

Fire protection in automated small parts warehouses & shuttle systems

Preventing fires instead of extinguishing them

Automated small parts warehouses and shuttle systems require tailored fire protection solutions

In warehousing and logistics, reliable **delivery capabilities** and 24/7 **fast availability** of stored goods are the top priorities. State-of-the-art, fully automated small parts warehouses and shuttle systems are capable of meeting these high demands for efficiency in logistics processes.

To ensure an uninterrupted supply chain at all times, compliance with certain safety measures is critical. A reliable fire protection solution is a key aspect and not to be underestimated. Tailoring the fire prevention system

to the exact conditions of the highly automated storage system is the only way to ensure the integrity of the stored goods and logistics processes and, last but not least, the investment itself without affecting the warehouse capacity.

The top protection priority is clear: **a fire must never break out in the warehouse!** Fire, soot and smoke can cause damage to the goods, which can have dire consequences for the availability of goods and delivery capabilities. This must be prevented, no matter what.

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The risk

When it comes to fire protection, automated small parts warehouses and shuttle systems present a challenge. The extremely **compact design** of the warehouses results in a high **packing density**. While this layout maximises the available storage space, it also requires special fire protection solutions. In addition, the **high degree of automation** and percentage of electric components also present a specific **fire risk** due to short circuits and overheating.

Without immediate counteractive measures, a fire could rapidly get out of control, because of the high packing density; standard fire protection solutions are quickly stretched to their limits in this environment. Due to the maximised utilisation and tight spaces in the warehouse, installing a water-based extinguishing system would result in high expenditure.

The plastic **small load carriers** often typical for automated small parts warehouses and shuttle systems also present a risk that shouldn't be underestimated. Polyethylene and polypropylene are combustible and, in the event of a fire, they drip when burning. These plastic fires are difficult to control as they can spread very quickly, and the material can continue to burn even after contact with water.

Reliably protecting fully automated shuttle systems and small parts warehouses from the effects of a fire requires intelligent alternatives. Modern, active fire prevention solutions focus not only on the protection of persons and the environment, but also minimising risk.

They are also designed to minimise the fire-related malfunctions and to protect the stored goods, as well as the storage system itself. In the event of a fire, processes should be maintained without any disruptions, while ensuring delivery capabilities. This is why modern automated small parts warehouses and shuttle systems are increasingly applying fire protection concepts consisting of **active fire prevention** and **early fire detection** – an approach that has proven itself in other industries for many years.



Plastic containers made from polypropylene and polyethylene are combustible and drip when burning.

The main causes of fire in automated warehouses



Technical defects involving electrical equipment



Short circuits in

- control units
- electrical cables
- control cabinets
- electric motors

Corporate insurance claims in Germany*



Top 1: Fire and explosions:

24%

The most important business risks in Germany*



Top 1: Business interruptions:

37%



Top 6: Fire and explosions:

19%

* Source: Allianz Risk Barometer 2019

What is fire prevention with oxygen reduction?

For a fire to ignite, three components are needed in specific ratios: oxygen, heat and fuel. If one of these three components is reduced, a fire can no longer develop. This is the approach taken with the oxygen reduction method. By reducing the oxygen content of the air by adding controlled levels of nitrogen, it literally 'takes the fire's breath away'. Releasing nitrogen into the area to be protected lowers the oxygen concentration to a level below the specified **ignition threshold** for the main materials present. This creates an atmosphere in which the development of a fire can be actively and reliably prevented. The oxygen in the air is no longer sufficient to sustain a fire or permit it to spread. Protected areas remain **accessible** to authorised personnel.

The nitrogen needed for oxygen reduction is extracted from the air in the room by nitrogen generators, a process which is both **environmentally friendly** and

cost-effective. Since nitrogen is a primary component of our natural atmosphere, this saves not only money, but, above all, a great deal of space: whereas conventional fire extinguishing systems require huge amounts of space for extinguishing agent, an oxygen reduction system takes up a far more manageable area. The generated nitrogen is fed through a pipe system to the small parts warehouse or shuttle system as needed. Here, the nitrogen is homogeneously distributed to create the **protective atmosphere**. Yet another advantage of active fire prevention systems: they are scalable. If the warehouse capacity changes, the fire prevention concept can easily be adapted with reasonable effort.

Benefits of fire prevention through oxygen reduction

- **Safe:** Active fire prevention system provides ongoing, reliable fire protection.
- **Customised:** Tailor-made protection concepts for customer-specific demands.
- **Simple:** Nitrogen is extracted directly from the ambient air.
- **Flexible:** Easy adaptation for storage expansion.
- **Economic:** Cost-effective nitrogen extraction; space-saving installation; no damage to goods due to extinguishing agents.
- **Environmentally friendly:** Use of natural nitrogen; no disposal of fire residues needed.



What is early fire detection?

Air sampling smoke detectors for very early smoke detection are installed as a basis for the fire protection solution on the basis of oxygen reduction. Smoke detectors used in automated small parts warehouses generally have to meet two conditions for reliable detection: on the one hand, they have to ensure **earliest possible** and **highly-sensitive** smoke detection, and to be able to initiate counter-measures early on in the event of a fire, they have to be extremely **secure against false alarms** to keep operational processes running without any disruptions.

Air sampling smoke detectors use negative pressure to actively take air samples from the ambient air and test them for the smallest of smoke particles. They enable fire detection in the earliest phase of development of a fire, referred to as pyrolysis.

Air sampling smoke detectors at a glance:

- ✓ Highly sensitive and secure against false alarms
- ✓ Earliest possible fire detection provides time to take countermeasures
- ✓ Best possible personal protection and protection from production downtime
- ✓ Power supply switched off immediately, minimising smoke contamination
- ✓ Maximum level of protection thanks to the combination of active fire prevention and early fire detection



TITANUS® air sampling smoke detectors actively extract air samples, offering best detection, as well as enhanced security against false alarms.

Fire protection tailor-made for your automated small parts warehouse or shuttle system

High concentration of assets

Planning a fire prevention solution comes with great responsibility. The primary protection goals such as maintaining operations and an uninterrupted supply chain must be met. The active fire prevention system ensures ongoing, reliable fire protection.

Flexible, dynamic, future-proof

Active fire prevention is a tailor-made protection concept for customer-specific demands. The system is flexible, scalable and can be adapted to warehouse expansions and changes as needed.

The bottom line: only with early fire detection and active fire prevention can you achieve your protection goals – no damage caused by fire or smoke, means no interruption to your supply chain.



Want to learn more about WAGNER fire prevention solutions for automated small parts warehouses?

<https://www.wagnergroup.com/case-studies/imperial>

Tailor-made fire protection solutions with over 40 years of experience

Fire prevention solutions consisting of active fire prevention and early fire detection have long been the standard in automated warehousing. Still, each of our customers are special to us; all projects and their individual protection goals are equally important. With over 40 years of experience in system engineering in the area of fire prevention, we offer an optimised fire prevention concept tailored to every project.

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1976 

> 600 employees



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(Research & development, design & project planning, system engineering, commissioning & maintenance)



> 800

OxyReduct® installations in use worldwide

11 locations worldwide

9 locations in Germany


107 million €

consolidated total output

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