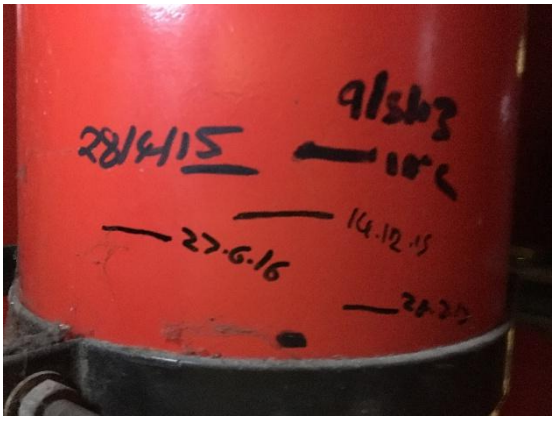
White Paper

Considerations for the extended lifecycle and or replacement of obsolete or aged, pressurised fire suppression gas systems.



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FirePro UK is certified by BSI to ISO 9001 and is an active subscribing member of the following trade associations

Product Certificate No. 1417a

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1. Ageing pressurised cylinders & enclosure integrity.

1.1 Ageing Cylinders and Pressure Vessels

- Cylinders require (PED Directive) hydrostatic efficacy testing (typically every 10 years).
- Older cylinders may often fail the test, making them non-compliant and requiring replacement.
- Manufacturers may discontinue older cylinder models, creating scarcity, driving prices.
- Transporting and testing high-pressure vessels is increasingly regulated and costly.

1.2 Pipework Integrity Degradation

- Pressurised gas systems rely on leak-tight pipe networks designed for specific flow rates.
- Over time, corrosion, joint fatigue, or building alterations cause:
    - Flow imbalance.
    - Pressure loss.
    - Non-compliance with design standards.
- Re-engineering pipework may be more expensive than replacing the system entirely.

1.3 Refill and Recharge Costs

- FM-200 and CO_2 require specialist refill facilities.
- FM-200 (HFC-227ea) is still available in the UK however refills are increasingly expensive.
- CO_2 refills require hazardous-materials transport and are increasingly regulated.

1.4 Environmental and Regulatory Pressure

- FM-200 has a high Global Warming Potential (GWP ≈ 3,220) and supplies are limited.
- Some end users may now discourage CO_2 due to life-safety risks.
- Replacement parts for older systems are discontinued as manufacturers shift to new technologies.

1.5 System Reliability Declines Over Time

- Pressure loss in cylinders.
- Valve failures.
- Actuator & pneumatic pipe degradation.
- Obsolete detection/control interfaces.
- Increasing maintenance costs and reduced system reliability.

2. Why enclosure seal integrity matters.

In simple terms: pressurised gas systems only work properly if the room can hold the gas long enough to put the fire out.
If the enclosure is leaky, the gas escapes, the concentration drops, and the system can't do its job.

A door fan test (to affirm agent hold time) is only a 'moment in time', i.e. it passed when it was tested. This is no different to a Government MOT vehicle inspection and test. Put simply, at the time of testing everything was verified as compliant. What it doesn't mean is that the enclosure will remain compliant for the next 364 days until the next test is undertaken, or say, vehicle tread that after driving 50 miles is then non-compliant, after the test confirmed it complied. Things change.

Both FM-200, CO_2, and similar systems work by filling an enclosure with a calculated amount of gas. If the enclosure leaks, the gas escapes and the concentration falls below the required level (specified by the manufacturer) to stop combustion. Think of it like trying to fill a bathtub with the plug out, it never reaches the level required.

2.1 Leaks allow gas to escape too quickly

Every protected room has small gaps:

- under doors.
- around cable penetrations.
- ductwork, ventilation.
- wall joints.
- ceiling voids.

If these aren't sealed properly, the gas flows straight out, especially because it is discharged at high pressure.

2.2 The system is design always assumes the room can "hold" the gas

Applicable BS/EN Standards require a minimum hold time, usually 10 minutes. This gives the fire time to cool and prevents re-ignition. If the room can't hold the gas for that long, the fire may restart even if the initial discharge knocked it down.

2.3. Poor room integrity negates the intended operation

If the enclosure fails a room integrity test (door fan test), the system is considered **non-compliant** because it cannot guarantee protection. This leads to:

- failed inspections & repeat test fees.
- increased maintenance costs.
- potential insurance issues.
- risk of system failure during a real fire.
- Repeat builders making good costs to achieve an 'on the day pass' status.

2.4. Leaks increase the risk of accidental gas migration

Escaping gas can move into adjacent areas, which is especially dangerous with CO_2 because it may displace oxygen in adjacent occupied spaces.

2.5 Maintaining seal integrity becomes harder over time

Buildings change:

- new equipment or cables are installed.
- contractors drill holes, unmanaged and without vigilance.
- doors may become damaged or warp.
- building services equipment is added or modified.
- Building structures move with time.
- Real estate changes hands, priorities change.

Each of these may create new leakage paths, meaning end user vigilance and care should increase over time with system age.

3. Overcoming the problem with FirePro fire suppression.

FirePro UK continues to positively react to requests from end users and specialist fire systems companies seeking an alternative solution, without detriment to fire cover and to elongate the fire suppression life cycle at lower cost.

Technically, FirePro does not behave the same way as pressurised gas. It does not rely on room pressurisation or gas concentration. It works by chemically interrupting combustion, not by flooding the room with a gas volume.

So FirePro:

- Has far greater tolerance to poor enclosure seal.
- Does not require room integrity testing, although testing may still be recommended.
- Discharges at negligible pressure therefore does not require over pressure venting.

This is one of the major reasons FirePro is ideal for retrofit, older buildings, and rooms where maintaining airtightness is impractical.

3.1 No Pressurised Cylinders

- FirePro generators are **solid-state**, all electrical, non-pressurised units.
- No hydrostatic testing, no pressure loss, no cylinder replacement.
- Eliminates the single biggest lifecycle cost of gas systems.

3.2 No Pipework or Nozzles

- FirePro is modular and installed directly in the risk area.
- No pipework to leak, corrode, or re-engineer.
- Ideal for retrofit projects where pipework replacement is inaccessible or impractical.
- Will liberate expensive real estate footprint required to house pressurised cylinders

3.3 Minimal Maintenance

- Only annual inspection and maintenance routines are required.
- No weighing of cylinders, no pressure checks, no flow calculations.
- Service costs are typically >30% lower than gas systems over the lifecycle.
- Does not require F-Gas certified competent personnel .

3.4 Long Service Life

- Comes with 3-year supply warrantee and 15-year certified lifecycle .
- No refills, no recharging, no consumables.

3.5 Environmentally Superior

- Negligible ODP / GWP.
- No PFAS, CFC's.
- No greenhouse gas emissions.
- This removes the regulatory and cost pressures associated with FM-200.

3.6 Safer Than CO_2

- Non-toxic at design concentrations.
- BS/EN 15276 lays out all required measures for safe system operation .
- Optional hold off, abort and door interlock options.

3.7 Lower Installation Costs

- No cylinders.
- No manifold.
- No pipework.
- No floor loading issues.
- No structural reinforcement .
- Simple electrical activation via control panel (e.g., Kentec Sigma XT).

4. Summary: Replace or retain?

Issue	Pressurised Gas Systems (FM-200 / CO_2)	FirePro Condensed Aerosol
Lifecycle Cost	High – cylinders, refills, hydrostatic testing	Very low – no pressure vessels
Regulatory Risk	Increasing (F-Gas, CO_2 safety)	Negligible GWP, fully compliant
Maintenance	Complex, expensive	Minimal
System Integrity	Dependent on pipework and pressure	Solid-state, no pressure
Refill Availability	Declining, costly	Not required
Retrofit Feasibility	Often difficult or impossible	Simple, modular
Safety	CO_2 hazardous to personnel	BS/EN 15276 lays out all required measures for safe system operation

In short: pressurised gaseous fire suppression systems become expensive to maintain as they age. The original intent to install was unquestionable, and the assets remain mission critical. Consideration of factors that may affect continued reliable operation are ever present with time for reasons stated. FirePro condensed aerosol fire suppression technology eliminates all of these failure points and provides a cleaner, safer, lower-cost, long-life alternative.

About the Author.

Tony Hanley, Managing Director of FirePro UK Ltd.

- Active fire systems engineering experience for >40 years.
- FIA board director 16 Years & currently Vice Chairman.
- Post Grenfell tragedy represented FIA in Hackitt review – WG4 Competency.
- 2023 FIA Lifetime achievement award – Exceptional services to fire industry.
- Formed fire engineering Co (Titan) in 1988, acquired by Marlowe PLC in 2016.
- Founder and Managing Director of FirePro UK Ltd.
- Pioneer in recognised competency standards for fire engineering.
- Ambassador for Children's Burns Camp Cambridge Charity.

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