

Case study

Industry Sector Building Technologies Division

Copenhagen, June 10, 2010

Siemens Provides Optimum Protection for Irreplaceable Documents

Denmark's Royal Archives trust Sinorix H₂O Gas

Tailored solutions for special requirements: The National Archives of Denmark in Copenhagen relies on the fully automated Sinorix H₂O Gas extinguishing system from Siemens for extinguishing fires. The system, based on a combination of water and nitrogen, extinguishes both open as well as smoldering fires quickly and reliably without damaging the valuable documents.

The Royal Archives of Denmark are partly located in a historic building almost 400 years old that once belonged to the royal palace. Since it was founded, the archives have housed valuable documents of the Danish authorities including maps, registers of baptisms, census documents, business records, and other unique documents and files.

"The worst thing that can happen in an archive," said Jan Pedersen, Administrative Security Officer of the Danish Royal Archives, "is not a theft, even if there is a high risk of that. Things that are stolen always find their way back somehow. Fires are really terrible, however, because then our valuable inventories are lost forever, never to return." Jan Pedersen clarified, "Fires are devastating in two respects: The fire itself causes a great amount of damage to the documents collected here, but the water used to extinguish the fire can be just as damaging."

Special situations require a tailored fire safety concept

The Building Technologies division of Siemens and the Royal Archives had several problems to solve in their search for the appropriate fire safety solution. First, a large number of irreplaceable documents were to be protected, of course. Next, the existing building structure had to be taken into consideration – the historically valuable building could only be adjusted structurally to a limited extent. Finally, there was only a small amount of space available, which is why the system had to be precisely adapted to the existing conditions.

After a thorough risk assessment and comprehensive tests, the Royal Archives selected the Sinorix H₂O Gas extinguishing system from Siemens. This system was selected particularly because it could be precisely tailored to the specific requirements of the archives, enables fires to be extinguished quickly and absolutely reliably, and its special fine spraying technology minimizes subsequent damage to the irreplaceable documents from the extinguishing.

More effectiveness through nitrogen and water

A fire can only burn as long as it has enough oxygen, heat, and combustible. If one of these components is removed, the fire cannot develop and it dies out. Automated extinguishing systems such as Sinorix H₂O Gas function on a principle based on this physical principle. Depending on the risk of fire and the application, different agents are used for extinguishing a fire such as water (e.g. sprinkler systems), gaseous extinguishing agents (chemical or natural gases), or a combination of water and gas (e.g. water mist). Water primarily cools the flammable material and ambient air, preventing the fire from spreading rapidly. The natural gaseous extinguishing agents primarily work by depriving the fire of oxygen (inertization) in the protected area, while the chemical gaseous extinguishing agents primarily reduce the heat in the fire.

Sinorix H₂O Gas combines the natural extinguishing agent nitrogen and water for a dual effect that quickly and reliably extinguishes the fire. While the nitrogen reduces the concentration of oxygen in the flooding zone, extinguishing the fire immediately, the water mist lowers the temperature to a level below the point where the flammable material could ignite again.

When discharged, both extinguishing agents are carried by the same piping network and are distributed by the same nozzles to the flooding zone. The nitrogen also serves as a propellant for the water and ensures a moderate and equal distribution. Already by using small amounts of water, the water mist mixture cools down overheated equipment and surfaces providing additional protection. The water mist also reduces the risk of the fire igniting again.

Thanks to the use of the fine spraying technology, exposed surfaces are coated with only a very thin layer of water – so thin that it is not damaging sensitive documents in the archive or poses a risk even to electronic devices because it evaporates within a matter of minutes. Toxic fumes from the air are removed and the room can be quickly ventilated through a ventilation system or windows. The natural extinguishing agents nitrogen and water are safe for the environment and people¹.

¹ Earth's atmosphere consists of around 78 percent nitrogen and around 21 percent oxygen. A fire dies out if the amount of oxygen falls below 13 percent by volume, but it is not a dangerous level for the people present.

Comprehensive fire safety solution for the Royal Archives

Today, the Danish Royal Archives are protected by a comprehensive fire safety solution from Siemens. The system is comprised of four fire control panels and 344 intelligent smoke detectors, two of them aspirating smoke detectors. In addition, there are 39 strategically located manual call points. In addition to the storage rooms for the documents, the offices and other rooms are also monitored.

The Sinorix H₂O Gas extinguishing system for the document storage rooms encompasses 14 flooding zones with a total of 160 extinguishing cylinders with nitrogen and water. In addition, two Sinorix N₂ systems were installed for the IT rooms.

All of the components of the solution are managed via a MM8000 danger management system from Siemens.

Learn more about Sinorix H₂O Gas at www.siemens.com/sinorix

Learn more about fire safety solutions from the Building Technologies division of Siemens at www.siemens.com/firesafety

Technical details for Sinorix H₂O Gas	
Extinguishing agents	Nitrogen (N ₂) and water (H ₂ O)
Nozzle pressure	10 – 60 bar
Droplet speed	50 – 150 m/s
Droplet size	10 – 50 µm
Coverage from each nozzle	30 m ²
Piping network	Galvanized steel pipes, designed for 60 bar operating pressure
Applications	Fire classes A, B, C
Flooding time	60 – 120 s
Approval	VdS (S307002)

Optimum fields of application for Sinorix H₂O Gas

Typical fields of application for Sinorix H₂O Gas are archives and libraries because Sinorix H₂O Gas is best suited for extinguishing smoldering fires as well as preventing reignition common with books and documents. Further applications are closed areas like vaults and UPS systems as well as rooms for machines and technical equipment, storerooms for flammable liquids, cable ducts and false floors, and also closed transformers and generators.

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The **Siemens Building Technologies Division** (Zug, Switzerland) is the leading provider of safe and energy-efficient buildings ("Green Buildings") and infrastructures in the world. As a service provider, system integrator and product supplier, Building Technologies provides building automation, HVAC technology, fire prevention, security, electrical installation technology and low-voltage energy distribution. With approx. 43,000 employees worldwide (as of September 30th 2009), Building Technologies achieved a turnover of around 7.0 million euro in 2009. www.siemens.com/buildingtechnologies