COLD CHAIN COMPLIANCE

Webinars for Cold Chain Professionals

COMPLIANCE WEEK DAY 1: FIRE RISK

STARTING AT 10:30AM

Supported by:

WAGNER®

BETTER SOLUTIONS IN FIRE PROTECTION

COLD CHAIN FEDERATION

TOM SOUTHALL
POLICY DIRECTOR
COLD CHAIN FEDERATION

SHANE BRENNAN
CHIEF EXECUTIVE
COLD CHAIN FEDERATION

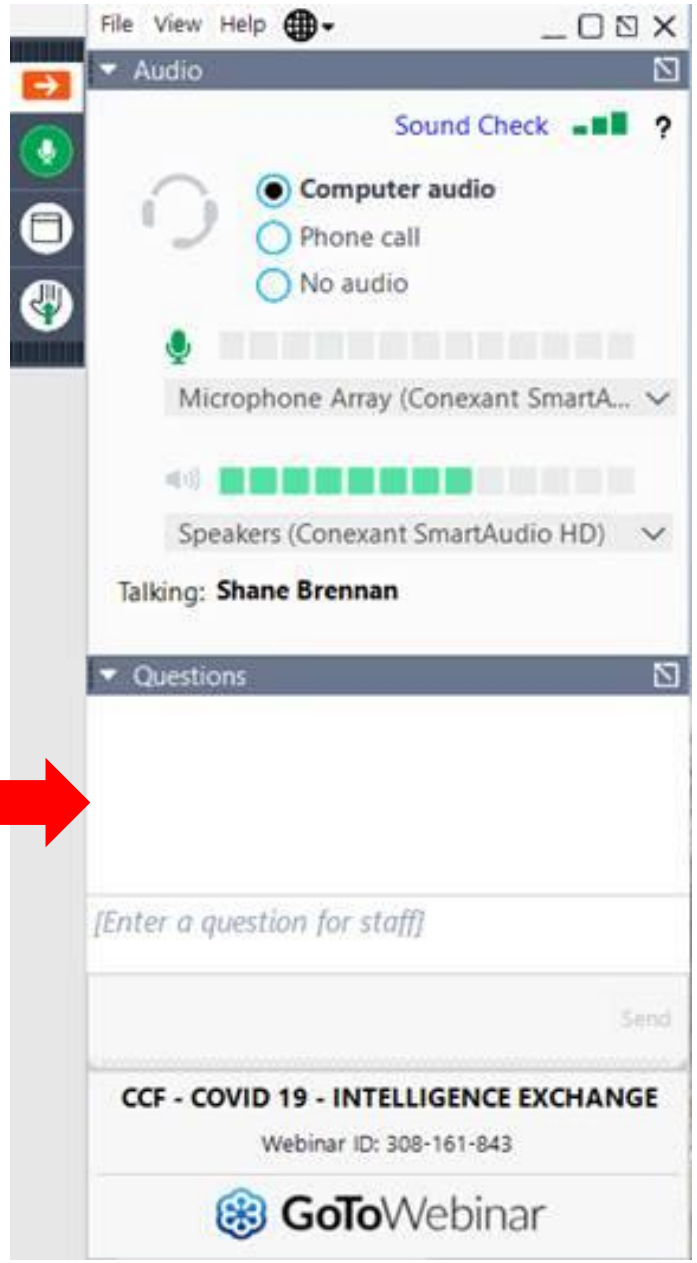
COLD CHAIN COMPLIANCE

DAY 1

FIRE RISK IN THE COLD CHAIN

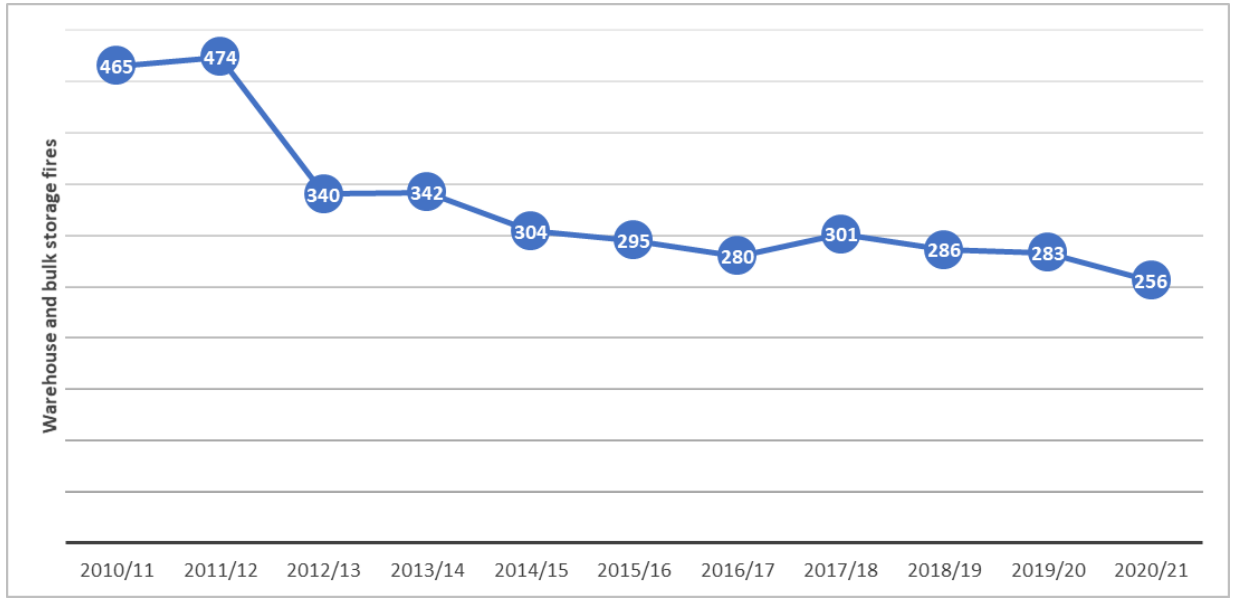
SCHEDULE

10:30 – 10:45	Introduction to fire risk in the cold chain	COLD CHAIN FEDERATION
10:45 – 11:00	Fire & smoke detection in cold stores	PWP BUILDING SERVICES LTD
11:00 – 11:15	Sprinklers in cold stores	Alpine.
11:15 – 11:40	Oxygen reduction systems	WAGNER® BETTER SOLUTIONS IN FIRE PROTECTION
11:40 – 11:55	Questions & Discussion	With: Shane Brennan



COLD CHAIN FEDERATION

FIRES: A GROWING RISK?



Fire statistics data tables: https://www.gov.uk/government/statistical-data-sets/fire-statistics-data-tables#fatalities-and-casualties

The cold chain:

- Growing sector
- Taller, bigger cold stores
- More electrical systems
- More valuable

ZURICH

Fears pandemic-led e-commerce boom could spark rise in warehouse blazes

Charles Bush, Head of Property and Energy Claims 29th April 2021

Zurich has warned of a potential rise in warehouse blazes as a pandemic-propelled e-commerce boom sparks a surge in demand for storage and distribution space.

HAZARDS & CAUSES OF FIRE IN COLD STORES

- Electrical faults: wiring (often behind panels), MHE infrastructure & automated systems
- Panels
- Dry environment
- Packaging & Pallets
- High rack heights and narrow aisles, restricting access and common fire suppression methods
- Refrigerants & other chemicals on site
- Maintenance work

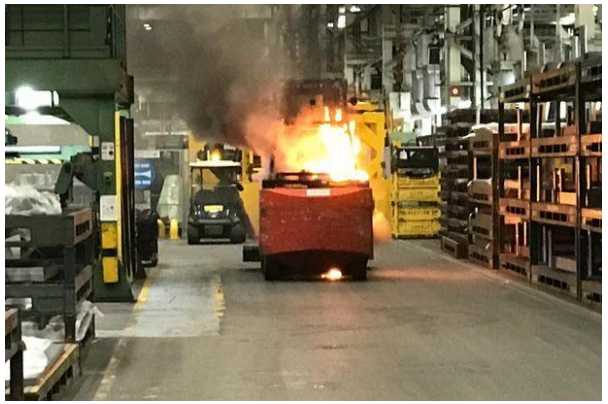


Image: Liverpool Echo

Image: Cooling Post/Feuerwehr Bad Rothenfelde

SCRUTINY: PANELS

Image: BBC/GETTY IMAGES/HOLLIE ADAMS

- Grenfell Disaster, the latest in a number of fire incidents on cladded buildings
- Insulation panels identified as causing spread of fire, cladding did not meet regulations
- Scrutiny has extended to other composite panels and buildings

SCRUTINY: INCREASED AUTOMATION

Photo: https://www.bbc.co.uk/news/uk-england-hampshire-49738355

- Andover – 2019
- Caused by electrical fault in battery charging unit of robot.
- Sprinkler system turned off
- Difficult for fire services to access
- Erith 2021 – robot collision

WHAT DOES THIS MEAN FOR COLD STORES?

- Growing risk of impacts of a fire?
- Scrutiny from fire authorities: new projects and existing protocols
- Insurance prices & questions

Originally broadcast 12 October 2021

https://www.coldchainfederation.org.uk/connect/previous-webinars/

Help insurers help you – risk presentation is crucial

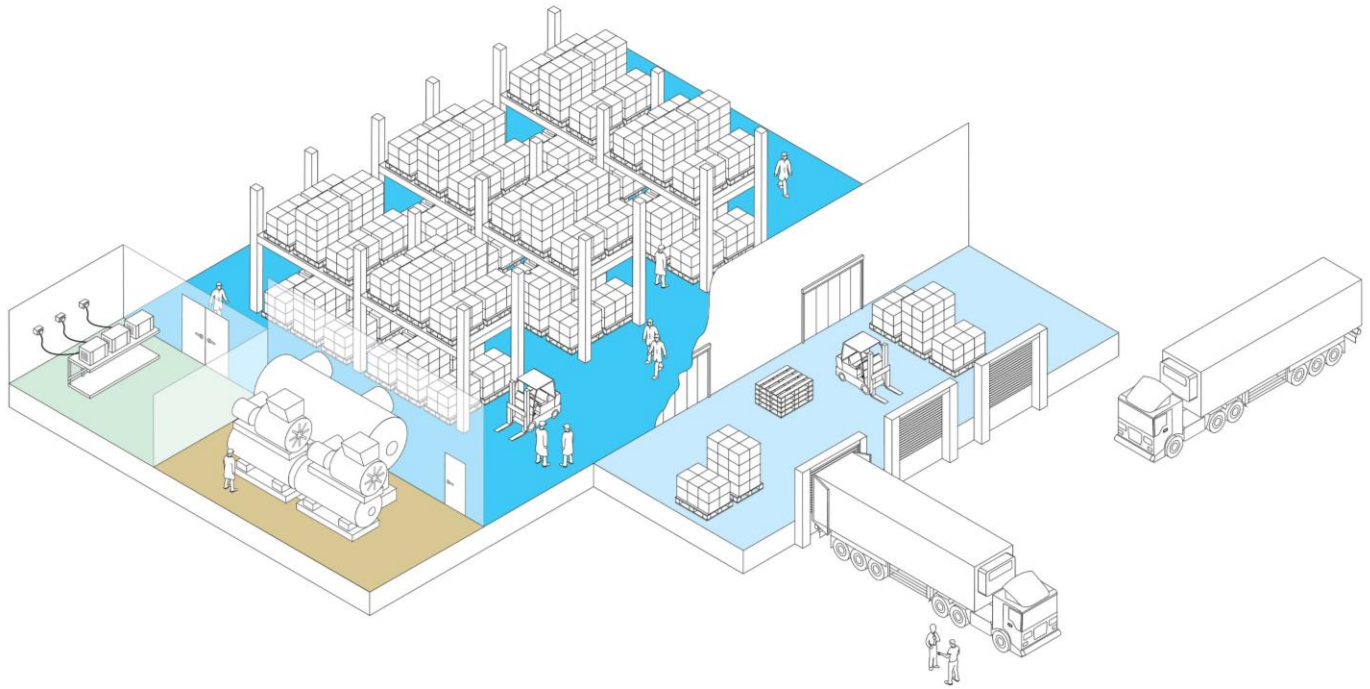
- Engage early – with both broker and insurer. Have a clear strategy
- Stand out from the crowd – show you are a ‘good risk of your type’
- Proactive – review company risk register and identify and implement improvements
- Give as much detail as possible on any claims or investigations – what happened? / what went wrong? / what has been done to avoid a repeat?
- Develop a clear strategy for renewal with your broker
- Be clear on what loss mitigation you have in place. Ensure insurers are aware. Be prepared to discuss with insurers and consider improvements
- Consider insurance implications of future plans.

Help insurers help you – cont.

- Organise your own risk management survey to fully detail the risk to insurers and to identify improvements that can be made
- Ensure mandatory electrical test are up to date and improvements made
- Composite panels – be clear on age and type – ensure integrity is maintained
- Share fire risk assessments – be clear on fire defensibility
- Detail processes and any hazardous or involving heat give explanations of how that is managed.

MANAGING THE RISK OF FIRE – TODAYS FOCUS

- PREVENTION
- DETECTION
- SUPPRESSION



FIRE & SMOKE DETECTION IN COLD STORES

GAVIN CLARKE
HEAD OF FIRE, PWP BUILDING SERVICES LTD

PWP Building
Services Presentation

To

COLD CHAIN
FEDERATION

Members

Fire Detection Systems

Contents

Why do we need anything more than a 'M' category system?

- The Building regulations requirements B1 states: *The building shall be designed and constructed so that there are appropriate provisions for the early warning of fire, and appropriate means of escape in case of fire from the building to a place of safety outside the building capable of being safely and effectively used at all material times*.

- Building control, insurers or a risk assessment will often request a system category greater than 'M'.

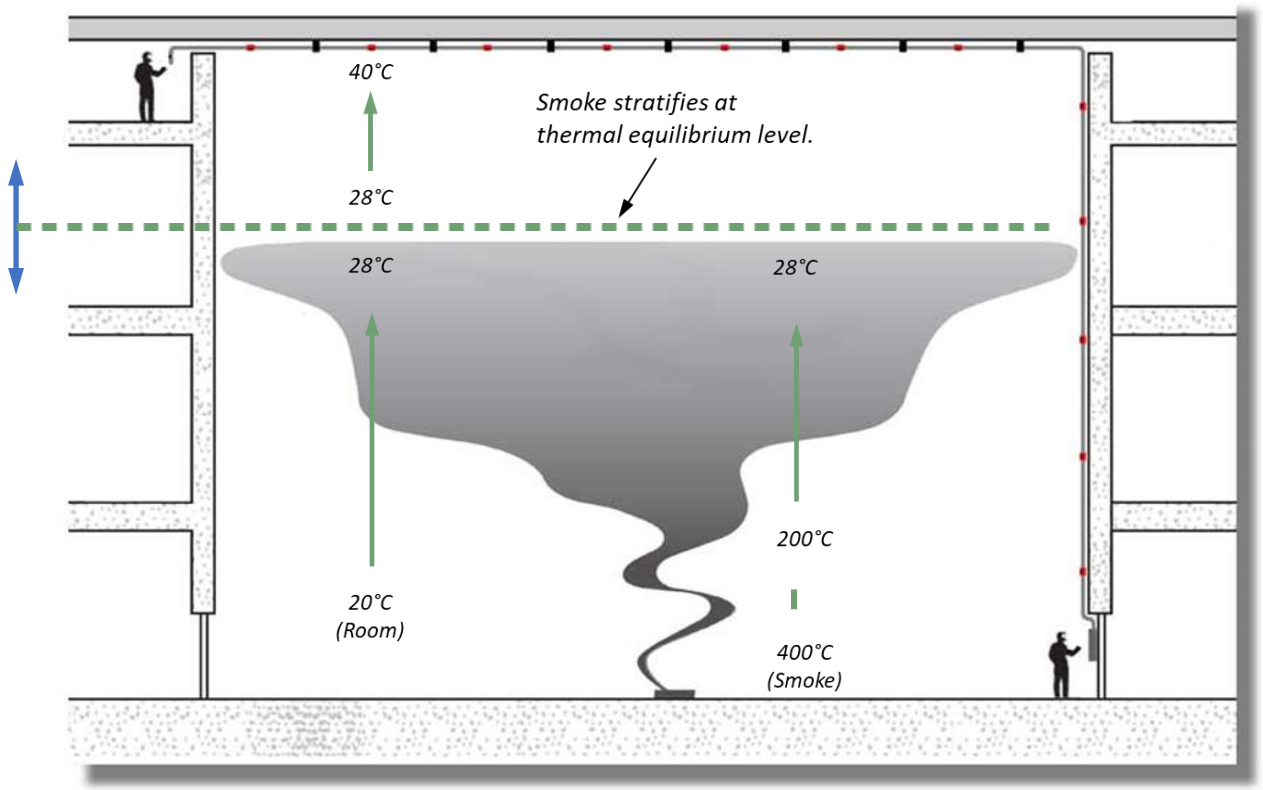
- Fire engineering consultants and their associated evacuation strategies will determine early warning of fire is necessary.

- The Fire Detection & Alarm System needs to be integrated with specific active fire safety systems including automatic fire suppression systems (sprinklers), security devices / hold-open devices/air conditioning systems/fire dampers etc.

Large Open Spaces

- Stratification
- Serviceability

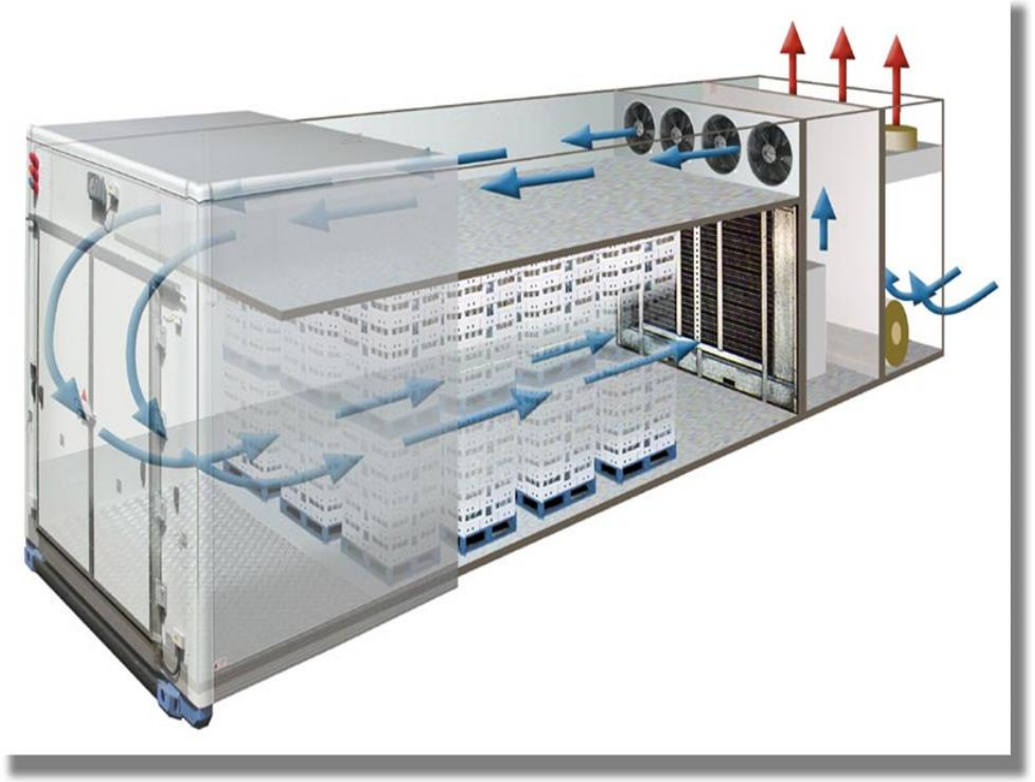
The smaller the fire, the lower the level of stratification.



Air Circulation

- Smoke Dilution
- Performance

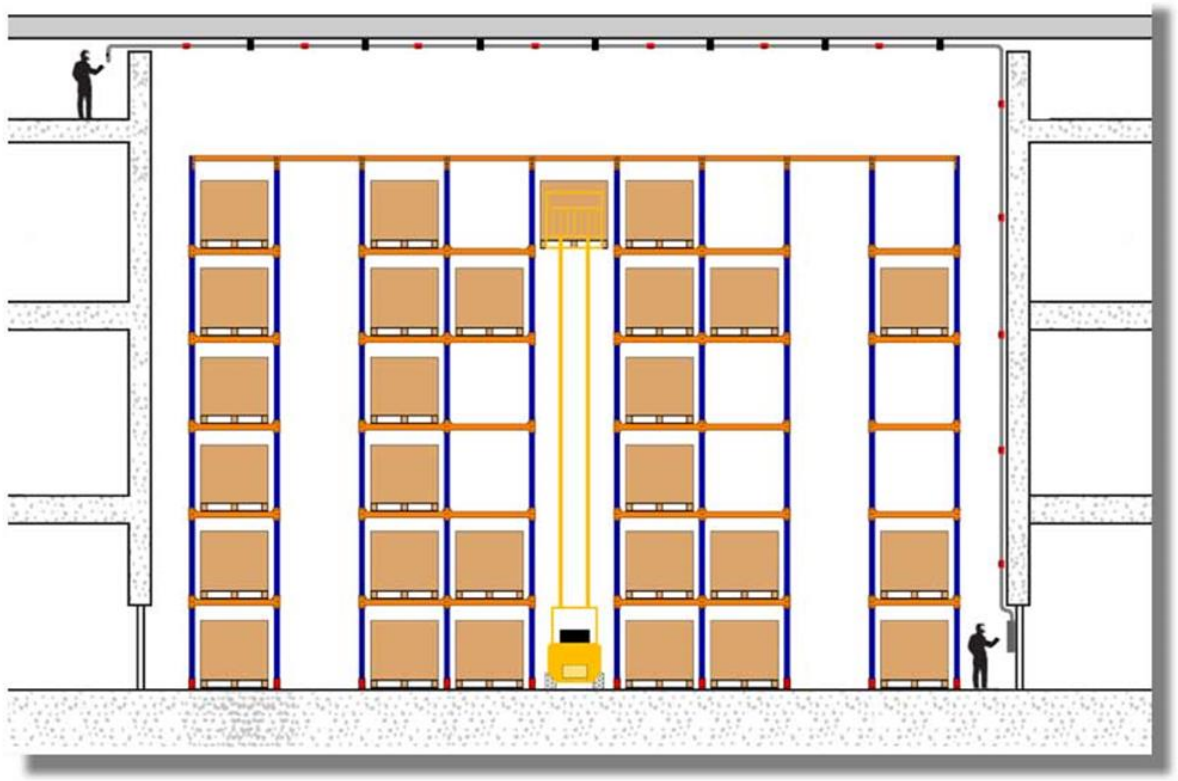
  Smoke never reaching point detectors

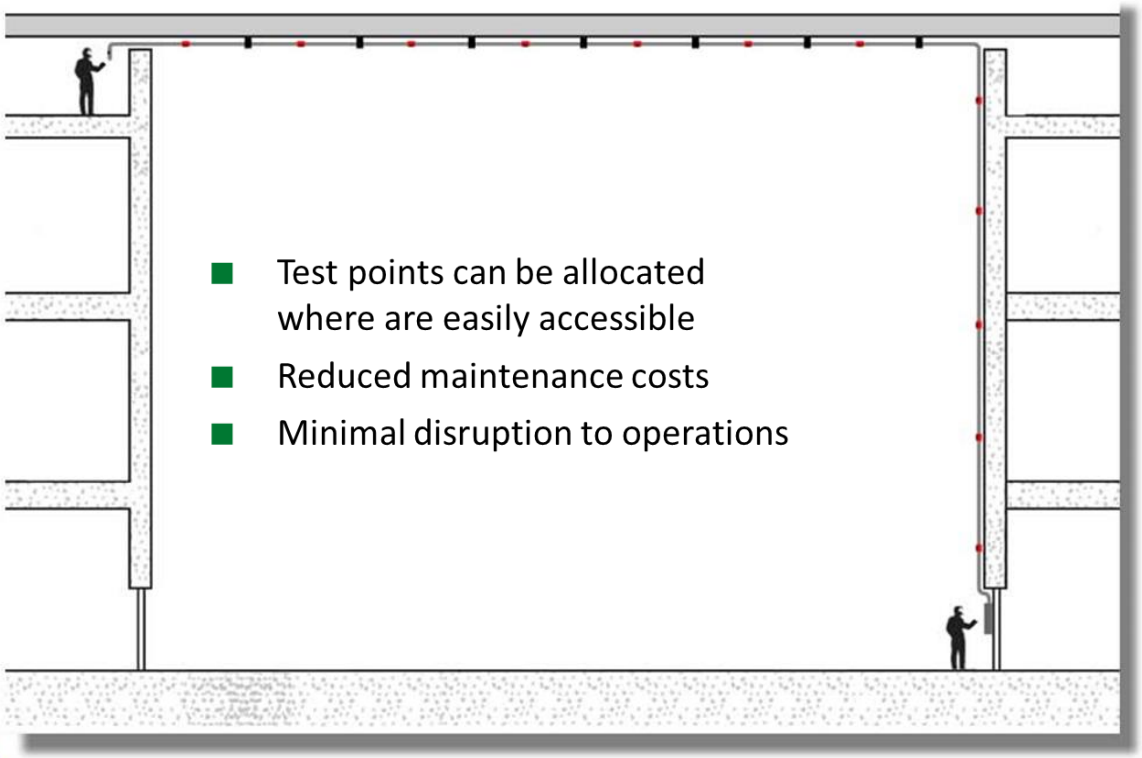


Obstruction

Moving Vehicles

- Disruptive to beam detectors




Test points can be allocated where are easily accessible
Reduced maintenance costs
Minimal disruption to operations

Water Vapor Clouds

- Performance
  - Nuisance alarms
  - Frosted sampling points

Beam and point detectors will create nuisance alarms.

Installation Simplicity

- Limited choice of detectors

Point detectors are operating at ***0°C to 50°C***

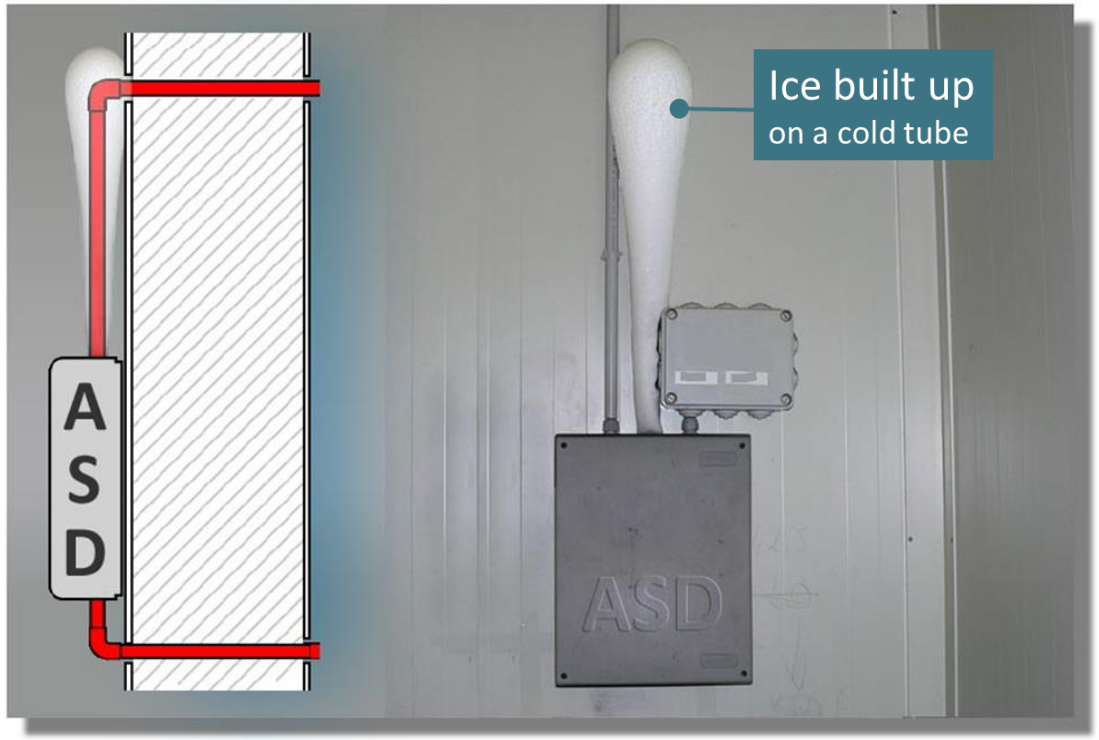
Laser based ASDs are operating at ***-5°C to 50°C***

Beam detectors are operating at ***-20°C to 65°C***

Operating Temperature Range

An ASD not specified to operate at -30° needs to be mounted outside the refrigerated area. Challenges:

- Condensation on cold tubes
- Ice building up on cold tubes
- Wall penetration



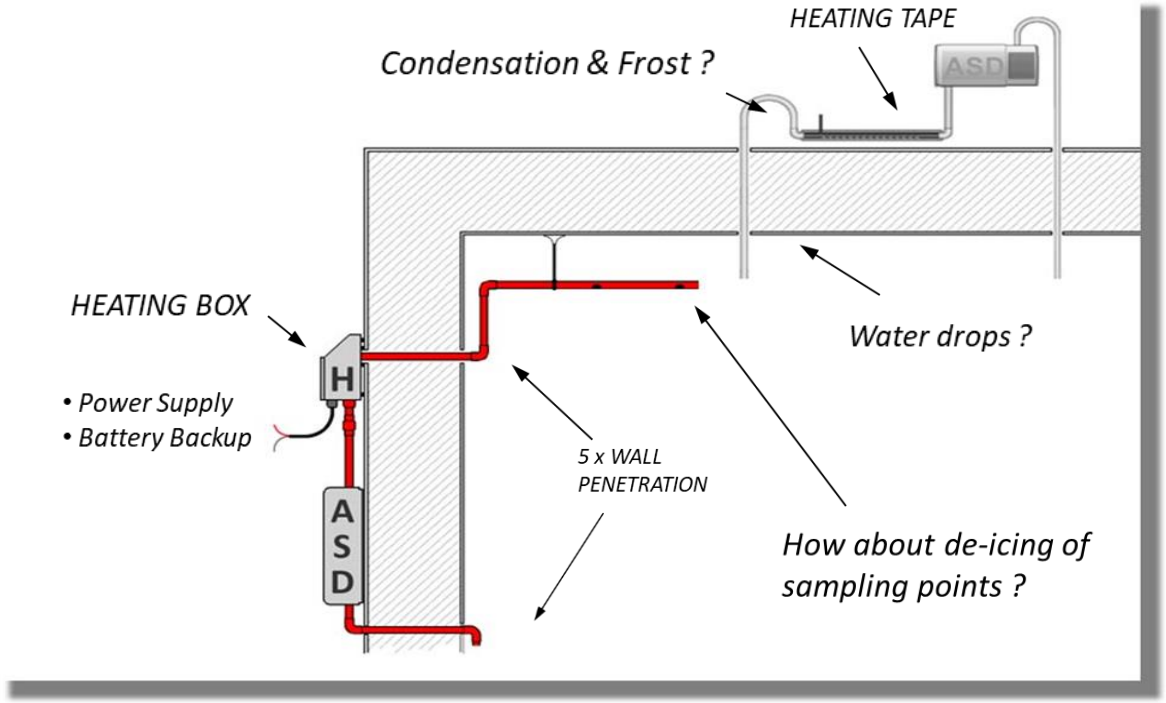
Detectors not able to operate at a temperature of -30°C are not suitable for this type of application!

Some like it hot …

… and propose a heater box.

A heater box / tape will only answer a detector problem – not an application challenge. In contrary: Heating will lead to other challenges:

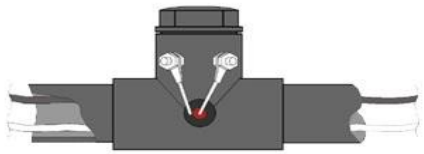
- Extra tubes, cabling, power supply and backup battery
- Lower performance due to added bows and the heater box
- Wall penetration

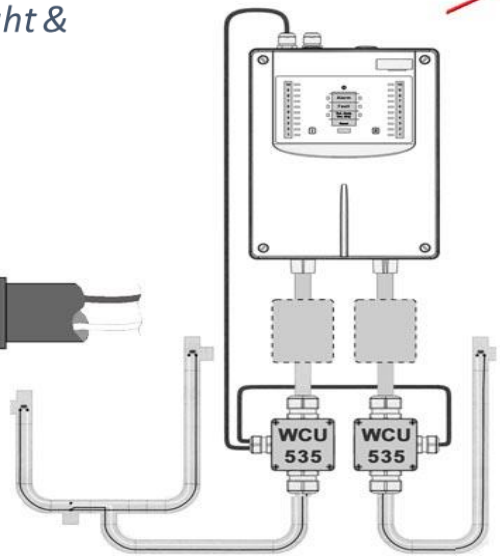


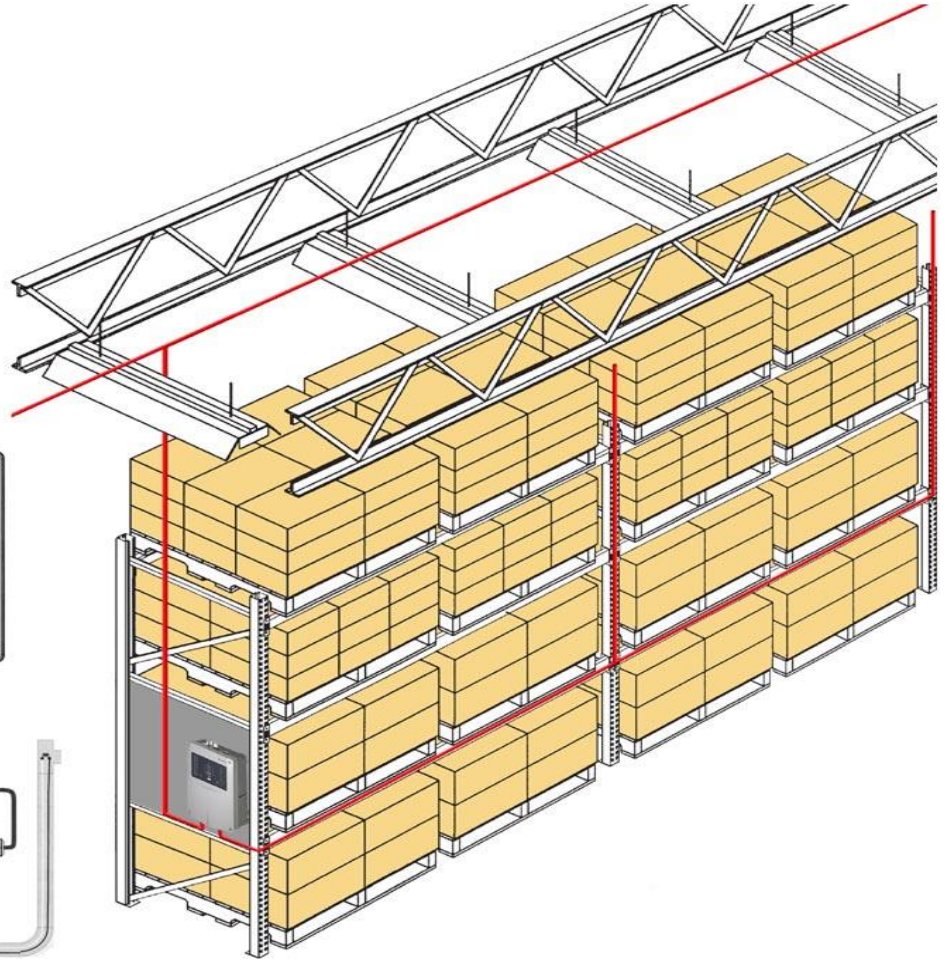
Does not answer the real need:

De-icing of sampling points

1. *Use of -30°C rated equipment*
2. *Mounted inside the cold store*
3. *Use of heated sampling points in case of intense air exchange*
4. *Horizontal pipes at the ceiling to protect the room / area*
5. *Horizontal pipes at intermediate level to cope with height & stratification*







- Seamless Integration with house alarm system.
- Buildings can operate under simultaneous split evacuation philosophy.
- Investigation periods can be set to limit the impact of false alarms.
- Coincidence (double knock) can be incorporated to facilitate the operation of pre-action sprinkler systems.

Summary

Automatic fire detection is generally required within deepfreeze and cold stores due to the risks involved and to satisfy the requirements of building control, insurers or fire strategies/risk assessments.

Traditional methods of detection (beams or point detection) are not adequate or can be problematic in terms of operation and ongoing maintenance.

ASD (Air Sampling Detection Systems) offer the correct solution however there are various manufacturers on the market and not all offer reliable solutions.

The ASD system we specify is specifically designed for freezer applications and proven to offer the correct solution and benefits to the end user as per the next slide.

User Benefits

Claim	Benefit	Proof
Most reliable and very early detection	• Early Warning in high airflow environment • No false alarms or icing by vapor	• Actively sampling the air • Cumulative sampling effect • Automatic de-icing
Most efficiently serviceable system	• High returns during maintenance • Test sampling point(s) can be out-side the cold room. • Units can be networked and remotely operated	• Avoiding the need to test every sampling point with smoke has tremendous cost savings, especially in areas of difficult access. • Not needing to enter the deep freeze zone for maintenance and testing saves time and costs.
Only way to a staged a incident control	• Pre-alarms avoiding unnecessary extinguishing release	Four sensitivity levels allowing for Alert, Action, Alarm and Extinguishing Release

SPRINKLERS IN COLD STORES

MARK THEWLIS
OPERATIONS DIRECTOR, ALPINE FIRE ENGINEERS

Alpine.

Fire Sprinklers – Low bay cold storage applications

Presented by

Mark Thewlis – Operations Director

Alpine.

Fire Engineers

Who We Are.

Alpine Fire Engineers are specialist providers in Design, Project Management and Maintenance of active fire suppression systems.

As an LPCB level 4 accredited business we are able to design, commission and maintain the most complex fixed fire protection systems.

Our success is driven by a reputation of exceptional customer service and reacting quickly enabling us to deliver projects to programme, budget and specification.

Assessed to ISO 9001
Cert/LPCB ref. 283

LPS 1048 Cert/LPCB ref. ASC-054

2,600,000
Square metres of Warehousing protected by Alpine designed and installed systems

1,100,000
Sprinkler Heads specified and installed

8,000
PPM tests and checks delivered annually

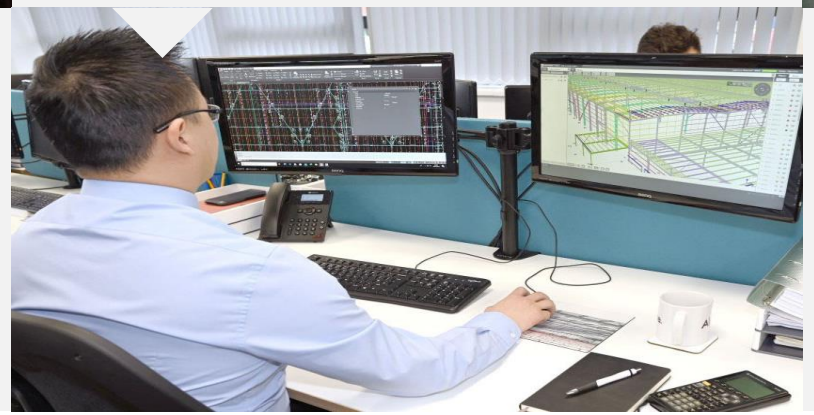
What We Do.

Design & Project Management

Alpine's fully employed team of
20 Designers & Engineers will be on hand to ensure on time on budget completion of the project.

Sales Estimating

Experienced and skilled cost planners provide cost certainty



Service & Support

A UK Wide network of service engineers ready to deliver planned maintenance and reactive response.

Design & Project Management.

Our fully employed team of 20 Design and Project Managers have delivered 25 new build schemes this year to date.

Client Impact:

Our design & project management team are fully conversant with both LPC and FM Global requirements. Using the latest innovations in BIM design technology and system design, Alpine will ensure that your solution will incorporate the most efficient, compliant and cost effective design and installation.

Where we work.

01	**Logistics**
02	**Aerospace**
03	**Automotive**
04	**F&B**
05	**Pharma**
06	**COMAH**
07	**Retail**

Sprinklers.

A fire sprinkler system is an **ACTIVE** fire protection measure.

Consisting of a water supply system, providing adequate pressure and flow of water through a distribution piping system

Onto which sprinkler heads are connected which operate in the event of a fire

ONLY IN THE VICINTY OF THE FIRE

Types Used in Cold Stores.

Four major types:-

1. **Wet Pipe System with trace heating and lagging**
2. **Wet pipe system with dry pendent drops**

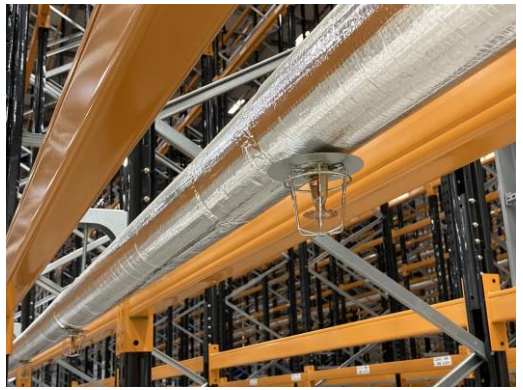
3. **Dry Pipe System**

4. **Pre-Action System**

NB Due to the intensive nature of protection required in automated high bay cold store applications, sprinklers in these areas can present huge technical / cost and programme challenges

Wet Pipe Sprinkler Systems.

01 Trace heating and lagging



Advantages

- Pipes constantly filled with water
- No delay in water getting to operating sprinkler head

Disadvantages

- Reliant on electricity supply
- Trace heating cable can degrade if constantly on
- Programme on build extended with electrical works

Wet Pipe Sprinkler Systems.

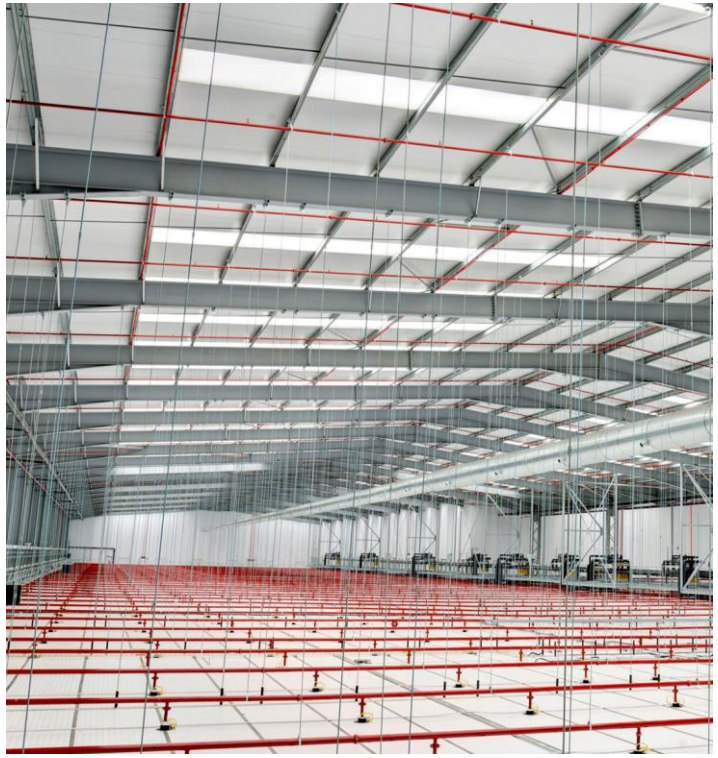
02 ambient temperature pipework feeding ESFR dry pendent drops into cold store

Advantages

- Pipes constantly filled with water, no delay in water getting to operating sprinkler head

Disadvantages

- ESFR Dry pendent drops more expensive per unit initial cost
- Practical limit on ceiling heights of 12.2m without supplementary in rack protection



Dry Pipe Sprinkler systems.

03 Air pressure holding back water at control valve

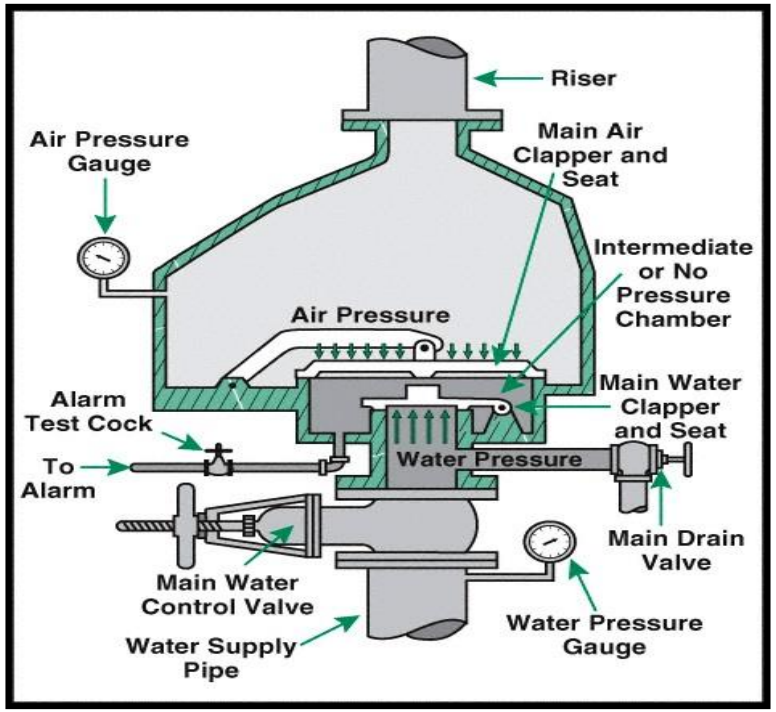
Advantages

Pipes filled with gas (nitrogen) or dehumidified air

Disadvantages

- Inherent delay in sprinkler activation, air/gas pressure must reduce to allow valve to open
- Size of installations limited, 30s delay maximum to remote sprinkler
- Pipework drainage slopes
- Cannot install in racks (LPC)

Not recommended for High Hazard storage



Preaction Sprinkler systems.

04 Mechanical Latch holding back water at control valve

Advantages

- Pipes filled with gas (nitrogen) or dehumidified air at lower pressure
- System fills with water prior to activation (no delay)

3rd party activation (fire alarm) minimises water being introduced into the pipework (hence *preaction*)

Disadvantages

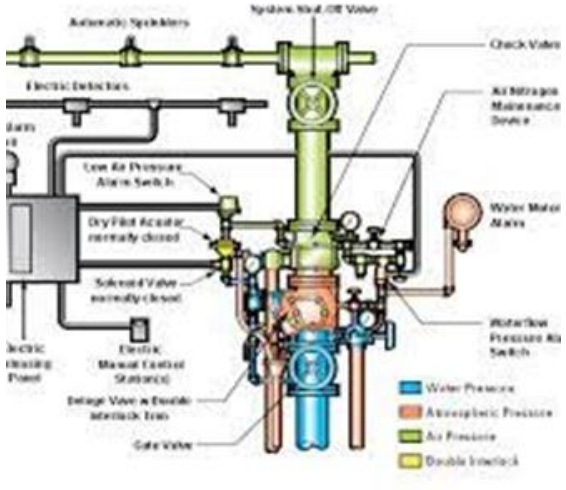
- Size of installations limited
- Pipework drainage slopes
- Cannot install in racks (under LPC) however regularly accepted as only means of protection as acceptable under FM regulations

Preaction Sprinkler Systems.

04 Interaction with other measures

Double knock:
2 separate coincidental signals from aspirating fire alarm (typically interlaced) send signal to control panel

Interlocks:
Interlock 1 = fire alarm signal, can be setup to operate on this alone Type
Interlock 2 = monitoring air pressure in pipework



Extract from FM DS 2-0 →

2.2.5.1.2 Install a refrigerated-area sprinkler system in accordance with the recommendations indicated for a double-interlock preaction sprinkler system in Section 2.2.4 except as modified or supplemented with the recommendations provided in Section 2.2.5.

Double knock + double interlock to be absolutely sure water is required before introducing into the pipework
NOT LPC APPROVED however required under FM regulations

Different Rulesets.

LPC (LPC rules incorporating BSEN12845) – British Standard, governed by BRE / LPCB

FM Global – International standard developed by FM Global, a US insurance company, governed by FM global risk surveyors

NFPA – International standard developed by National Fire Protection Association , governed by insurer involved

Other standards (VDS, ASIB) other standards specific to different countries

Service and Maintenance.

Specific to above options

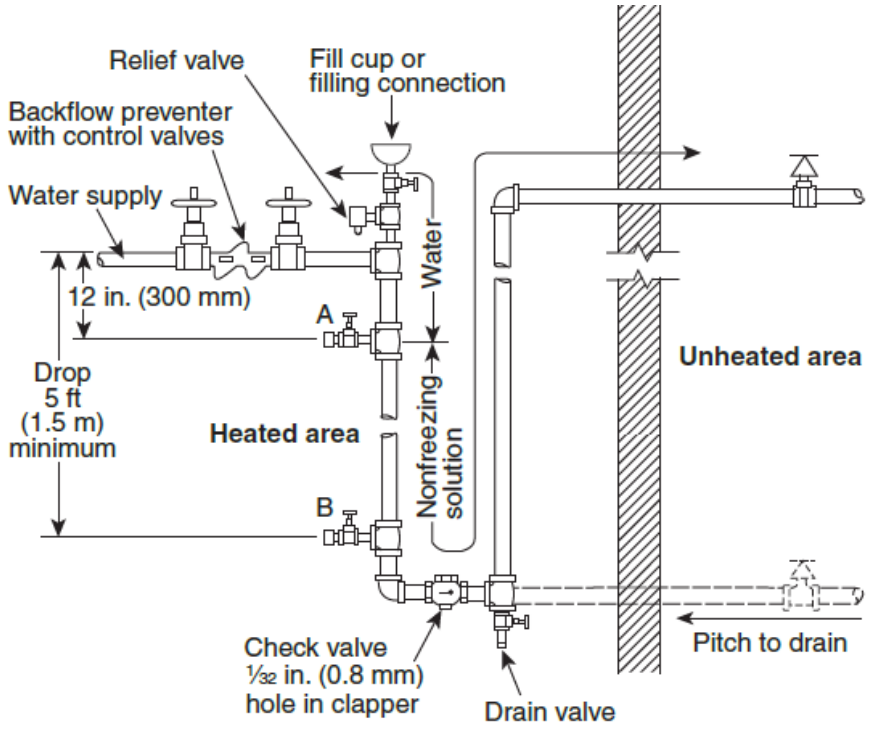
- Trace heating and lagging – Weekly checks for correct function
- Air pressure in dry pipework
- Preaction systems 6 monthly check function of Fire alarm interface with preaction panel by activating a detector (or pair of detectors)

All systems should have alarm interfaces checked weekly (bell test) and pumps checked for operation along with valves being in the correct position (amongst other items)

Other options.

Antifreeze (typically Glycol):

- Limited to 20 sprinklers area maximum under LPC rules
- Approved glycol to be used, guidance under FM and NFPA for use (incorrect use can lead to fire being fueled)
- Water in pipework must be fully premixed and tested with backup premix kept on site
- New products being developed in this arena variations on above themes (e.g. Quell system from Tyco, combination of ESFR and preaction)



Consultation with (AHJ's) Authorities Having Jurisdiction .

- Compromise difficult to avoid when selecting the correct sprinkler solution for cold stores
- Early consultation with insurer, fire officer, building control can make the process much smoother, engineering out potential issues.
- Programme management key when dealing with the inevitable "pull down" date and enabling water testing and commissioning in advance.

Our People.


Alpine.
Fire Engineers

Thanks for your time.

If you have any questions, please don't hesitate to get in touch.

Mark Thewlis
Operations Director

Alpine.
Fire Engineers

ADDRESS
Alpine House,
Hollins Brook Park,
Bury, BL9 8RN

CONTACT
0161 791 4500
hello@alpinefire.co.uk

www.alpinefire.co.uk

OXYGEN REDUCTION SYSTEMS

CARL BRYAN
DIRECTOR, WAGNER UK

WAGNER®
BETTER SOLUTIONS IN FIRE PROTECTION

Oxygen Reduction Fire Prevention Systems

Managing Fire Risk in the Cold Chain

Presenter

Carl Bryan

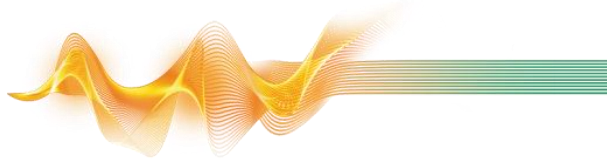
WAGNER UK Limited

Managing Director

Email: carl.bryan@wagner-uk..com

Website: www.wagner-uk.com

Agenda



- Introduction WAGNER
- OxyReduct – history
- System Definition
- Standards
- System set-up & design
- Benefits & Considerations
- References
- Closing Remarks

WAGNER – a family owned and operated company

WAGNER Group

- Founded in 1976
- Family-owned company (100%)
- Company headquarters in Langenhagen (near Hanover – DE)
- Worldwide activities

Werner Wagner
General Director

Torsten Wagner
General Director

Steffen Springer
General Director

EVOLUTION

1998

New technology: Fire prevention
With OxyReduct®, WAGNER introduces for the first time the technology of fire prevention.

2005

Expansion of OxyReduct® fire prevention systems
Introduction of the Compact systems for applications of 50 m³ and up, e.g. for IT and EDP areas.

2011

VPSA technology
New milestone for fire prevention with **OxyReduct®**: VPSA technology allows energy saving of up to 80 %.

2021

Installed systems
Since inception in 1998, more that 1100 **OxyReduct®**: systems have been installed around the world

2022

Areas of focus
The main areas of focus for the application of OxyReduct systems is automated logistics, archives and data centres

Oxygen Reduction System Definition

“Oxygen reduction systems are designed to prevent fires from starting or spreading, by means of the introduction of oxygen reduced air. Oxygen reduction systems are not designed to extinguish fires.

The design and installation shall be based on detailed knowledge of the protected area, its occupancy and the materials in question. It is important to suit the fire protection measures to the hazard as a whole”.

Source: BS EN 16750:2017

Oxygen-reduction – current standards

Country	Organization	Reference	Issued in year
DE **Germany**	VdS	VdS 3527 (01) VdS 3527 (02)	2007 2015
AT **Austria**	Fire brigades ASI – Austrian Standards Institute	TRVB S 155 08 OENORM F 3073	2008 2010
CH **Switzerland**	SNV	SN 123456	2009
NL **The Netherlands**	KIWA	BRL-K21017	2009
UK	BSI British Standards Institute	PAS 95	2011
Europe	CEN European Committee for Standardization	EN 16750	2017
USA	UL Underwriter Laboratories	UL 67377 #1 UL 67377 #2	2016 2016
Worldwide	ISO - International Organization for Standardization	ISO 20338	2019

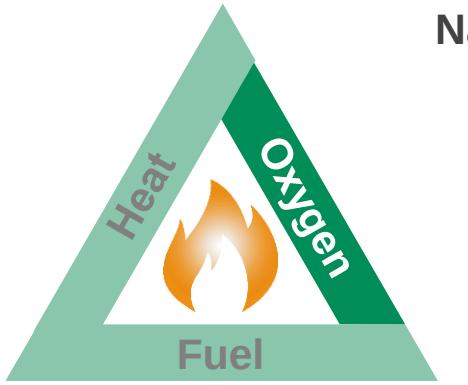
NEW: FM Global Examination Standard for Oxygen Reduction Systems, Class No. 5800, August 2021
NEW: FM Property Loss Prevention Data Sheets 4-13 Oxygen Reduction Systems, Oct 2021

OxyReduct® Fire Protection Solution

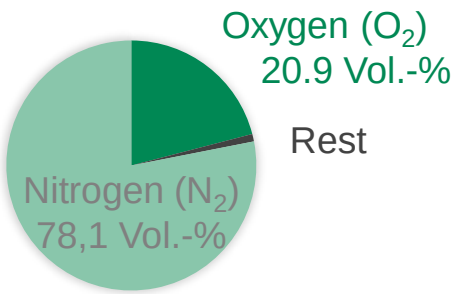
Oxygen reduction systems with OxyReduct®

Fire detection and alarm systems with TITANUS®

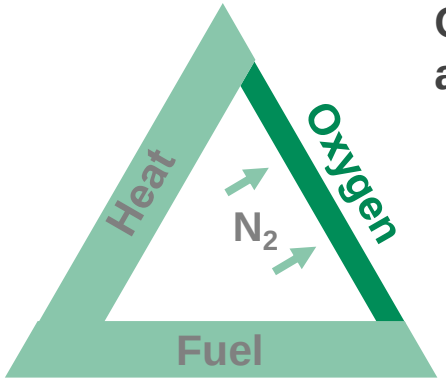
The fire prevention system principle



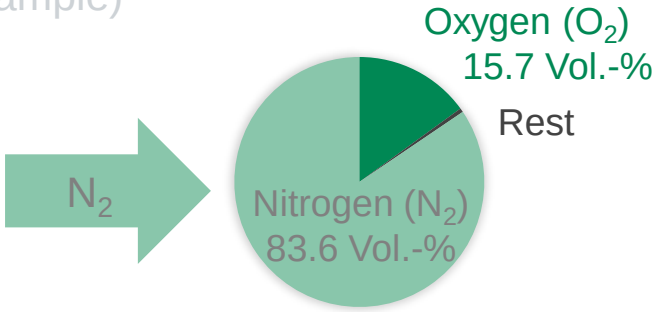
Natural atmosphere



By introducing nitrogen, the mixture ratio of the atmosphere changes.



Oxygen-reduced atmosphere (example)

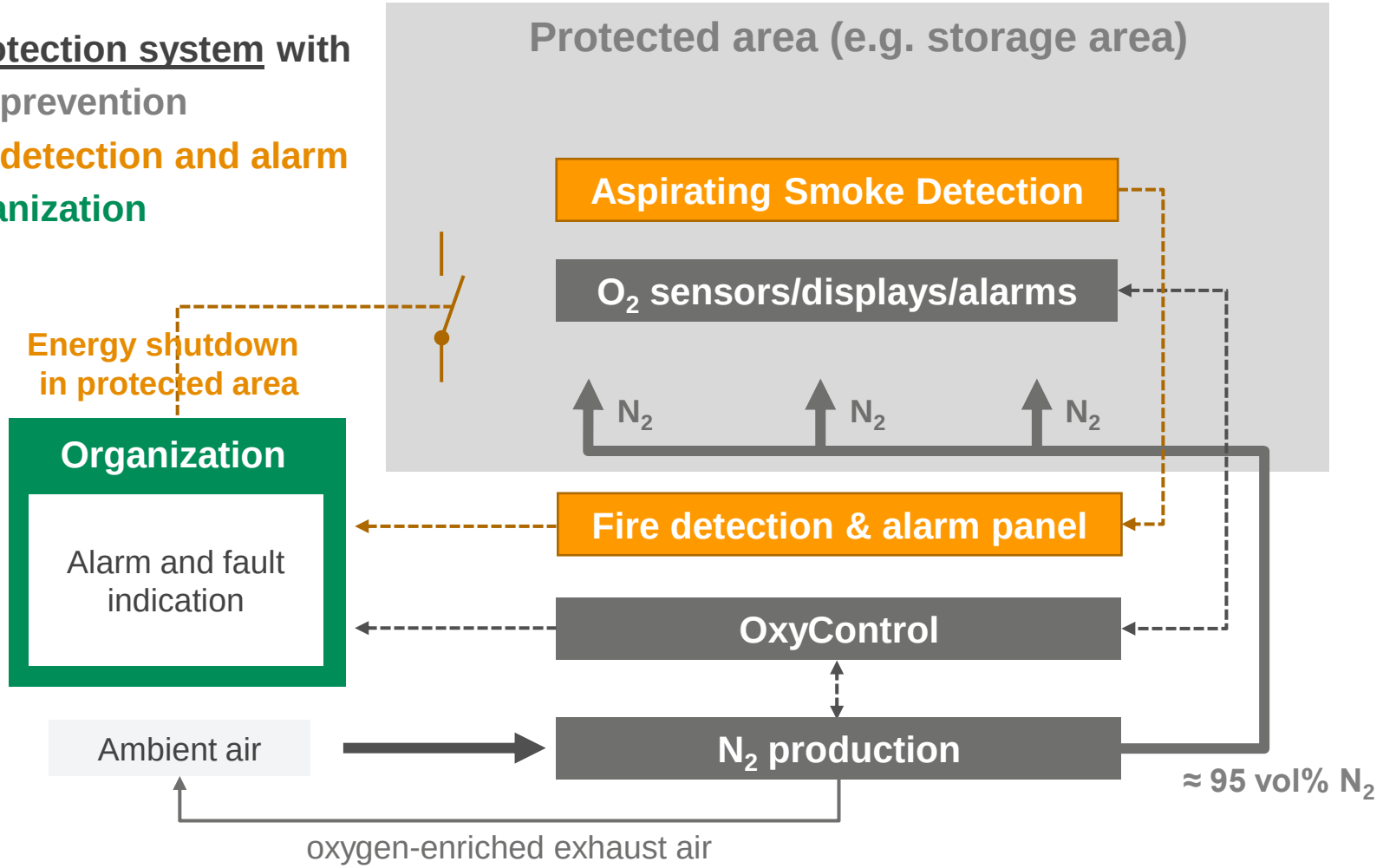


When oxygen concentration is reduced, so is flammability

System schematic of an OxyReduct® solution

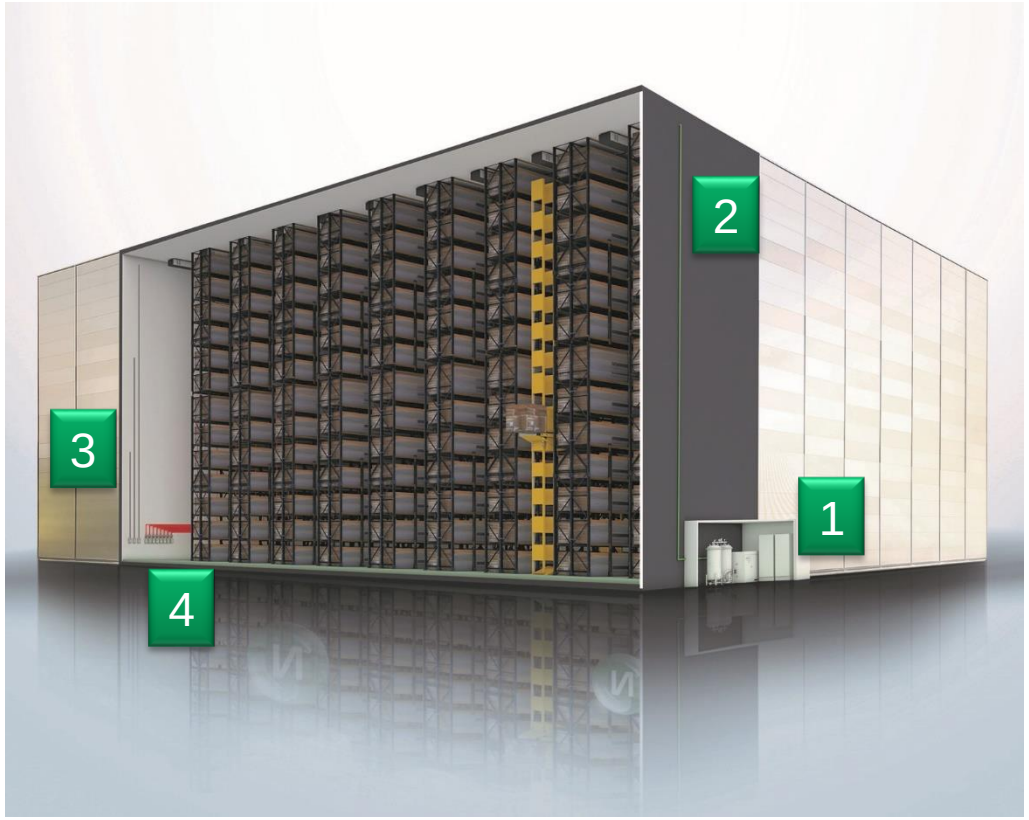
Fire protection system with

- Fire prevention
- Fire detection and alarm
- Organization



OxyReduct® component overview

1. OxyReduct machine room
   - Nitrogen module VPSA
   - Control PLC OxyControl
   - Electrical cabinets
2. Nitrogen pipe
3. Oxygen sensors
4. Titanus aspiration smoke detectors



OxyReduct® VPSA system - example

Equipment Room OxyReduct

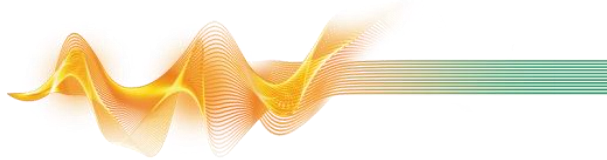
- VPSA vessels
- VPSA compressor / vacuum pump
- VPSA control cabinets
- Control air compressor
- Nitrogen piping incl. filter
- PLC OxyControl

Benefits

- Due to reduced oxygen level in protected area, no fire is able to propagate by means of the tested material
- No smoke contamination of sensitive materials and goods (e.g. frozen food, meat,…)
- No water damages due to reactive system activations (false or genuine)
- Product storage height is no longer influenced by the costs of in-rack fire protections systems
- Horizontal and vertical racking runs uninterrupted throughout the length and width of the cold store – maximizes storage density
- In combination with ASRS, low-oxygen systems enable higher-density and lower footprint configuration, which reduces building, energy and land costs

Our references

Closing Remarks



- Fire protection in automated frozen warehouses is challenging
- Active fire prevention with low-oxygen systems is an innovative solution with s number of benefits
- Already in use in Europe for more than 20 years
- Fire prevention systems are designed on a project by project bases
- The complexity of automated frozen warehouses requires close collaboration between all stakeholders to achieve the best possible outcome
- Oxygen reduction fire prevention gets to parts that others can’t!

Our promise

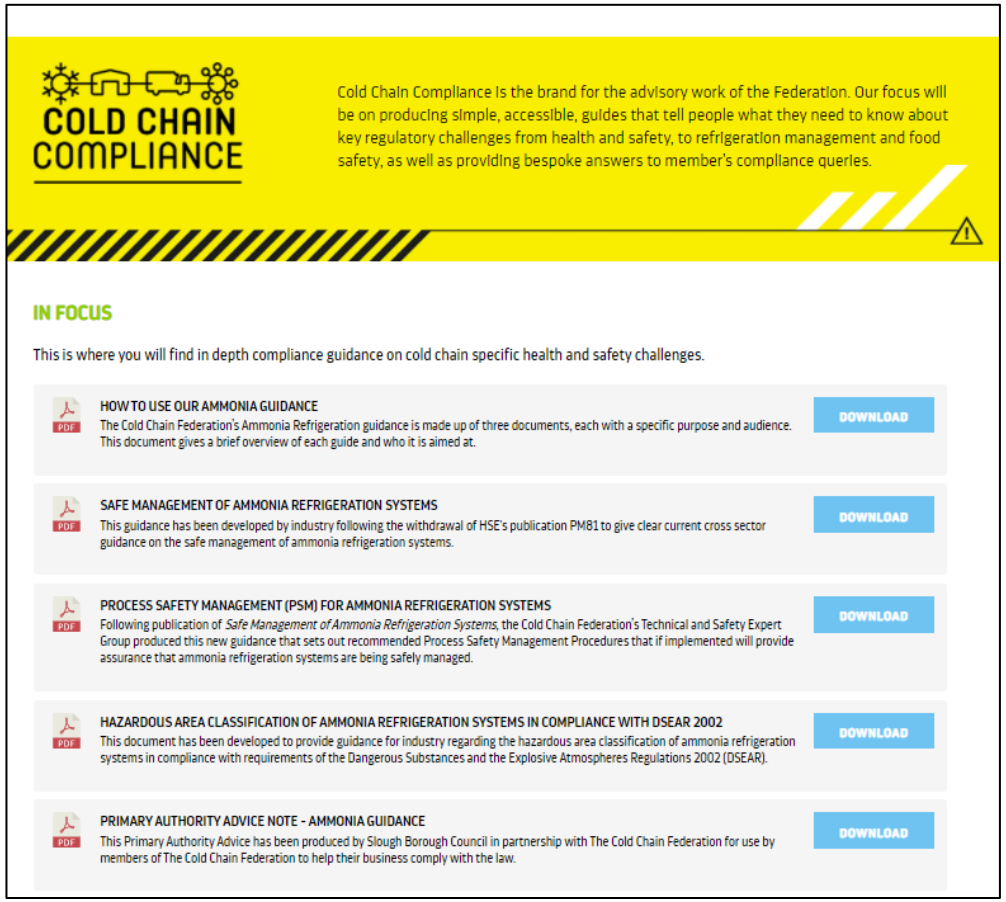
Better solutions
in fire protection

www.wagnergroup.com

QUESTIONS & DISCUSSION

With: SHANE BRENNAN
CHIEF EXECUTIVE, COLD CHAIN FEDERATION

GUIDANCE



All free to download at: www.coldchainfederation.org.uk

COLD CHAIN FEDERATION **ASSOCIATE MEMBERS**

WHO CAN HELP WITH YOUR **COMPLIANCE** AND **REFRIGERATION** QUESTIONS

COLD CHAIN FEDERATION

Citation

D. ...tec International Limited

Global QA Consultants

Gold Freeze

kiwa

S2 Fire Solutions

iAuditor by SafetyCulture

WAGNER BETTER SOLUTIONS IN FIRE PROTECTION

blended experts in chemical gases

Opteon Refrigerants

Chemours

EMERSON

Greencold Refrigeration & Air-Conditioning Engineers

Umwelt Stiftung Grosskopf GmbH

Hydratech

jd cooling Group

Ryan-Jayberg

space. engineering services

STAR REFRIGERATION

STRATOX

STYNE REFRIGERATION

COLD CHAIN COMPLIANCE

THANK YOU

JOIN US TOMORROW:

Wednesday 26th January 10:30am

DAY 2: FUTURE OF REFRIGERANTS

Ryan-Jayberg

Opteon™ Refrigerants

Chemours™