

Application Bulletin 2

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Application Bulletin: **Chemical Storage Enclosures** • Technology: **FirePro Condensed Aerosol**

Application
Chemical Storage Enclosures

The Risk
Flammable liquids, reactive substances, oxidisers and packaged chemicals, with risks of vapour ignition, rapid flame spread and reactions that can intensify fire conditions.

This Bulletin Covers
- Design considerations
- Environmental requirements
- End user responsibilities
- Post-discharge procedure
- Myths & comparative analysis

Mandatory Message to End Users
"All chemicals must be sealed in appropriate, approved containers. Compatibility between stored chemicals and aerosol residue must be verified as part of the hazard assessment."

Condensed Aerosol Fire Suppression in Chemical Storage Enclosures

Design Considerations, Environmental Requirements, End User Responsibilities, Myths & Comparative Analysis

1. Introduction

Chemical storage enclosures present a highly variable and potentially hazardous fire risk due to the presence of flammable liquids, reactive substances, oxidisers, and packaged chemicals.

Risks may include vapour ignition, rapid flame spread, and, in some cases, chemical reactions that can intensify fire conditions.

FirePro condensed aerosol (CA) technology provides an effective, LPCB-certified suppression solution for **fire control and flame suppression** in chemical storage environments, particularly where traditional water or gaseous systems are unsuitable due to contamination risks, infrastructure complexity, or compatibility concerns.

This bulletin outlines the design considerations, environmental requirements, end user responsibilities, and common misconceptions relevant to FirePro systems in chemical storage applications.

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2. Purpose of FirePro in Chemical Storage Environments

FirePro is designed to:

- Rapidly suppress fire at an early stage
- Prevent flame spread between stored materials
- Reduce the likelihood of escalation to full enclosure involvement
- Protect surrounding assets and infrastructure

However, FirePro is **not designed to neutralise hazardous chemicals or prevent chemical reactions unrelated to combustion**.

> **Therefore:**
> *FirePro must form part of a comprehensive risk management strategy, including correct chemical segregation, storage compliance, and hazard identification.*

This requirement must be clearly communicated to the end user during system design, installation, and handover.

3. Important Note on Residue and Chemical Compatibility

FirePro is not a clean gas agent and does not provide zero-residue discharge.

A light, dry aerosol particulate may deposit on surfaces after activation. In chemical storage environments, this may result in:

- Surface residue on containers and shelving
- Contamination of open or improperly sealed materials
- Interaction risks with certain highly reactive substances

> **Mandatory message to end users:**
> *"All chemicals must be sealed in appropriate, approved containers. Compatibility between stored chemicals and aerosol residue must be verified as part of the hazard assessment."*

This is a mandatory operational requirement.

4. Why Sprinklers and Water-Based Systems Are Unsuitable for Many Chemical Storage Applications

Water-based systems can present serious risks depending on the stored substances.

4.1 Chemical Reactions with Water

- Many chemicals react violently with water (e.g., alkali metals, certain powders)

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- Risk of explosion, toxic gas release, or fire escalation

4.2 Spread of Flammable Liquids

- Water can spread burning liquids, increasing fire area
- Ineffective on hydrocarbon pool fires in confined storage

4.3 Contaminated Run-Off

- Firewater becomes chemically contaminated
- Requires controlled drainage and environmental containment

4.4 Damage to Packaging and Containment

- Water can degrade packaging materials
- Leads to secondary spills or leaks

4.5 Water Mist Limitations

- May not suppress vapour-phase fires effectively
- Still introduces moisture into sensitive environments

5. Why FirePro Is Well Suited for Chemical Storage Enclosures

FirePro offers significant operational advantages where chemical compatibility is confirmed.

5.1 No Water or Liquid Discharge

Eliminates risks of:

- Chemical reaction with water
- Contaminated firewater run-off
- Packaging degradation

5.2 Rapid Flame Suppression

- Interrupts combustion at the molecular level
- Effective on flammable liquid vapours and packaging fires

5.3 Minimal Collateral Impact

- Does not spread liquid chemicals
- No mechanical force from discharge

5.4 No Cylinders or Pipework

- Suitable for confined or hazardous zones
- Simplifies installation in chemical stores or cabinets

5.5 Minimal Pressure Rise

- No requirement for pressure relief systems
- Suitable for non-sealed enclosures

5.6 High Tolerance to Leakage

- Effective even in ventilated chemical stores

5.7 Long 15-Year Operational Life

- Reduced lifecycle and maintenance cost

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6. Chemical Storage Protection Requirements (Mandatory)

6.1 Chemical Compatibility Assessment

- All stored substances must be reviewed for compatibility with aerosol systems
- Special attention required for:
  - Strong oxidisers
  - Reactive metals
  - Unstable compounds

6.2 Proper Containment and Sealing

- All chemicals must be stored in sealed, approved containers
- Open storage is not permitted in FirePro-protected enclosures

6.3 Segregation of Chemicals

- Incompatible chemicals must be physically separated
- Storage must comply with COSHH and relevant regulations

6.4 Ventilation Control

- HVAC systems must shut down upon activation
- Controlled ventilation may be required post-discharge

6.5 Spill Management

- FirePro does not address chemical spills
- Secondary containment must be in place

7. Environmental Conditions

Maintaining a controlled environment enhances system performance:

TEMPERATURE Stable, within safe chemical storage limits	**HUMIDITY** Controlled to avoid condensation or degradation
AIRFLOW Must be stopped during discharge to maintain aerosol concentration	**POST-DISCHARGE VENTILATION** Ventilate enclosure within 10–15 minutes

8. Design Considerations for Chemical Storage Enclosures

8.1 Fire Load Assessment

- Include packaging materials, shelving, and stored chemicals

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- Consider vapour-phase risks and spill scenarios

8.2 Enclosure Volume and Leakage

- Calculate full protected volume
- Apply leakage compensation factors

8.3 Aerosol Generator Placement

- Ensure even distribution across storage areas
- Avoid direct discharge onto sensitive or reactive materials where possible

8.4 Detection and Control Integration

- Early detection is critical (smoke, heat, or gas detection as appropriate)
- Integration with:
  - Fire alarm system
  - HVAC shutdown
  - Alarm notification systems

8.5 Explosion and Vapour Risk Considerations

- Where flammable vapours are present:
  - Consider explosion risk assessment (ATEX/DSEAR)
  - Ensure appropriate zoning and compliance

9. Post-Discharge Procedure

1. Evacuate and secure the area
2. Ventilate enclosure within 10–15 minutes
3. Inspect all chemical containers for integrity
4. Check for leaks or spills
5. Clean surfaces as required using appropriate chemical-safe methods
6. Confirm no ongoing reaction or hazard
7. Recommission FirePro system

10. Common Myths & Factual Counterpoints

Myth 1: "Aerosol systems are unsafe around chemicals."

Fact: FirePro is safe when chemical compatibility is properly assessed and storage is correctly managed.

Myth 2: "Water is always the safest fire suppression method."

Fact: Water can cause violent reactions, spread flammable liquids, and create environmental hazards in chemical storage scenarios.

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Myth 3: "Gas systems are better for chemical stores."

Fact: Gas systems require sealed enclosures and pressure venting. Many chemical storage areas cannot meet these requirements. FirePro operates effectively without them.

11. Transparency Statement

FirePro UK maintains full transparency:

- FirePro is designed to suppress fire, not neutralise chemicals
- FirePro is not a zero-residue agent; a dry particulate will be present after discharge
- Chemical compatibility must be verified before installation
- Proper sealing and containment of chemicals is mandatory
- FirePro is not certificated for deep-seated or chemically driven reactions
- FirePro introduces no water, avoiding reaction and contamination risks
- FirePro is often the most practical suppression method where water or gas systems are unsuitable

12. Summary

FirePro condensed aerosol provides an effective fire suppression solution for chemical storage enclosures, particularly where water-based systems pose reaction risks and gaseous systems are impractical.

Its ability to suppress flames rapidly, without introducing liquid or pressure complications, makes it well suited for a wide range of compliant chemical storage applications.

However, successful implementation depends on:

- Proper chemical compatibility assessment
- Correct storage and segregation practices
- Integration with detection and safety systems

Key operational requirement:
All chemicals must be correctly sealed, stored, and assessed for compatibility with aerosol discharge to ensure safe and effective fire protection.

If you would like to learn more about FirePro, or discuss a chemical storage application, please visit us at **www.fireprouk.com** – see contact details below.

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