



# Comprehensive Fire Protection with OxyReduct® TITANUS® VisuLAN®

Reference solution  
Data centres



Dependable fire prevention  
to protect data at the seat of  
government of Lower Saxony  
in Hanover

## THE CUSTOMER

The State Parliament of Lower Saxony in Hanover relies on fire prevention from WAGNER in its newly built underground IT centre.



State politics at the historical Leineschloss in the heart of Hanover

**The State Parliament of Lower Saxony has been housed in the Leineschloss (Leine Palace) in Hanover since 11 September 1962. The building in the heart of the city has been through many changes in its eventful history. Over the ages, it has served as a monastery, palace, seat of government, almshouse, hospital, school, mint, warehouse, barracks, soup kitchen and museum.**

Originally built as a ducal residence in 1637, the palace has been converted and added to many times over the centuries, turning it into a large complex of buildings with architecture that is anything but

uniform. The air raids over Hanover in World War II ended up burning the Leineschloss down to its outermost walls. After the City of Hanover waived its right of use in 1949, reconstruction was commenced in 1956 so that the premises can now be used to house the State Parliament of Lower Saxony today.

### **Present-day politics behind historical walls**

As the supreme constitutional body of the federal state of Lower Saxony, the State Parliament (Landtag) passes state laws, determines the state budget and elects the minister president. It also assists in forming the government and controls the federal state government of Lower

Saxony. Representatives from all over the state meet at the Leineschloss for plenary and committee meetings and caucuses. In addition to the offices of the individual political groups' employees and the state administration, the state parliament building also houses the plenary hall and many other assembly halls, a library and reading room, a public art forum and the study for the head of the state parliament, which is steeped in history in its location in the winter garden of Queen Friederike of Hanover.

## RISK ANALYSIS

The first priority: ensure that the important electronic data of the state of Lower Saxony remain available at all times.



Invisible to the outside world, a network of communication lines converge at the state parliament's underground data centre. Vast amounts of data must be processed and secured here in order to make sure the state government's business operations keep running. This means it is very important to have an effective IT infrastructure which is available at all times without interruption. So when the new data centre was established in 2011, a comprehensive fire prevention concept was required to ensure IT security and availability.

### **Accurately estimate the extent of damage**

An IT failure at the State Parliament of Lower Saxony would severely disrupt internal and external procedures or even shut down administrative operations and political group activity altogether. The data centre is crucially important and irreplaceable meaning any financial or

non-financial loss caused by fire could be disastrous. And this does not only apply to the data centre as a whole – the same holds true for the individual server racks and components it holds. For this reason, great effort was put into designing an effective IT infrastructure which would ensure maximum availability and uninterrupted operation.

### **Risk of fire in the data centre**

Faults in electrical equipment, line terminals and connections, overload and short circuit protectors and cable lines (see VdS2837) are

bound to happen – and any could cause a fire. The ordinary components used (such as cable insulation, circuit boards, housings, false floors, insulating materials, etc.) contain a wide variety of flammable materials which add up to form a considerable fire load in a data centre. In a worst-case scenario, a fire could result in the loss of important, irreplaceable data, as well as the entire infrastructure itself.

## THE PROTECTION OBJECTIVE

### **Prevent IT infrastructure failures caused by fire at any cost.**

**The objective for protecting the Lower Saxony State Parliament's data centre is to ensure that the high level of IT availability desired will still be maintained if fire breaks out. In order to achieve this, it is essential to:**

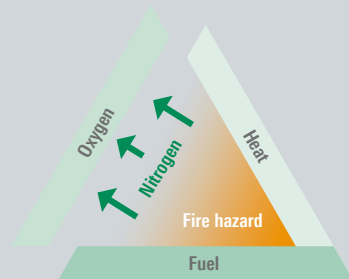
- prevent fires in the data centre to the greatest extent possible.
- detect any fire that still manages to form (due to undesired energy input or malfunctions in one

**or more components, for instance) at the earliest possible stage (ideally during the pyrolysis phase).**

- take suitable counter-measures following early detection, if necessary.
- guarantee that the data centre remains available during the entire event.
- ensure that the data centre is fully accessible to personnel during normal operation.

## THE SOLUTION

Pro-active fire prevention at the IT centre of the Lower Saxony State Parliament.



### The principle behind fire prevention via oxygen reduction

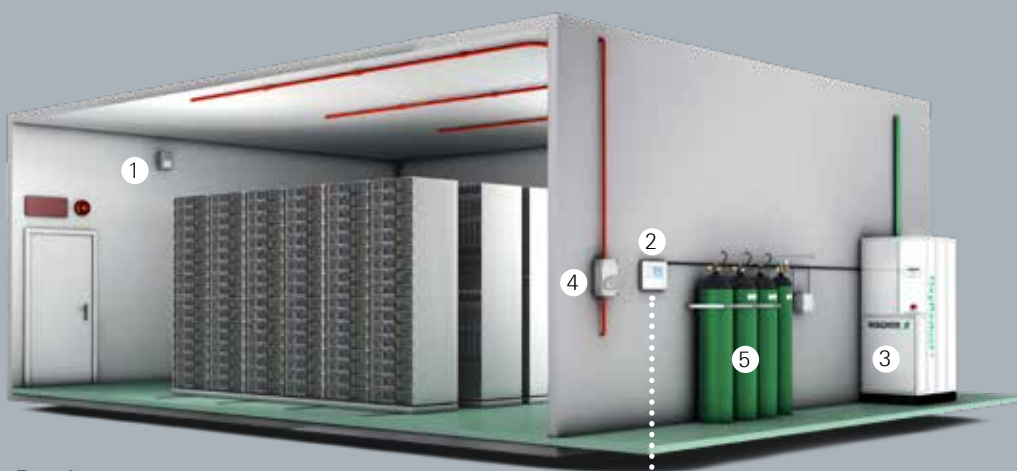
The controlled introduction of nitrogen is used to reduce the oxygen content in the protected area and thus alter the oxidation/combustion process. The reduced oxygen concentration is adjusted based on the individual ignition thresholds of the main materials present.

An OxyReduct® system makes up the core of this fire protection system. The active fire prevention system is able to prevent a fire from forming and spreading at a normal operating oxygen concentration of 17 % vol., while the data centre is simultaneously monitored at all times by a TITANUS® air sampling smoke detector for earliest possible fire detection. If a fire is detected, malfunctions in the IT equipment can be ascertained and the oxygen concentration can be reduced further (to 14.6 % vol.), so that any fire which still managed to form cannot spread any further.

### Atmosphere with reduced risk of fire

A fire requires sufficient amounts of heat, oxygen and fuel in order to form. Only one of these three factors needs to be changed in order to alter the oxidation/combustion process. OxyReduct® relies on the principle of oxygen reduction. It uses a controlled nitrogen feed to displace the oxygen and lower its concentration in the protected area. Nitrogen and oxygen are natural parts of the atmosphere and the slightest change to their proportions will have a significant effect on fire behaviour.

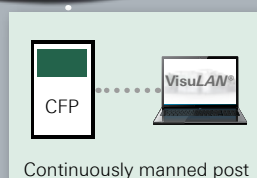
## SAMPLE SYSTEM IN DATA CENTRE



### Function

The OxyReduct® fire prevention system reduces the oxygen content in the protected area to a constant 17 % vol. and maintains it at this level.

If the TITANUS® air sampling smoke detection system detects signs of fire, the CFP is notified and nitrogen cylinders are used to initiate quick release to an oxygen level below 14.6 % vol.



### Fire protection solution with OxyReduct® fire prevention system and TITANUS® air sampling smoke detection system

The OXY-SENS® oxygen sensor **1** continuously monitors the oxygen content in the protected area and transmits this information to the control panel. **2** This controls the oxygen concentration maintained by the OxyReduct® fire prevention system. **3**

The TITANUS® air sampling smoke detection system **4** detects the earliest signs of a fire forming. Nitrogen for the quick release process is supplied from cylinders. **5**

The central fire panel (CFP) is connected directly to the VisuLAN® risk management system so that all of the safety systems can be viewed, monitored and controlled from a central location.

Reducing the oxygen content will deprive a potential fire of the air it needs to “breathe”, thus creating an atmosphere in the data centre which prevents the fire from spreading normally. The nitrogen required to reduce the oxygen content is taken directly from the ambient air on site with the help of membrane technology. The ignition thresholds of the substances and materials in the protected area are also critical factors in the development of a fire. The oxygen concentration is defined based on the materials which are typically found in IT systems (the oxygen level in the IT facility is reduced from the normal 20.9 % vol. to below 14.6 % vol. in accordance with VdS Guideline 3527). In order to ensure that the area remains freely accessible to personnel, the oxygen content in the data centre is only reduced to 17 % vol. and the OxyReduct® oxygen reduction system is combined with a quick release feature which further reduces the oxygen concentration to levels below 14.6 % vol. in the event of fire. However, the risk of fire is already dramatically lower at an oxygen concentration of 17 % vol. – and personnel can still access the data centre freely.

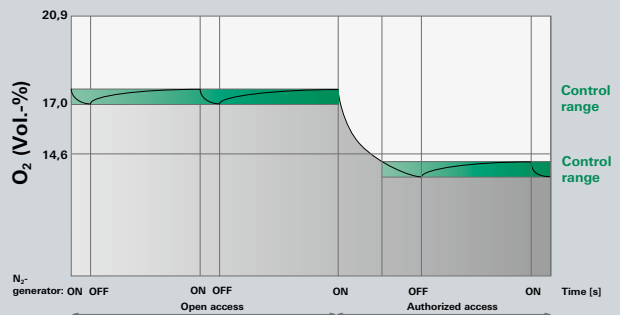
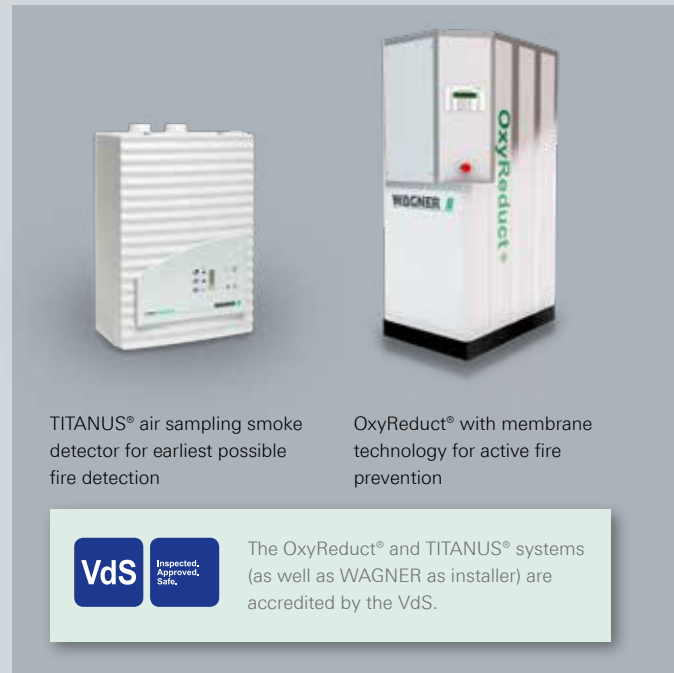
## Continuous monitoring

In order to safeguard the protected areas with absolute dependability, the fire prevention system was supplemented by a highly sensitive TITANUS® air sampling smoke detector (in accordance with DIN EN 54-20 Class A), which was installed directly in the IT centre as well as in the wiring enclosures and cable ducts. The system continuously monitors the ambient

air in the protected areas and can reliably detect fires in the pyrolysis phase – when the smoke is not yet visible and the fire is in such an early stage of development that it cannot yet be detected by conventional smoke alarms. Two grams of material undergoing pyrolysis within 180 seconds are all it takes to set it off. In a data centre, this could be caused by something as minor as the slightest smouldering of a cable.

## Quick release if smoke is detected

As soon as the formation of a potential fire is detected, countermeasures can immediately be taken to contain the fire and prevent it from growing. The fire protection concept used in at state parliament includes quick release, which means that additional nitrogen is fed in from bottles to further reduce the oxygen content in the data centre to levels below 14.6 % vol., thus ensuring a safe environment within minutes. Even at such levels, the rooms can still be accessed by persons who have undergone occupational health examinations, so that they can begin troubleshooting or take any safeguarding measures which may be necessary. Except for the components which were automatically disconnected due to a short circuit or power surge, the rest of the IT equipment will remain available without having to be disconnected from the power. Another advantage in emergencies: networking with the VisuLAN® fire risk management system means that all systems and necessary safeguarding measures can be controlled centrally during emergencies.



The OxyReduct® fire prevention system reduces the oxygen concentration to 17 % vol. If the TITANUS® early smoke detection system detects any products of pyrolysis, it uses quick release to lower the oxygen level to less than 14.6 % vol.

## Summary

The combination of cutting-edge fire prevention technologies provides the Lower Saxony State Parliament’s data centre with an ideal fire protection solution which meets the customer’s required protection objectives in every way. The concept thus guarantees dependable fire prevention, unrestricted access to personnel and uninterrupted availability of the IT centre to maintain the technical communications procedures at the state parliament.

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WAGNER sets standards in fire protection – with innovative and comprehensive solutions

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### Fire detection and alarm systems

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Very early fire detection systems (TITANUS®)

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Active fire prevention (OxyReduct®)

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Fire extinguishing (FirExting®)

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Hazard management (VisuLAN®)

BETTER SOLUTIONS IN FIRE PROTECTION

**WAGNER®**