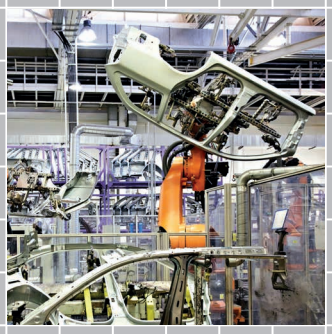
Experts in fire protection

Oxeo extinguishing systems



TECHNOLOGIES

GAS EXTINGUISHING SYSTEMS

Residue-free fire extinguishing

Oxeo extinguishing systems from Minimax use nitrogen and argon to fight fire. These natural inert gases are characterized by an outstanding extinguishing effect – even in special risk areas. Since they are also electrically non-conductive and leave no extinguishant residues behind in the event of fire, they can be used especially in areas with high-value and sensitive facilities.

The inert gases used in Oxeo extinguishing systems are distributed homogeneously in the event of fire and displace the oxygen from the fire source. Thanks to the three-dimensional mode of action, even concealed fire sources are reliably and safely extinguished before re-ignition. For this reason Oxeo extinguishing systems are very suitable even for the fire protection of special risk areas with flammable liquids and other hazardous substances and of areas with high fire loading.

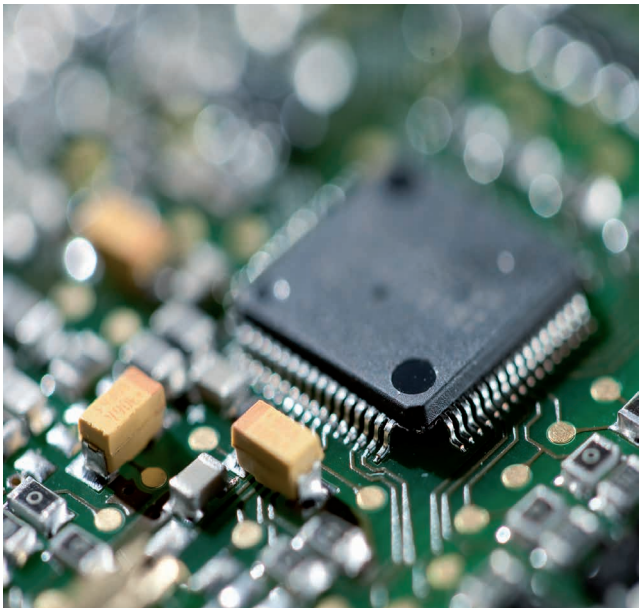
Rapid fire extinguishing with inert gases keeps damage caused by fire to a minimum. In addition to this – in contrast to water, foam or power – secondary damage caused by the extinguishing agent is excluded: inert gases leave no extinguishing agent residues and can be simply removed from the affected area again by ventilation after extinguishing the fire. Oxeo extinguishing systems are therefore always an outstanding solution if it is worth protecting valuable goods or irreplaceable cultural objects from being destroyed by fire. Moreover inert gases are electrically non-conductive, so that they can also be used in areas with electrical or electronic components. So Oxeo extinguishing systems avoid long downtimes and expensive interruptions in operations.

Nitrogen and argon are non-toxic even at concentrations capable of extinguishing fire – the oxygen concentration of the ambient air is however significantly reduced in the process. Therefore, persons present are called to leave the extinguishing area by acoustic and optical alarm signals before extinguishing agent flooding is activated.

Oxeo extinguishing systems can therefore be deployed particularly in areas with movement of people.

Besides accessible rooms (room protection), Oxeo extinguishing systems also protect enclosed facilities, such as control cabinets and distributor boxes or machine tools (local protection). The special prefabricated Oxeo compact assemblies are optimally equipped for this.

Inside track: Oxeo extinguishing systems offer the features of all modern inert gas extinguishing systems – from 300 bar technology to ConstantFlow versions. In addition the in-house developed Minimax Design Manager always ensures the optimum dimensioning of the system.



Inert gases possess a first-class extinguishing effect for fires of fire classifications A (solids), B (flammable liquids) and C (flammable gases). Furthermore, argon is the only inert gas also suitable for fires of fire classification D (metal fires).

Nitrogen and argon are natural components of the ambient air and, therefore, have no harmful impact on the atmosphere. No other gaseous extinguishing agent has this outstanding environmental audit. Both gases are consequently not only safe for the future but are also easily and quickly obtainable nearly everywhere, as apart from fire extinguishing they are also used for many other purposes. Therefore, after a release Oxeo extinguishing systems that use pure nitrogen or pure argon can be cost-effectively and quickly refilled and put back into operation again.

Whichever inert gas is used – nitrogen, argon or if necessary a mixture - in Oxeo extinguishing systems the system technology is always the same.

For every risk the suitable inert gas

- **Nitrogen**
  Nitrogen is a 78.1% constituent part of the natural atmosphere by volume. Its density in relation to air is 0.967: 1. Nitrogen thus has a special gravity similar to air, which means that it is optimally distributed in the extinguishing area and can maintain an inert gas concentration capable of extinguishing for a particularly long time. This qualifies nitrogen as a universal extinguishing agent for multiple applications.

- **Argon**
  Argon is a noble gas obtained from the ambient air and is contained in the natural atmosphere at 0.93 vol %. Its density in relation to air is 1.38: 1. Argon is therefore significantly heavier than air and is thus particularly suitable for double floors, and as a “real inert gas” with its high inertness is also outstanding as an extinguishing agent for metal fires.

- **Mixed gases**
  Mixed gases, which contain both nitrogen and argon and as necessary also small proportions of carbon dioxide, can also be used in Oxeo extinguishing systems. Typical mixed gases for use in inert gas extinguishing systems are IG 55 consisting of 50 % nitrogen and 50 % argon – and IG 541 – consisting of 52 % nitrogen, 40 % argon and 8 % carbon dioxide.

Constuction and function

Oxeo extinguishing systems are subdivided into fire detection and extinguishing control technology, the extinguishant supply and into one or more extinguishing areas with corresponding area subdivision.

Fire detection- and extinguishing technology

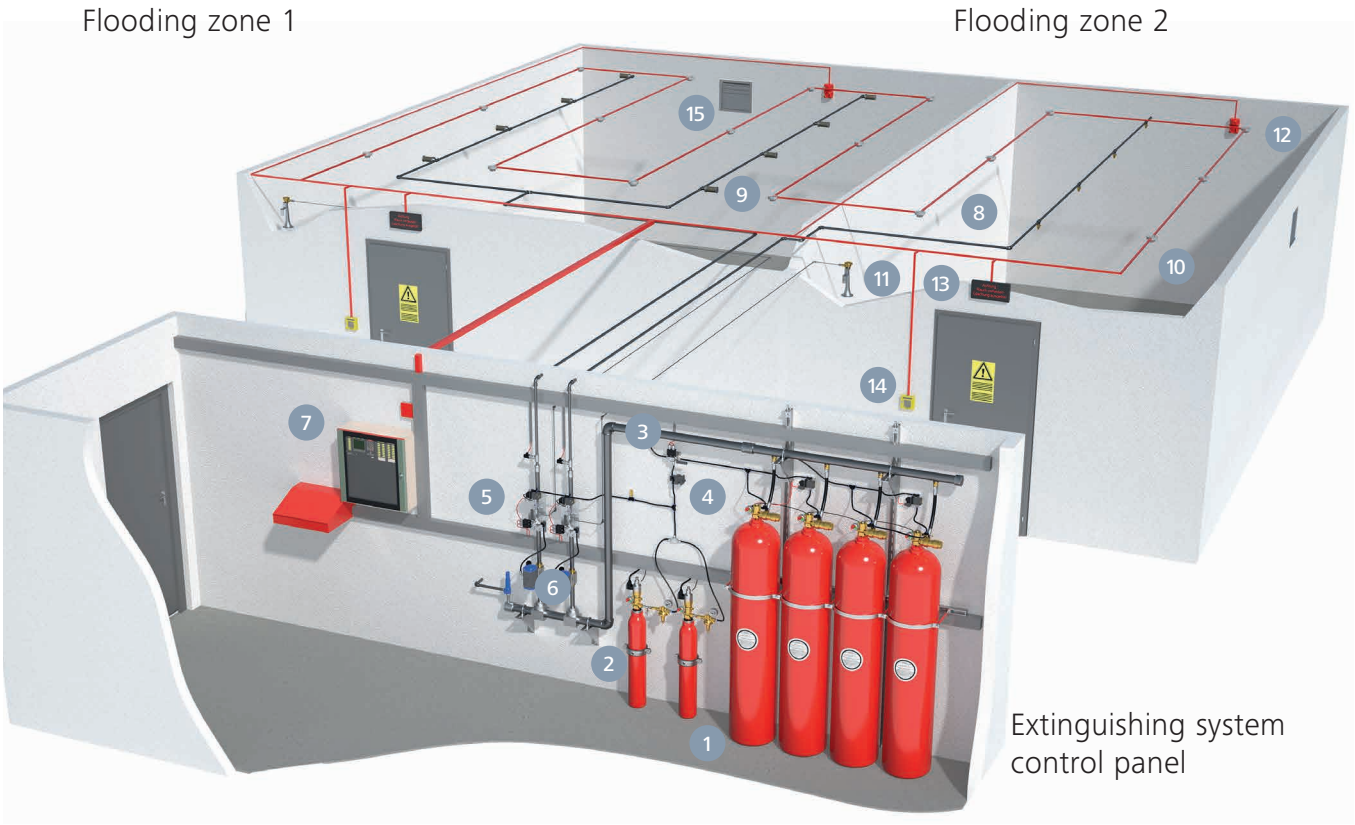
Oxeo extinguishing systems are controlled and function-checked by Minimax's proven fire detection and extinguishing control technology. This guarantees optimal compatibility, confirmed by the corresponding approvals, of electrical and mechanical system components. Unnecessary expenditure of effort on coordination and interface problems between different units are avoided. The extinguishing areas are continually monitored by smoke-, heat- and/or flame detectors. In a fire event these emit a signal to the fire detection and extinguishing control panel. The latter releases an acoustic and optical alarm by which persons present are notified to leave the affected room and in parallel sends a signal to a permanently attended place. Upon expiry of a predefined pre-warning period the extinguishing agent is released from the containers via cylinder valves. A precisely calculated filling quantity is fed via the pipe network into the extinguishing area and escapes at the extinguishing nozzles. The rapid and homogeneous distribution of the extinguishing agent displaces the oxygen from the fire source.

Extinguishing agent supply

The extinguishing agent is stored in high pressure cylinders which in turn are placed together in the Oxeo supply system in a space-saving but extendable manner. The charging pressure on each individual cylinder is constantly monitored for leakage by pressure recording. Any error messages are automatically forwarded to the fire detection and extinguishing control panel. So the available filling quantity is constantly under control. The filling quantity to be supplied depends upon the fire risk and the size and condition of the facility to be protected. The modular construction of the Oxeo supply system enables an optimum adjustment to individual customer requirements and local conditions and offers the highest degree of flexibility for conversion- or extension actions.

Extinguishing zones and zone division

Oxeo extinguishing systems can be designed as a single-zone system to protect one extinguishing section or as a Multi-Zone system for the protection of two or more extinguishing areas. Multi-Zone systems are fitted with selector valves which in the event of fire direct the extinguishing agent only into the extinguishing area affected by the fire event. Individually controllable container groups always release a filling quantity exactly adjusted to the extinguishing areas. This means that each area does not need to be provided with its own extinguishing agent supply. The total supply of extinguishant is reduced to the quantity required for the largest extinguishing area and thus to a minimum. Further, the system can be easily adjusted. Changes of use and conversions in the building can be reacted to extremely flexibly. The filling quantity to be fed in and the flooding time determine the arrangement of the extinguishing nozzles and the complexity of the pipework. Specially designed extinguishing nozzles allow the pipework to be simply designed.



Extinguishing system control panel

1	Oxeo supply system (operation and reserve)
2	Pilot cylinders (operation and reserve)
3	Operation/reserve changeover
4	Time delay device
5	Zone control- and disabling device
6	Selector valves
7	Fire detection and extinguishing control panel

Extinguishing zones

8	Oxeo VN extinguishing nozzle
9	Oxeo SPA extinguishing nozzle
10	Fire detectors
11	Pneumatic horn
12	Optical/acoustic signaller
13	Illuminated warning signal
14	Manual actuation
15	Pressure relief flap

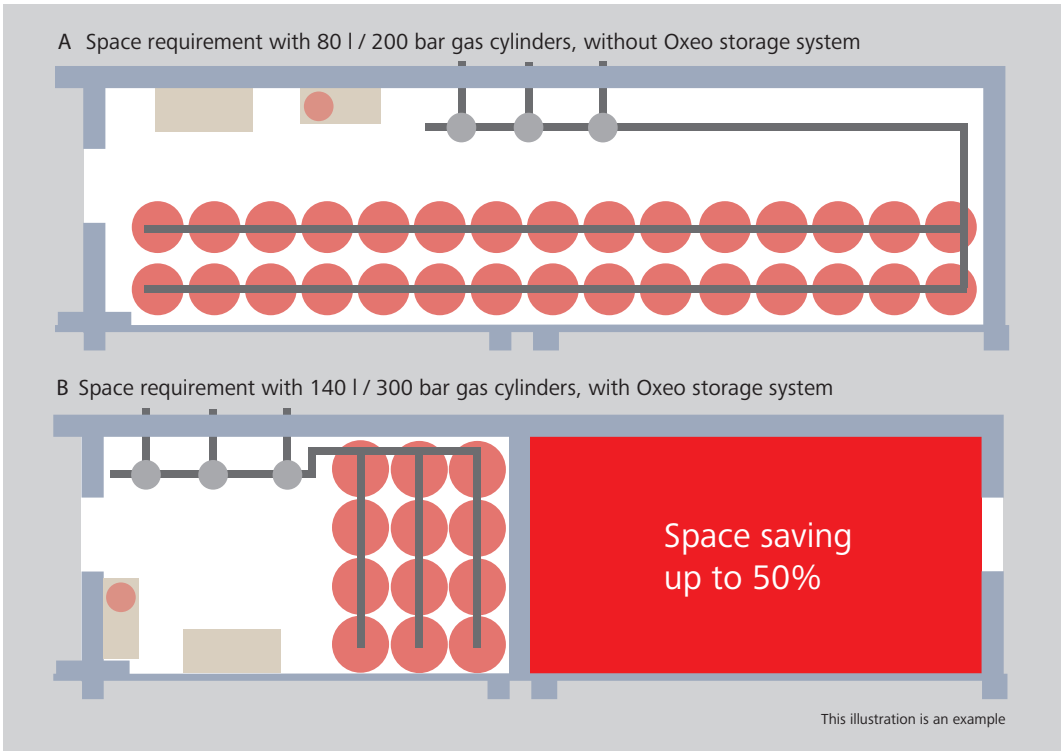
Technology for a space-saving supply of extinguishing gas

Oxeo extinguishing systems allow a particularly compact and space-saving supply of extinguishing agent.

In Oxeo extinguishing systems the inert gas is stored as standard in extinguishing agent cylinders with a volume of 140 liters at a charging pressure of 300 bar. A large volume and high charging pressure allow the uptake of large quantities of inert gas per cylinder. So only a few extinguishing agent cylinders are required for the supply.

In addition, the cylinders can be set up extremely compactly using the Oxeo supply system. The ability to arrange the extinguishing agent cylinders in multiple rows and to adapt the cylinder set-up to the premises creates additional flexibility for the inert gas storage.

Therefore, Oxeo extinguishing systems require up to 50 % less space for the extinguishing agent supply than inert gas systems with 80 l / 200 bar gas cylinders extinguishing agent containers. Consequently via the use of Oxeo extinguishing systems a smaller space for the extinguishing agent supply can be planned in new buildings, which incurs lower construction costs. In existing buildings on the other hand the use of an inert gas extinguishing system often only becomes possible at all with the space-saving extinguishing agent supply.



ConstantFlow technology

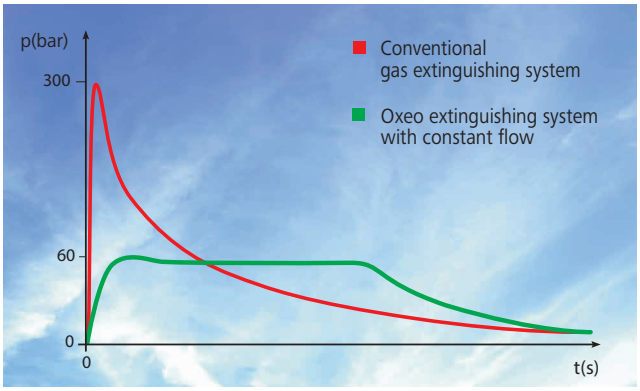
Oxeo ConstantFlow technology operates with high-performance pressure regulators mounted directly on the extinguishing agent cylinder valves. At the start of the extinguishing procedure the operating pressure is thus already reduced to a maximum of 60 bar at the output of the extinguishing agent cylinders. In addition, a constant stream of extinguishing agent is created without a pressure spike. In conventional inert gas extinguishing systems on the other hand the gas escapes from the cylinders into the pipe network at the beginning of the extinguishing process with a charging pressure of up to 300 bar. This creates a pressure spike at the beginning of an extinguishing process as well as a heavy stream of extinguishing agent which rapidly decreases with the duration of the flooding.

A crucial advantage: In Oxeo extinguishing systems with ConstantFlow, thanks to the constant stream of extinguishing agent, pressure relief flaps can turn out to be 70 % smaller than in conventional inert gase xtinguishing systems.

The extinguishing areas can be planned more flexibly. Smaller pressure relief flaps can be more easily integrated into exteriors and the area excess pressure from basements can be conducted via small channels into the open air without any problem.

Together with the special nozzles with SPA silencers the constant stream of extinguishing agent without a pressure spike allows a "soft flood" in the event of fire. The gentler flooding process reduces vibrations on the protected equipment and in particular is gentle on particularly sensitive equipment such as rotating hard drives in server rooms and data centers.

When using Oxeo ConstantFlow technology the connected conduits and selector valves need only to be designed for the low pressure level of 60 bar maximum, which may result in significantly profitable solutions being implemented in many cases.



A constant stream of extinguishing agent without a pressure spike – Thanks to Oxeo ConstantFlow Technology

Oxeo ConstantFlow Technology cylinder valve with high-performance pressure regulator

Nozzles for all incidents

Different requirements and integration situations both in the room and in local protection each require specially tailored nozzle designs: Oxeo extinguishing system nozzles of types VN, SPA, ARGE and DD introduce the inert gas in the required flooding time and quantity into the extinguishing area, distribute it evenly there and thus provide the desired oxygen displacement.

- The **type VN nozzle** is available in various sizes and offers an innovative solution: It can be adjusted to the relevant required extinguishant throughput via a patented screen technology. Room alterations simply require an adjustment of the nozzle, but not of the pipework.

- The Oxeo extinguishing system **type DD nozzles** are designed for flush integration, for example on housings or fairings on facilities to be protected. The nozzles are designed with threads on the input- and output side so that they can be attached quickly and easily from outside on the housing.

- Together with the ConstantFlow Technology the **special nozzles with SPA** silencers allow a "soft flooding" in the event of fire: The acoustic pressure is significantly reduced when the inert gas emanates and the flooding process using the Oxeo extinguishing system is thereby overall gentler. Protected facilities are thus protected against strong vibrations and particularly sensitive equipment, such as rotating hard disks in server rooms and data centers, spared.

- The **ARGE type special nozzles** have particularly small nozzle bores which enable an extremely fine extinguishant output. For fire fighting in control cabinets, narrowly confined facilities or in very small rooms they are the ideal solution, since they introduced the inert gas very slowly and in very small quantities.

Prefabricated for local protection

For the protection of smaller enclosed facilities, such as control- or server cabinets or machine tools, the Oxeo extinguishing system offers pre-fabricated compact assemblies.

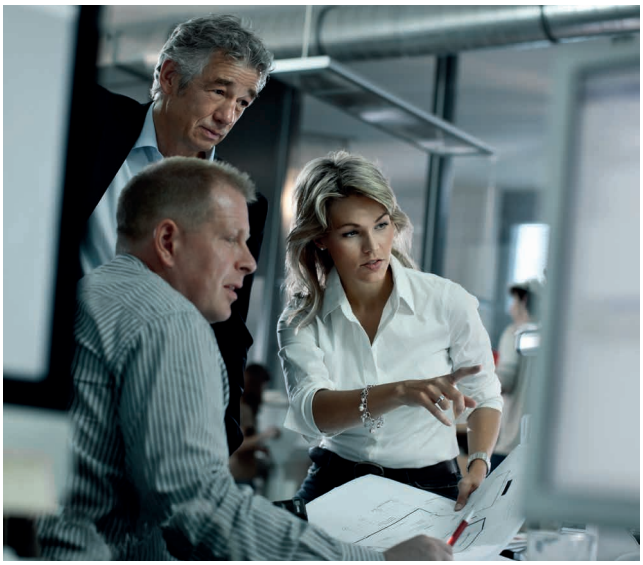
In the compact assemblies, all central components are combined into one unit in a cabinet and protected against dust, moisture and mechanical stress. One or two extinguishing agent cylinders and an electronically monitored depletion indication and electromagnetic extinguishant release are combined in the cabinet. The integrated fire detection and extinguishing control panel controls the extinguishing unit in the event of fire.

Standardized connections are available on the compact assembly for pipework with Oxeo extinguishing nozzles and for cables to the fire detectors.

Optimally designed with the Minimax DesignManager.

Oxeo extinguishing systems are designed project-specifically with the Minimax DesignManager. Minimax has developed this calculation program on the basis of comprehensive theoretical foundational work and numerous flow tests with real extinguishant floodings. Minimax DesignManager's calculation accuracy allows an optimal dimensioning of gas extinguishing systems both from a safety-related and economic perspective: The extinguishing systems designed have proven reliable and effective.

1/2 inch or 1 1/2 inch nozzles, 200 bar or 300 bar technology, single- or multi-zone systems, with or without ConstantFlow, the MinimaxDesignManager will always find the optimal system variant and solution for every task.



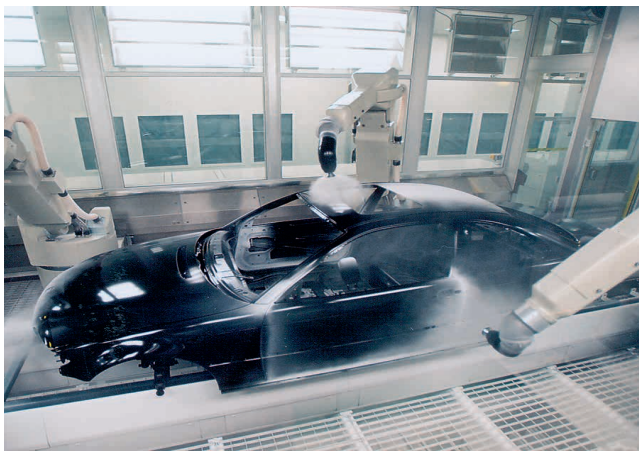
The Minimax DesignManager integrated connection to CAD software allow the calculation to be easily executed and the result to then be inserted into project documents and system documentation.

Applications

As inert gases are electrically non-conductive and leave no extinguishant residues behind in the event of fire, Oxeo extinguishing systems are an outstanding solution to protect valuable goods and irreplaceable cultural objects or prevent electrical or electronic equipment from being out of operation for a long time.

Oxeo extinguishing systems are also best suited for the protection of special risk areas with flammable liquids and other hazardous substances, such as paint facilities, and of areas with concealed fire sources such as automated storage and retrieval systems. With argon even metal fires can be extinguished. All system variants and options of the Oxeo extinguishing systems are tested and recognized by the VdS Schadenverhütung (German testing institution for fire protection and safety). In addition, approvals from international certifying bodies are also available.

- Data centers, server rooms and server cabinets
- Switchgear, control rooms, and control cabinets
- Control centers, operations- and control rooms
- Utility rooms
- Painting- and powder coating systems
- Hazardous substance- and VbF (flammable liquid) stores
- Automated storage and retrieval systems (shuttle/paternoster)
- Machine tools
- Museums, archive rooms



There are many reasons in favor of Oxeo extinguishing systems from Minimax:

- Ideal for the protection of high-value goods and sensitive facilities
- Outstanding extinguishing effect even in risk areas with high or concealed fire load
- Prevents long downtimes and expensive interruptions in operations
- Particularly good for use in areas with movement of persons
- Inert gases are extinguishing agents that are safe for the future
- Implementation of complex systems over large distances and cost-effective multi-zone systems possible
- High flexibility - therefore also very suitable even for conversion- or extension measures
- Up to 50% space saving in the area of the extinguishant supply
- Use of up to 70% smaller pressure relief flap possible
- The Minimax DesignManager will find the optimally designed solution and system variant for each project

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