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UK & IRELAND

White Paper

Considerations for the compliance-driven replacement of PFAS-based foam and compressed air foam (CAFS) fire suppression systems.



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Disclaimer: the views expressed in this document are intended to share the author's personal fire industry experience and subject considerations, as an aide memoir only.

1. The changing legal landscape for foam-based suppression

1.1 What changed on 4 July 2025

From 4 July 2025, firefighting foams containing PFOA above the applicable regulatory thresholds became prohibited under the UK POPs regime and associated chemical restrictions. As a result, affected firefighting foams should have been removed from service and replaced or disposed of through compliant routes.

This change represents a significant compliance milestone for UK duty holders. The focus of the restriction is the chemical composition of the foam concentrate rather than the delivery system. Where American references do appear, such as UL listings, FM approvals, the US Department of Defense's MIL-SPEC for fluorine-free foam or US AFFF litigation, they are included because they shape the products and the liability climate that reach the UK market, not because they set the rules UK sites must follow.

The scope of the ban is narrower than is often assumed:

- The restriction applies to the foam concentrate chemistry (PFOA/C8), not to any particular delivery hardware.
- It affects legacy AFFF (Aqueous Film-Forming Foam) stock wherever it is held, whether in portable extinguishers, fixed foam systems or Compressed Air Foam Systems (CAFS).
- Modern C6/fluorotelomer AFFF and fluorine-free (F3/SFFF) concentrates are not covered by this specific ban and remain lawful to use, refill and maintain.

CAFS itself has not become illegal. CAFS is a delivery mechanism, in which compressed air, water and a foam concentrate are mixed and applied under pressure. The ban applies to a specific class of legacy concentrate chemistry that many CAFS and fixed foam installations were originally commissioned with.

1.2 Why this still matters for CAFS operators

Even so, CAFS-equipped sites are more exposed to this change than most, for practical reasons:

- CAFS units typically hold a bulk foam concentrate reservoir (tens to hundreds of litres) rather than a single sealed extinguisher charge, so legacy C8 stock is more likely to be present, and in greater quantity, than in point-of-use extinguishers.
- Tanks, pumps, hose lines and proportioning systems that have carried C8 concentrate for years can retain PFOA residue even after a refill with compliant concentrate, unless properly decontaminated.
- Many CAFS installations pre-date clear labelling and batch-tracking practice, which makes it harder for duty holders to prove to an inspector or insurer exactly what chemistry is in the system today.
- Refill, service and decontamination of C8-contaminated hardware itself falls within the scope of the ban, which can leave duty holders unable to lawfully service equipment they still rely on.

1.3 Further restrictions are expected

The 4 July 2025 change is unlikely to be the last. Duty holders should plan on the basis that regulation will continue to tighten:

- The HSE opened a six-month public consultation on wider PFAS restriction in firefighting foams (including C6/PFHxA chemistry) on 18 August 2025, which closed on 18 February 2026.
- A formal UK restriction arising from that consultation is not expected to enter into law before early 2027 at the earliest, with a phase-out period likely to follow rather than a sudden cut-off.
- In the EU, Regulation (EU) 2025/1988 bans the sale of PFAS-containing foams from 23 October 2025 and requires full removal of PFAS-containing extinguishers by 31 December 2030. This does not apply directly in the UK, but it is likely to influence the direction and pace of UK restriction.
- Many fire engineers, consultants, insurers, airport operators and industrial end users now favour fluorine-free (F3/SFFF) solutions where suitable listed products are available for the specific hazard and application.

For duty holders, this means C6 AFFF and CAFS systems that are lawful today are likely to face restriction in future. Planning replacement now is likely to cost considerably less than a forced replacement once C6 is also restricted. Legal exposure is also not limited to future regulation. In the US, thousands of AFFF-related lawsuits are already before the courts, including a $10.3B settlement with 3M that is under appeal, which shows that legacy PFAS liability is a commercial issue as well as a compliance one.

1.4 The practical risk for duty holders now

- Legacy stock exposure: not knowing with certainty which concentrate chemistry is currently held or has historically passed through tanks and pipework.
- Disposal cost and complexity: legacy concentrate and PFAS-contaminated waste streams may require specialist hazardous waste treatment or disposal routes approved for PFAS-containing materials. Insurance and claims risk: insurers may request evidence of foam chemistry, compliance status and replacement planning during underwriting, renewal and claims investigations.
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- Environmental liability: PFAS run-off into drains, soil and watercourses during testing, training or a real discharge is a growing enforcement priority for the Environment Agency.
- Site downtime: hardware that cannot lawfully be serviced or refilled leaves the risk area without fire cover until the issue is resolved.

2. Why foam chemistry, rather than hardware, is the main issue

2.1 How CAFS and AFFF systems achieve suppression

CAFS and AFFF systems work by generating a foam blanket from a liquid concentrate, water and (for CAFS) compressed air. The blanket smothers the fuel surface, excludes oxygen and, in the case of fluorinated (AFFF) concentrates, forms a thin aqueous film across the fuel that suppresses vapour release. The suppression performance is a property of the concentrate chemistry, not of the pump, tank or delivery hardware.

Replacing the concentrate therefore changes what the system legally is, without necessarily changing the mechanical system around it. It also means compliance and performance must be assessed separately: a compliant concentrate must still be proven, tested and listed for the specific fire risk and hardware it is used with. Foam concentrate is listed for use with specific proportioning equipment and discharge devices; where a listing does not already exist for a given combination, the components need case-by-case approval from the authority having jurisdiction.

2.2 Contamination and cross-batch risk

- PFAS chemicals have some of the strongest chemical bonds known and adhere tightly to tank walls, hose linings, pump seals and proportioning equipment.
- Refilling a system that has historically held C8 concentrate with a compliant C6 or fluorine-free product does not, on its own, guarantee the discharged agent is free of legacy PFOA, and verified decontamination or hardware replacement may be required. Decontamination effectiveness can vary significantly depending on the system design, materials of construction and historical use. Where contamination is suspected, effectiveness should be demonstrated through documented testing and verification appropriate to the installation.
- Mixed-batch record-keeping across decades of top-ups makes it difficult to state with confidence, in an audit or after an incident, exactly what has been discharged historically.
- Different types and brands of foam concentrate should not be mixed for storage or use unless the manufacturer can demonstrate compatibility and the authority having jurisdiction accepts that data. This is a relevant constraint when planning any phased or partial replacement of an existing CAFS system.

2.3 Environmental and operational liabilities

- Test discharges, training exercises and real fire events all release agent into the environment, so run-off containment and disposal now carry regulatory and cost implications.
- Bunding, drainage isolation and firewater retention requirements are becoming stricter for any site holding fluorinated foam, adding to the ongoing cost of retaining a foam-based system.
- Legacy concentrate and contaminated hardware awaiting replacement must be stored and eventually disposed of via licensed hazardous waste routes, at a cost that rises with delay. Foam concentrates also have listed storage temperature limitations, which can require heated or cooled storage in more extreme climates.

2.4 Compatibility issues when switching concentrate

- Proportioning systems, branch pipes and foam-making equipment are calibrated to a specific concentrate's expansion ratio and viscosity, so changing chemistry can require re-commissioning as well as a refill.

- Fluorine-free concentrates do not form the same aqueous film as AFFF, so system performance against the specific fire risk must be re-verified against the manufacturer's listing (for example, UL 162 or an equivalent FM approval) rather than assumed.
- Where hardware cannot be proven decontaminated or re-verified as compatible, duty holders should weigh full system replacement against a documented decontamination-and-refit programme. The right choice depends on the age and condition of the hardware, the cost of each route, and how much confidence the decontamination evidence provides.

2.5 Increasing scrutiny

- Some insurers are increasingly requesting confirmation of foam chemistry, environmental controls and regulatory compliance as part of underwriting, renewal and claims-related enquiries.
- The Environment Agency's enforcement focus on PFAS in firewater run-off is increasing, particularly for high-hazard and COMAH sites.
- Fire risk assessors and consultants are increasingly flagging legacy AFFF/CAFS installations as a documented risk in fire risk assessments, creating a paper trail of known but unaddressed liability.

3. Compliant replacement pathways

There is no single correct replacement for every PFAS-affected foam or CAFS installation. The right choice depends heavily on the application (open-air and large-surface Class B risk is a very different problem from an enclosed plant room or engine enclosure) and on the condition, age and contamination history of the existing hardware. Two broad compliant replacement pathways are available, although suitability will depend on the hazard, enclosure characteristics, applicable standards, operational requirements and lifecycle cost considerations.

3.1 Fluorine-free (F3/SFFF) foam: retrofit or replacement

Synthetic Fluorine-Free Foam (SFFF) is a foam concentrate based on hydrocarbon surface-active agents rather than PFAS chemistry, and it is now the most direct like-for-like replacement for most existing CAFS and fixed foam installations, particularly for open-air, large-surface Class B risk such as bunded tank farms, runway response or vehicle and wildland fire response, where a foam blanket remains the established technology.

- UL-listed and FM-approved SFFF products are already on the market, and a DoD MIL-SPEC-approved SFFF concentrate exists under MIL-PRF-32725, with further approvals expected as manufacturers bring products through testing.
- Because it uses the same basic delivery principle as AFFF, existing CAFS pumps, tanks and proportioning hardware can often be retained, subject to verified decontamination and re-listing for the new concentrate rather than a full mechanical rebuild.
- Decontamination has to be proven rather than assumed. PFAS residue is persistent, so tanks, hoses and pumps with AFFF history need a documented clean-out (or targeted component replacement) before they

can be relied on to run PFAS-free, and system performance needs re-verification against the new concentrate's listing for the specific fire risk.

- Ongoing costs are broadly similar in kind to a legacy foam system (concentrate purchase, proportioner calibration, and run-off containment for testing and training), but without the PFAS-specific disposal and liability burden.

3.2 Condensed aerosol for enclosed risk areas

Condensed aerosol technology, such as FirePro, is designed primarily for enclosed and normally unoccupied or intermittently occupied risk areas including electrical rooms, machinery spaces, generator enclosures, switchgear rooms and similar applications. Unlike foam systems, condensed aerosol systems do not rely on liquid concentrates, water supplies or proportioning equipment. System suitability should always be assessed against the specific hazard, occupancy profile, enclosure integrity requirements and relevant standards.

Because there is no liquid agent, there is nothing to refill, decontaminate, or classify as PFAS-related hazardous waste, and no exposure to future PFAS-specific restrictions.

- Units are typically installed within the protected enclosure and may reduce the need for some of the infrastructure associated with traditional foam systems, subject to project-specific design requirements.

- Maintenance requirements vary by manufacturer, certification scheme and application. In many cases they may be lower than those associated with foam systems because there is no foam concentrate management, proportioner calibration or routine agent sampling.

- The main limitation is scope. Condensed aerosol is not a like-for-like replacement for open-air, large-surface Class B applications such as tank farms or runway foam response, where CAFS and foam remain the established technology. Adopting it also means a full system replacement rather than a retrofit of existing foam hardware, so the capital cost profile is different from a foam-to-foam transition.

- As with any total flooding technology, effectiveness depends upon correct design, installation, enclosure integrity and ongoing maintenance in accordance with the manufacturer's requirements and applicable standards.

3.3 Choosing between the two

For most estates, the decision comes down to a few practical questions:

- Is the risk area enclosed (a plant room, enclosure or engine space) or open-air/large-surface? For enclosed risk, either pathway may be suitable; open-air and large-surface Class B risk will generally need to stay with a foam-based solution.

- How confident can you be, with evidence, that existing tanks, hoses and pumps can be decontaminated and re-verified? Where that confidence is low, the practical cost of full replacement (in either technology) may be lower than the cost of proving decontamination.

- What is the comparative lifecycle cost over the expected service life? For a foam-based route this covers concentrate, testing, proportioner maintenance and disposal; for condensed aerosol, the capital cost of full replacement.

A fire engineer or consultant can help weigh these factors against the specific hazard, hardware condition and budget for a given site, rather than defaulting to a single technology across an entire estate.

3.4 Applicable Standards and Third-Party Approvals

Fire suppression systems should always be designed, installed, commissioned and maintained in accordance with the relevant standards, certification requirements and approval schemes applicable to the risk.

Depending on the technology employed, these may include:

- BS EN 13565 series for foam systems.
- BS 5306 series where applicable.
- EN 1568 performance standards for foam concentrates.
- NFPA 11 where specified by insurers or global engineering standards.
- ISO 15779 for condensed aerosol fire-extinguishing systems.
- EN 15276 where relevant to fixed firefighting applications.
- Third-party approvals such as LPCB, UL, FM, VdS or Kiwa certification where available.

Compliance with recognised standards and approvals remains as important as compliance with chemical restrictions and should form part of any replacement strategy.

4. Summary: understanding the trade-offs

Issue	Legacy PFAS AFFF / CAFS	Fluorine-free (F3/SFFF) foam retrofit	Condensed aerosol (enclosed risk only)
Legal status	**Partly banned**: C8 (PFOA) already banned from use, refill and service (4 Jul 2025 in the UK); C6 under active HSE restriction consultation	**Lawful**: not covered by the current C8/PFOA ban; UL-listed and FM-approved products available, plus one DoD MIL-SPEC-approved product (MIL-PRF-32725)	**No PFAS content of any kind**: outside the scope of current and proposed restrictions
Regulatory trajectory	**Increasing**: further restriction possible from ~2027 onward, and F3/SFFF is already the default specification for new Class B risk in many organisations	**Currently unrestricted**, but as a fluorine-free hydrocarbon chemistry it should still be tracked against future foam-specific rules	**Not applicable**: removes PFAS exposure permanently for the risk area it covers

Issue	Legacy PFAS AFFF / CAFS	Fluorine-free (F3/SFFF) foam retrofit	Condensed aerosol (enclosed risk only)
Lifecycle cost	**High**: tanks, pumps, proportioners, concentrate, hazardous disposal, plus decontamination or replacement of contaminated hardware	**Moderate**: concentrate cost plus verified decontamination (or targeted hardware replacement) of any tank, hose or pump previously used for AFFF	**Low for the areas it protects**: no liquid agent or foam-making equipment, but full replacement rather than retrofit
Contamination / decontamination risk	**Significant**: legacy PFAS residue is strongly bonded and can persist in tanks, hoses, pumps and even tools after cleaning	**Requires proven decontamination**: any equipment with AFFF history must be cleaned and verified; contaminated tools, transfer pumps and hoses should be segregated and never reused for SFFF	**None**: no liquid agent present at any point, so no cross-contamination pathway
Environmental risk	**High**: firewater run-off, soil and watercourse contamination risk; PFAS-contaminated waste must go through licensed hazardous disposal (typically high-temperature incineration)	**Lower than legacy AFFF**, but run-off containment, concentrate storage temperature limits and disposal of any legacy residue still apply	**Negligible**: no PFAS run-off risk from testing, training or discharge
Maintenance	**Complex**: pumps, proportioners, concentrate sampling and compatibility checks (different foam types/brands must not be mixed unless manufacturer data proves compatibility)	**Moderate**: proportioning equipment must be listed for the specific concentrate and re-verified after any chemistry change	**Minimal**: annual inspection only, no proportioner calibration or concentrate sampling
Suitable applications	**Broad**: including open-air / large-surface Class B risk	**Broad**: including open-air / large-surface Class B risk and bunded tank farms; the closest like-for-like replacement for most existing CAFS installations	**Enclosed risk only**: total-flooding areas such as plant rooms, enclosures and engine spaces; not a substitute for open-air or large-surface Class B applications

The 4 July 2025 ban on C8/PFOA firefighting foam is the first confirmed step in a wider tightening of UK PFAS regulation that is likely to reach C6 and other foam chemistries within the next few years. CAFS hardware itself is not illegal, but sites relying on legacy AFFF concentrate now carry compliance, environmental and insurance exposure that is likely to increase. Fluorine-free (F3/SFFF) foam has become a widely adopted replacement option for many foam applications where appropriate approvals, listings and performance verification are available for the specific risk.

For enclosed risk areas specifically, condensed aerosol systems offer an alternative that removes liquid foam concentrate altogether. The right route (foam-to-foam replacement, condensed aerosol, or a mix of both across a site) should be decided application by application, based on the hazard, the hardware, and the evidence available.

About the Author.



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- 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 for 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.
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To see our general FAQs, click here.

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