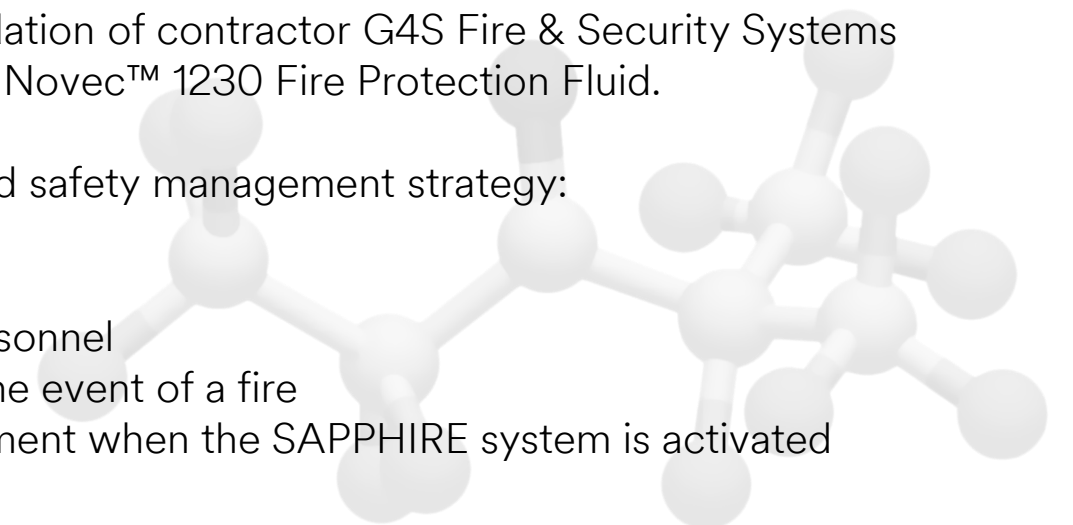
“We now have ... an excellent fire safety strategy in place, one that supports human welfare, protects the network, ensures rapid action and respects the environment too.” says Chris Dunlop, Senior signalling project engineer for Translink.

The system

Following a thorough procurement process, the decision was made to select the recommendation of contractor G4S Fire & Security Systems (UK) to install SAPPHIRE® fire suppression systems from Johnson Controls, which use 3M™ Novec™ 1230 Fire Protection Fluid.

Chris Dunlop reports that the selected system is a good fit for the company’s rigorous risk and safety management strategy:

- **Space conscious design** – small size of SAPPHIRE system is ideal for relay rooms
- **Speed of suppression** – the system controls and extinguishes fire in its incipient stage
- **Personal safety** – Novec 1230 fluid offers a substantial, unrivalled safety margin for personnel
- **Asset protection** – minimal, if any damage to sensitive electronics or critical assets in the event of a fire
- **Ability to remain operational and avoid disruption** – no need to ‘power down’ equipment when the SAPPHIRE system is activated





3M™ Novec™ 1230 Fire Protection Fluid replaces halon at USAF Hush Houses

Customer

The United States Air Force (USAF) had been protecting its Jet Engine Noise Suppressor Test Facilities (Hush Houses) with Halon 1301 for decades. **A hush house is a very large mobile enclosure which resembles an aircraft hanger and is designed for testing aircraft engines in an enclosed environment.**

Customer requirements

In the mid-1990s Halon 1301 was targeted for removal from all USAF hush houses due to environmental impacts. **The Montreal Protocol prompted strict controls over halon discharges**, eventually mandating halon production due to its Ozone Depletion Potential.

USAF worked with Vital Link Inc (VLI), an OEM specialty designer and supplier of aero engine test facilities, and its sub-contractor Hillier Systems to identify **a suitable halon replacement.**

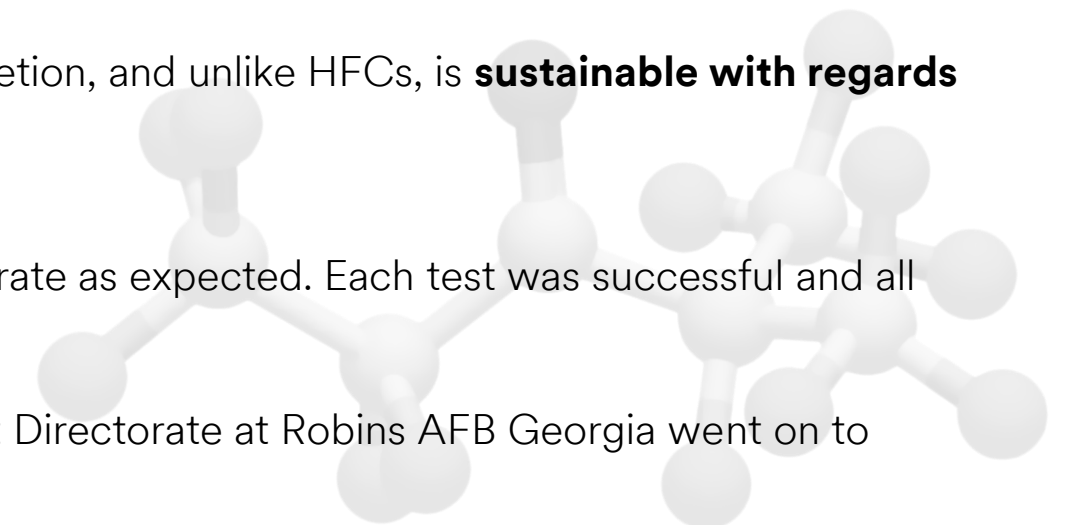
The system

VLI and Hillier studied Novec 1230 fluid and determined it would be an ideal replacement for halon, based on the following criteria:

- Novec 1230 fluid is **an operational equivalent to halon**
- It has **a high margin of safety for occupied spaces**, does not contribute to ozone depletion, and unlike HFCs, is **sustainable with regards to climate impact**
- Novec 1230 can be **stored and shipped in liquid form**, with no shipping restrictions

Stringent live testing was conducted to ensure the system using Novec 1230 fluid would operate as expected. Each test was successful and all test fires extinguished within 30 seconds.

Engineers at the USAF Support Equipment & Vehicles Division of the Aerospace Sustainment Directorate at Robins AFB Georgia went on to select an integrated system solution using Novec 1230 fluid.





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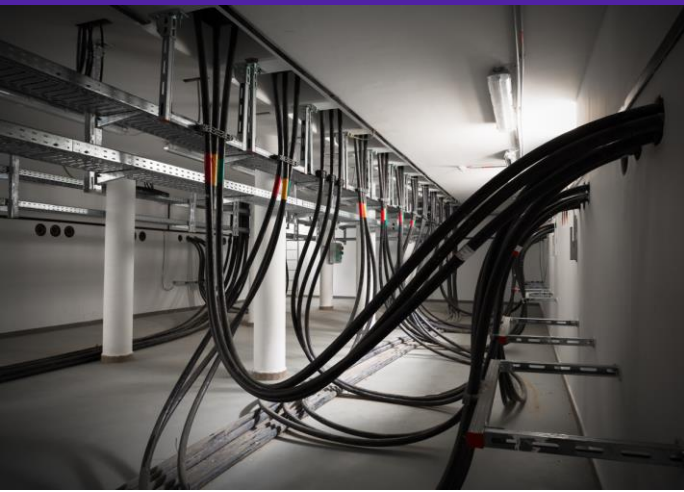


Power Generation & Utilities

3M Science. Applied to Life[™]

Power Generation & Utilities

Help protect critical systems in generating facilities, substations and control rooms with **3M™ Novec™ 1230 Fire Protection Fluid**, engineered to keep vital equipment and workers safe from fire.



Iberdrola™ chooses 3M™ Novec™ 1230 Fire Protection Fluid for substation

Customer

As part of a €400 million investment, the Spanish electrical supply utility, Iberdrola, installed **17 new electrical substations in the city of Madrid in 2013**. The local government of Madrid had previously presented electric power utility Iberdrola with a new decree – the Electricity Supply Law, following a series of blackouts in the Spanish city of Madrid, many of which were caused by substation fires. The legislation sought to protect consumers against supply interruptions and mandated that **substations should be equipped with efficient fire extinguishing systems**.

Customer requirements

To meet these requirements, Iberdrola developed an investment plan that involved the construction of 17 new substations in the Madrid area. This plan, **the largest ever implemented by Iberdrola** in a major city, put all of the substations and other electrical distribution facilities underground, thereby freeing up more than 355,000 square meters of surface space for other uses such as the construction of houses and offices.

Iberdrola proudly claims to supply the cleanest energy on the planet, and therefore **sustainability was a vital consideration in choosing the right fire protection system**.

The system

Iberdrola conducted a full-scale evaluation to determine the best alternative for the applications. Among the list of potential alternatives were water mist, foam and CO₂.

Presented with the multiple benefits of Novec 1230 fluid, backed by the reassurance of the unique 3M™ Blue Sky™ Warranty, Iberdrola decided that **it was the only clean extinguishing agent that would meet its requirements in terms of both extinguishing and environmental performance**. As a result, fire protection systems using Novec 1230 fluid have been installed in all seventeen of the new Madrid substations.

Similar systems using Novec 1230 fluid are also now being used at many other Iberdrola locations throughout Spain.



13 Saudi GIS Substations protected with 3M™ Novec™ 1230 Fire Protection Fluid

Customer

SAS Systems Engineering were selected **to supply and install fully integrated fire protection systems for thirteen 132kV substations** throughout the Kingdom of Saudi Arabia.

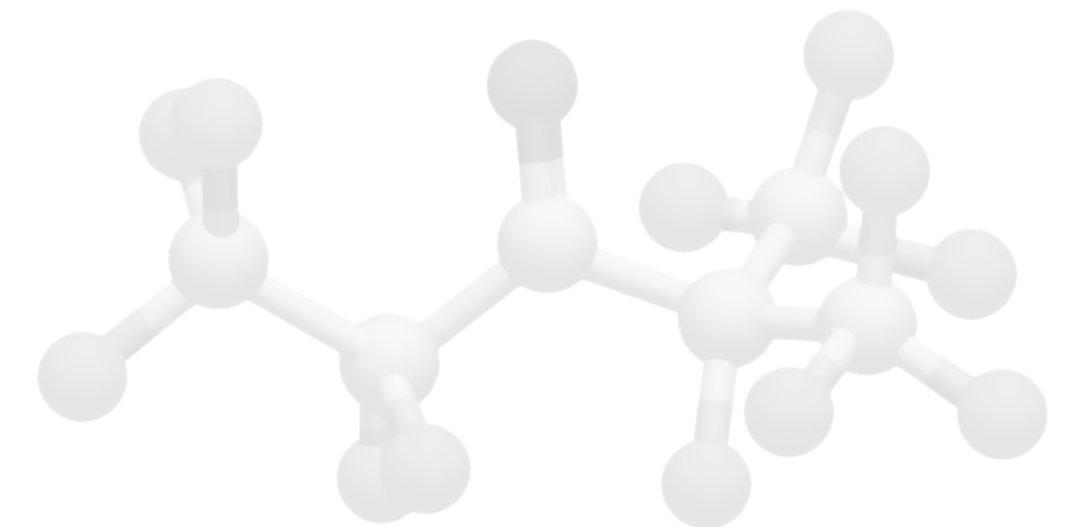
Customer requirements

The Riyadh team were awarded the contract by Al-Babtain Contracting Company, a market leader with an excellent reputation in the construction of 132kV substations throughout Kingdom.

The scope of work **included the design, supply, installation, testing and commissioning of all fire alarm, fire detection and firefighting systems** required for the project, including the Novec 1230 fluid systems plus portable fire extinguishers.

The system

The challenging aspect of this job **was to deliver and execute in parallel the entire implementation of the 13 substations located in various locations**, mainly Riyadh, Al-Qassim and Ad-Dawadmi.





Power Industry Upgrades: Building code variances open doors to safer fire suppression

Customer

In 2011, responding to concerns about worker safety, a major power company subsidiary in the US servicing 3.5 million customers received the green light on a variance request with their local Committee on Building Standards and Tests to install an alternative fire suppression system. **The granted variance allows the use of 3M™ Novec™ 1230 Fire Protection Fluid for fire protection in addition to the previously approved use of water or CO₂ systems.**

Customer requirements

The safety of human lives was the main driver for the power company to pursue the variance and ultimately led officials to choose a system utilising Novec 1230 fluid **after carefully evaluating safety, sustainability, and effectiveness of all of the potential alternatives.**

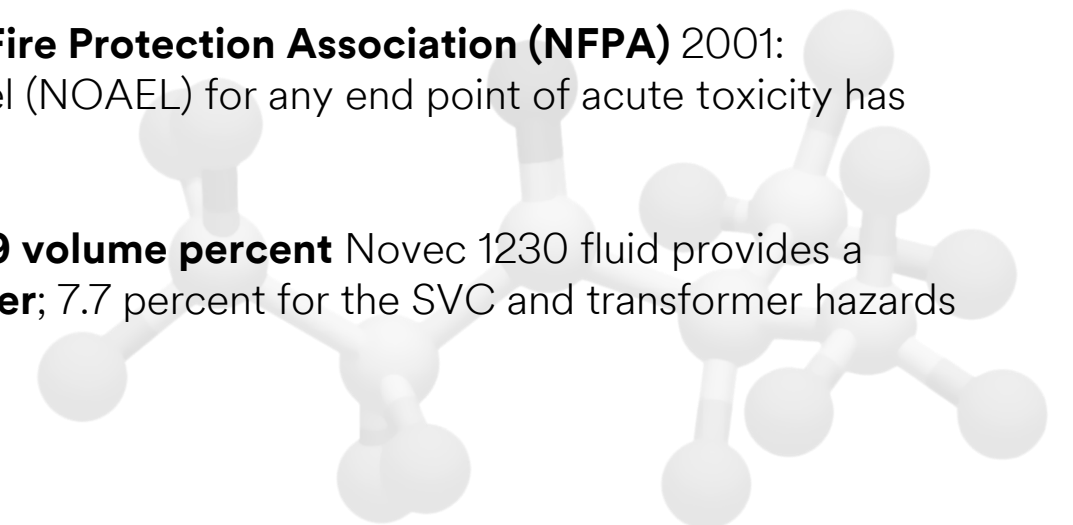
Performance was also a key consideration, with Facility Managers seeking assurance that Novec 1230 fluid was **an effective agent to extinguish transformer fires.** Novec 1230 fluid underwent **a series of rigorous tests, which yielded positive results.** In particular, it **quickly extinguished fires from transformer mineral oil and prevented dangerous re-flashing (reigniting)** in the enclosed and volatile area.

The system

Novec 1230 fluid has **the highest safety margin of any clean agent listed in the National Fire Protection Association (NFPA) 2001: Standard on Clean Agent Fire Suppression Systems.** The No Observable Adverse Effect Level (NOAEL) for any end point of acute toxicity has been determined to be 10 volume percent in air.

With a **NOAEL of 10 percent**, and **typical design concentrations in the range of 4.5 to 5.9 volume percent** Novec 1230 fluid provides a margin of safety that enables power companies **to safely specify concentrations a bit higher;** 7.7 percent for the SVC and transformer hazards and 5.6 percent for all other areas, and **still preserve a substantial margin of safety.**

Novec 1230 provides a margin of safety that enables power companies to safely specify higher concentrations





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Customer

Sustainable fire protection for QINOUS smart energy storage

QINOUS is a Berlin-based **renewable energy storage specialist and provider of smart energy storage solutions**. QINOUS develop microgrid storage systems for solar and wind energy in an average power range of 30–2000 Kilowatts. These microgrids can connect and synchronise to other power grids, or can operate independently in ‘island mode’, as required by physical or economic conditions. **QINOUS has recently started using 3M™ Novec™ 1230 Fire Protection Fluid in its systems as its fire protection solution.**

Customer requirements

A fire protection system with Novec 1230 fluid can be used to protect the compartment with the battery trays, converter and the control systems. Novec 1230 fluid met all the criteria required by this application, **including space-saving, fast discharge within ten seconds and rapid, clean fire extinguishing**. Joseph Theune, Systems Engineer at QINOUS explains: **“A fire protection system with Novec 1230 fluid offers the required personal safety and the agent itself is inert and does not damage the materials in the container.** Fire protection systems with Novec 1230 fluid will be our solution in cases where our customers request fire protection”. With the highest environmental profile of synthetic clean agents available today, Novec 1230 fluid was an obvious choice to complement QINOUS’s smart energy solutions.

The system



The QINOUS energy storage systems are housed in standard ISO 20 feet or 40 feet shipping containers. The outdoor cabinet is made of a vandalism-proof, double wall, aluminium structure and state-of-the-art thermal insulation material to withstand the harshest of climates. The interior is separated into two sections. One section is completely airtight, preventing deterioration effects from dust, salt mist, insects or humidity. The other compartment houses the heat exchanger, the AC system and the transformer.

The fire protection system is not used to extinguish a battery fire, since the installed battery management system and the passive safety mechanism protects the container from battery fires and prevents thermal runaway. **The fire protection system using Novec 1230 can instead be used to protect the control system and inverter. Fires in the incipient stage are rapidly extinguished through the removal of heat, avoiding spread of fire to the battery racks.**

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Other markets

3M™ Novec™ 1230 Fire Protection Fluid can be used in any industries where customers need to protect against fire whilst also safe-guarding valuable assets.

From manufacturing sites to chemical plants, from racing cars to call centres...

Novec 1230 fluid offers a smart, safe and sustainable solution our customers can trust.



Fire protection for PCC Rokita SA, the largest chemical facility in Lower Silesia, Poland with 3M™ Novec™ 1230 Fire Protection Fluid system

Customer

Based in Brzeg Dolny, PCC Rokita SA is **the largest chemical facility in Lower Silesia** supplying specialised products to various industries. **The accumulation of hazardous materials potentially incurs the risk of a serious industrial breakdown and a major environmental hazard.** But this risk has successfully been diminished, with safety and sustainable development among the company's top priorities.

Customer requirements

PCC Rokita participates in the **Responsibility Care Programme and the SPOT – System of Hazardous Materials Transport Assistance** (as one of 12 entities in Poland and the only one in Lower Silesia). Specialists working in the plant provide training and support to emergency services for chemical failure clean-ups. In 2009 they invested in a production plant to manufacture chlorine by membrane electrolysis. **Maximum fire protection became an obvious 'must', as any downtime would entail significant financial loss.**

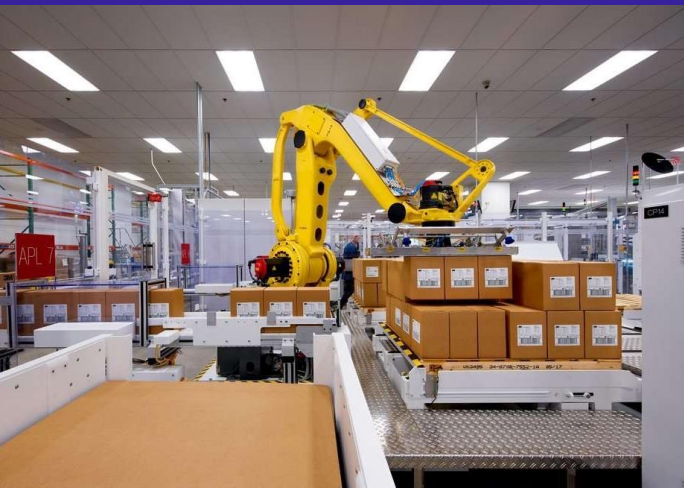
The system

When selecting a fire suppression system, **the primary objective was effectiveness.** At the same time, **it was important that the extinguishant did not damage the devices in the protected rooms.** All these conditions were met by Novec 1230 fluid, which has **no adverse effect on the efficiency of the electrical devices, nor leaves any deposits or residue.**

The fire suppression installation in PCC Rokita was effected by Kidde® Polska.

*“The most challenging task for us here was **to secure the installation against aggressively corrosive environment.** We **used an innovative solution of encasing the fire suppression systems in overpressure-encapsulated cabinets,**”* describes Grzegorz Probe, PCC Rokita Project Manager from Kidde. *“After four years, the effectiveness of this solution is obvious.”*

*“We have also conducted **our own tests at the premises.** The results were positive. Novec 1230 **guarantees zero adverse effects on the environment,** which perfectly matches PCC Rokita SA's environmental policy”* says Łukasz Starczewski, Prevention Specialist in PCC Rokita



3M™ Novec™ 1230 Fire Protection Fluid based system provides business continuity for large snack-food manufacturer in New Jersey

Customer

A multi-national corporation that has multiple business segments ranging from manufacturing one of America's favourite chocolate bars to providing information technology services.

Customer requirements

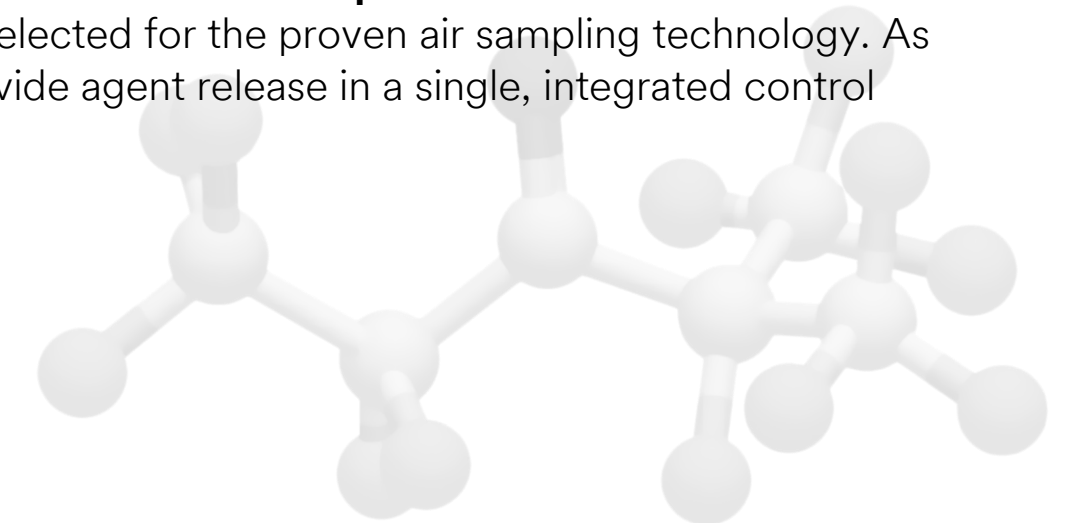
The current fire suppression system protecting the main computer for the Information Technology segment was being phased out, and **the client wanted to replace their old fire protection system with today's newest technology.**

Having used Halon in the original system, the client wanted **to ensure that the agent chosen for this system upgrade would fit a higher environmental standard.** The client turned to Fenwal™ to advise them on the best solution for their application.

The system

The existing Halon suppression system was replaced with a Fenwal Engineered Suppression System designed for use with Novec 1230 fluid. **The new room required nine cylinders total: seven large-bottom discharge cylinders for the above-floor space and two for the sub floor space.** For detection, two AnaLASER™ II High-Sensitivity Smoke Detectors (HSSD®) were selected for the proven air sampling technology. As a control device for the system, a FenwalNET 2000 was selected to monitor, detect and provide agent release in a single, integrated control package.

The result? **Integrated system configuration, with 24/7 system monitoring and control.**





NASCAR® driver protected by 3M™ Novec™ 1230 Fire Protection Fluid based system as standard in the No. 16 Ford Fusion

Customer

In 2013 the No. 16 3M Ford Fusion was **the first racecar to incorporate a sustainable fire suppression fluid**, using Novec 1230 fluid from 3M.

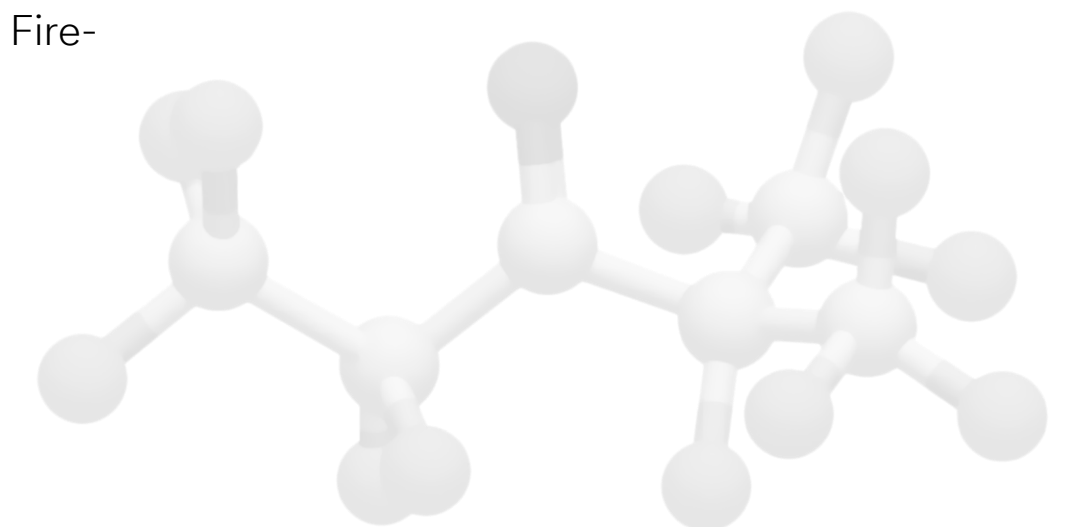
Customer requirements

Novec 1230 fluid balances **performance requirements with favourable environmental and safety properties**, giving driver Greg Biffle **added reassurance and peace of mind**.

Novec 1230 fluid **is a clean extinguishing agent that is stored as a liquid but is discharged as a gas that leaves no residue**. The fluid **does not damage sensitive electronics or equipment** in the racecar and provides **a wide margin of safety** if deployed in an enclosed area near Biffle. It also does not affect the surface of the racetrack, keeping it clean for other drivers.

The system

Metalcraft, Inc., an international leader in fire suppression, equipped the cockpit of the No. 16 3M Ford Fusion with its Fire-Trak™ branded fire suppression system using Novec 1230 fluid. The Fire-Trak system and 3M's Novec 1230 fluid received NASCAR approval in 2012.





911 call centre in the US relies on 3M™ Novec™ 1230 Fire Protection Fluid to protect against its own emergency

Customer

A 911 call centre in one of the largest metropolitan areas in the US invested in a new clean agent fire suppression system using Novec 1230 fluid.

Customer requirements

Data, processing and communication equipment pose significant risks for fire, and this risk is even higher in a technologically dense environment like a 911 call centre.

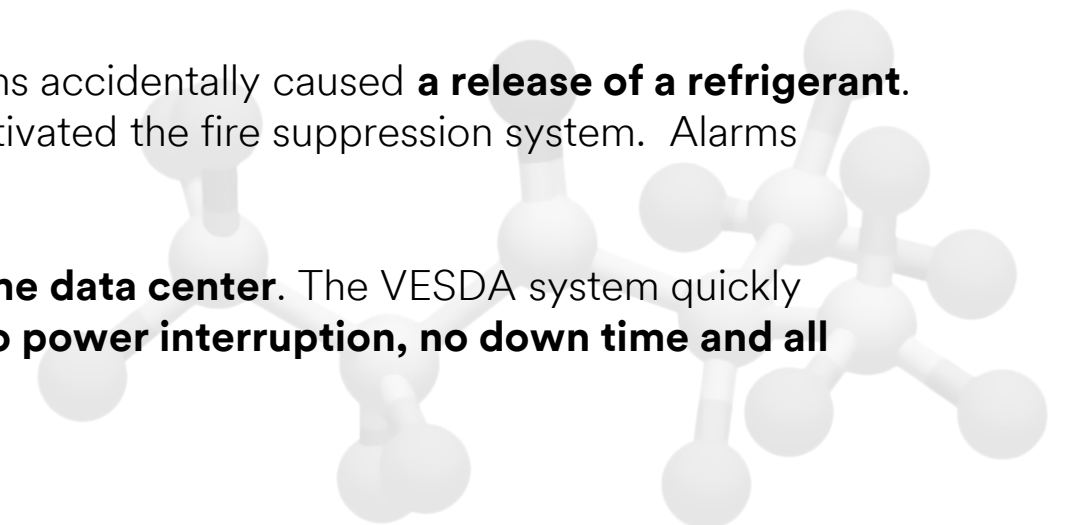
Minimising business disruption and danger to staff in the event of a fire were critical considerations for the 911 call centre, so the staff **can continue to respond to emergencies** in the community. Novec 1230 fluid quickly extinguishes the fire at the incipient stage, **typically allowing the facility to remain in continuous operation, even during a fire event.**

The system

Since installation **there have been two events that have put the fire protection system to the test.**

Firstly when a technician replacing refrigerant for one of the cool aisle air conditioning systems accidentally caused **a release of a refrigerant.** The release activated the Very Early Smoke Detection Apparatus (VESDA™) which in turn activated the fire suppression system. Alarms sounded, **Novec 1230 fluid was discharged and an evacuation occurred.**

The second incident involved an electrical power surge that **burned a surge suppressor in the data center.** The VESDA system quickly detected the fire, which activated the fire suppression system. In both instances there **was no power interruption, no down time and all systems remained completely operational.**





3M™ Novec™ 1230 Fire Protection Fluid selected to protect all broadcasting outlets across Saudi Arabia

Customer

Saudi Broadcasting Corporation (SBC) is a government authority organised under the Ministry of Culture and Information, responsible for all media in Saudi Arabia. **SBC operates almost all broadcasting outlets in the Kingdom, including approximately 82 TV stations and more than 18 radio stations.** It is considered one of the fastest moving organisations in Saudi Arabia.

Customer requirements

Originally all **SBC premises were protected by halon systems but in 2005 the SBC started to seek a more sustainable solution.** Ahmad Abdulftah Bugis, Director of Power and HVAC projects in the Engineering Affairs department at SBC, comments:

“Sustainability was the main deciding factor when it came to upgrading our fire protection systems. **We were keen to work with safe agents like Novec... it’s really important to participate in environmental issues.**”

Space saving is a further benefit realised by SBC. **Since Novec 1230 fluid is stored as a liquid rather than a gas, it requires significantly less cylinders than a comparable inert gas or CO₂ based system.**

The system

After evaluating various options including FM-200™, CO₂ and chemical powders, SBC eventually selected Novec 1230 fluid as the standard fire protection agent in all new SBC buildings. Mr Bugis has also been overseeing the process of retrofitting older halon systems with systems using Novec 1230 fluid, a significant undertaking considering the scale of SBC’s assets.

“Some of our systems are over 25 years old” says Mr Bugis “Several systems were replaced but some of them are original. We are planning the retrofit in steps, over a 5 year schedule which is still ongoing. **Compatibility with existing facilities is a really important consideration. When we plan the retrofit I seek to make the least changes to the system, for example, the pipes, the sprinklers. Of course the large items need to be changed, but costs of installation can be reduced where the system compatibility is high.**”

As the retrofit project continues, Mr Bugis is satisfied that SBC has invested in a future-proof fire protection system. “We considered other fire protection solutions but I’m convinced about the benefits of Novec 1230 fluid, I think this is still the safest option. The installation is going smoothly so far and **I’m pleased to have invested in a system that will stand the test of time**”.



An SBC radio station control room



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