



Reference solution

Fire prevention in a high-bay freezer warehouse OxyReduct®

The OxyReduct® active fire prevention system enhances safety in the world's largest deep-freeze high-bay warehouse.

THE CUSTOMER

When it comes to fire prevention, Preferred Freezer Services, a US provider of frozen goods logistics for the food industry, focuses on risk minimization rather than loss adjustment.



The logistically efficient, clad-rack structures are not yet as common in the US as they are in Europe.



The frozen French-fries stored at Preferred Freezer Services' warehouse are now protected by WAGNER fire prevention technology.

The figures are impressive: three protected areas with a total volume of over 1.05 million cubic meters (± 40 million cubic feet), 35-meter-high (98.4') shelving systems, 117,000 pallet storage spaces and an order volume of over US\$100 million.

Preferred Freezer Services' automated, high-bay freezer warehouse in Richland, WA, is the largest of its kind in the world. Commissioned in July of 2015, the warehouse stores and unloads around ±900,000 tons of frozen food per year – primarily French-

fries for the West Coast market. This warehouse is setting new standards of fire prevention as the first building in the US to be protected by WAGNER's OxyReduct® active fire prevention system.

In the US, Preferred Freezer Services' high-bay freezer warehouse is also uncommon in its structure. Not only are high-rack storage facilities fairly rare in the US, those with deep-freeze capabilities are even rarer. Preferred Freezer Services consciously chose this design as the best and most efficient solution for their automated logistics processes for storage and

distribution. When it comes to fire prevention, however, warehouses of this size and capacity do present special challenges.

THE RISK ANALYSIS

Sprinkler system or firefighters – in the event of a fire, neither one can reach the source of the fire quickly enough.

In the US, conventional sprinkler technology is still the norm. Very tall rack systems, however, quickly push sprinklers to their limits. In a high-rack storage facility with a height of over 30 m (±100'), there is no guarantee that the water intended to extinguish the fire will even reach the source of the fire. In densely packed warehouses, the extinguishing water can get 'lost' amid the racks before it can reach the fire. Even if fire is detected and the sprinkler system is triggered in a timely manner, there is a high probability that the extinguishing water will not effectively hit the source of the fire.

This was the conclusion drawn by the planning office commissioned to create a risk report that focused on the dimensions of this warehouse in relation to standard market solutions.

Constant air movement in a high-rack storage facility would cause the vertically released sprinkler water to swirl around as ice water. In this environment, firefighters' ability to counter a potential fire was determined to be virtually impossible. In a dark, ice-cold environment with aisles approximately 144 meters (482') long and shelves 35-meter-high (115') shelves, this warehouse would push the firefighters to

their physical and technical limits.

For Burnie Taylor (GM, Preferred Freezer Services Richland) sprinkler represented an unsatisfactory solution – especially as experience has shown that 50 to 70% of damage within a warehouse is caused as a result of burst water pipes on sprinkler systems or sprinkler heads that are loose or come off during operations.

"Our warehouse has to be operational 24/7. We can't afford interruptions of any kind," explained Burnie. "A fire would be a nightmare scenario – not only would it be a threat to Preferred Freezer as a company, it would be a huge blow to the entire region."

In other words: the consequences for the operator, its employees

and the entire region around Richland, would be catastrophic. It was this reason that WAGNER's OxyReduct® active fire prevention system was selected as the most logical fire protection solution. The final decision was made when executives from Preferred Freezer Services and its investor, Victory Unlimited Construction, paid a visit to WAGNER World near Hanover, Germany. It was there where they learned more about the functional principles of the OxyReduct® technology and witnessed fire tests and a live installed system presentation.

THE PROTECTION OBJECTIVE

The following protection objectives were defined for the new, fully automatic deep-freeze storage facility within the scope of the project planning activities:

- Prevents fires from breaking out or spreading in order to minimize the level of damage

- Solutions involving water-based fire extinguishing could not be used

- The unconditional preservation of the logistic cold chain and operational workflows

THE SOLUTION

Action rather than reaction: the active fire prevention system minimizes the risk of fire from the outset.



The Preferred Freezer Services warehouse is the first building in the USA to be protected by OxyReduct® technology

The fire prevention system installed in Preferred Freezer Services' freezer facility is an OxyReduct® Pressure Swing Adsorption (PSA) system specially adapted to the site's structural conditions.

The system's principle is based on lowering the air's oxygen concentration in the warehouse through controlled introduction of nitrogen.

The right level of oxygen was determined on the basis of fire tests considering ignition thresholds of the stored goods packaged in

dispatch-ready cartons as well as the negative temperatures (-23°C/ -10°F) in the warehouse. The results of fire tests were approved by the independent German authority VdS (Organization of Property Insurers).

For Preferred Freezer Services' fully automatic, deep-freeze storage facility, the oxygen level was reduced to approx. 16% Vol.O₂, a level that will stop fires from breaking out or propagating.

The nitrogen will be produced on site and on demand. The chosen technology is the new WAGNER

PSA system that generates nitrogen by separating oxygen and nitrogen with the help of active carbon. While the active carbon binds the oxygen of the compressed air in the CMS tanks, the nitrogen is released into the protected area.

Sensors in the OxyControl control system monitor the oxygen concentration in the protected area to ensure that the nitrogen introduction never runs out of control and that the oxygen concentration in the protected area is continuously maintained at the specified level.



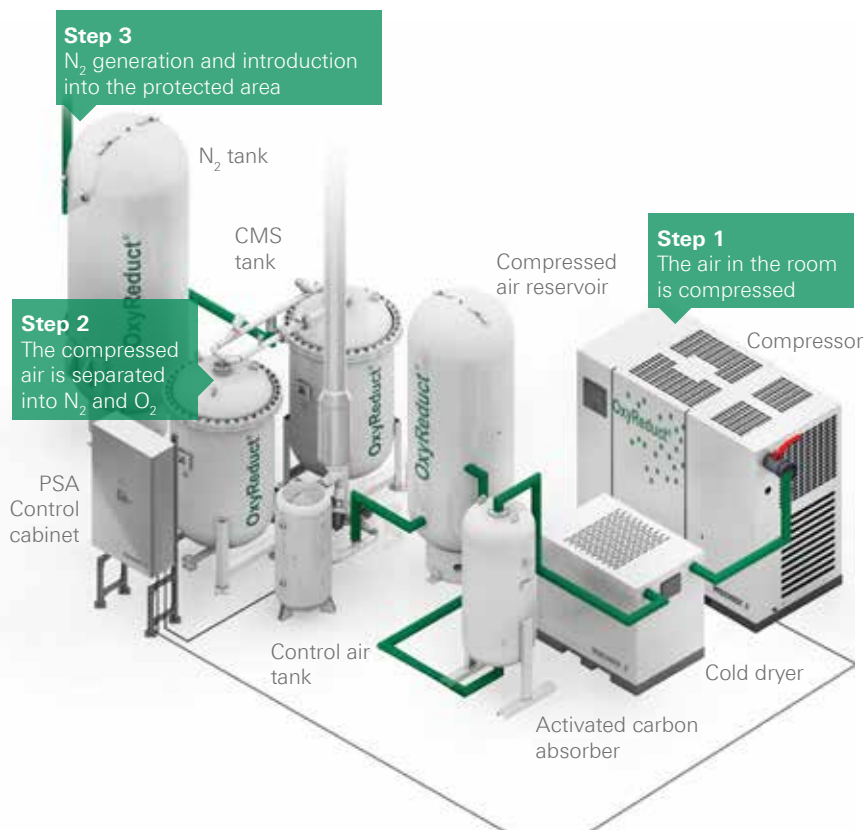
An interview with Frank Siedler, Director of International Sales at the WAGNER Group

SYSTEM DIAGRAM

The fire prevention system reduces the oxygen concentration in the protected area by introducing nitrogen.



OxyReduct® nitrogen production in the operating area



What were the fire protection solutions considered for the world's largest high-bay freezer warehouse?

A better question would be: What fire protection solutions were out of the question? When it comes to fire protection in the US, sprinkler systems are almost always the given standard. However, in high-rack storage facilities, which are still relatively rare in the US, sprinkler get to its limits. This is especially true for rack systems with over 30 meters height ($\pm 100'$). There is a need for an alternative that can do better: active fire prevention using oxygen reduction, or OxyReduct®.

Why did Preferred Freezer Services choose a WAGNER solution?

WAGNER has installed a significant number of large-scale projects in Europe that demonstrates, we are capable of providing customized solutions to protect very large warehouses – especially freezer or deep-freeze storage facilities. However, even more important for our client, our solution will deliver fire protection without damage from fire, smoke or firefighting!

What was the biggest hurdle to realizing this project?

The biggest hurdle was providing a system that had never been seen before with this dimensions in the North American market. And, yes of course, we had to adapt European OxyReduct® product to comply with US building and safety specifications while strictly maintaining project deadlines.

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