Business Update

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Dennis Convey, Business Development Manager at Fire Lion Global, outlines how to retrofit fixed foam systems for fluorinefree performance, pump compatibility and regulatory compliance

t Fire Lion Global, we receive constant enquiries from engineers, contractors and facility owners navigating the transition away from firefighting foams containing perand polyfluoroalkyl substances (PFAS) such as AFFF (aqueous film forming foam), AR-AFFF (Alcohol Resistant AFFF) and FP (Fluoroprotein). This article outlines the essential steps, hidden challenges and core design principles for converting fixed fire protection systems - specifically those using foam pumps - to SFFF (Synthetic Fluorine-Free Foam).

The shift away from PFAS

The fire protection industry is undergoing a major transformation as global regulators phase out PFAS. These "forever chemicals" have been linked to environmental and health concerns, triggering product bans, litigation and regulatory reform.

SFFF has emerged as the replacement of choice, but making the switch is not a simple swap. Especially in fixed foam systems using positive displacement gear pumps, the shift requires detailed evaluation, hydraulic "All systems that are required to operate during an event must be tested simultaneously to simulate actual discharge conditions." . WWWWWWW



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recalculations and – often – substantial system modifications.

SFFF is not a drop-in replacement

One of the most common – and dangerous – misconceptions is that SFFF performs the same as AFFF. It does not.

AFFF forms a vapour-sealing aqueous film that rapidly suppresses volatile fuel vapours. SFFF lacks this filmforming ability and relies entirely on foam blanket quality and stability. Knockdown times can be longer and performance on volatile fuels may be reduced unless the system is adjusted accordingly.

This reality forces system designers and owners to focus heavily on foam quality, expansion and blanket sustainability under harsh conditions, particularly in hydrocarbon fuel storage and aviation hangars.

Wide performance variability across SFFF brands

SFFF products (those without intentionally added PFAS) are not standardised. Major differences include:



- Approved SFFF products are typically non-Newtonian and shear thinning. One cannot select a single-point viscosity for calculations, as the shape of the viscosity vs shear curve also determines frictional losses.
- Many concentrates are significantly more viscous than AFFF, requiring positive displacement (PD) foam pumps.
- Replacement of proportioning equipment is always required (unless utilising the FM approved Electronic Foam Proportioner – EFP).
- Expansion ratio This is affected by nozzle design, water quality and foam formulation.
- Application rate Some SFFF products require substantially higher flow rates than AFFF for similar performance on challenging fuel types.

Selecting the right foam concentrate means evaluating approvals (UL, FM, EN etc.), application test results and ensuring compatibility with sitespecific hazards.

Compatibility with existing equipment

Legacy systems were designed around AFFF and may not support the higher viscosity or application demands of SFFF:

- Proportioners (mechanical, ILBP, venturi) may fail to deliver accurate ratios unless upgraded or replaced.
- Pressure Sustaining Valves must comply with SFFF concentrates' material construction requirements and include sensing line sizes appropriate for viscous concentrates.



- Traditional nozzles and aspirating devices may underperform if not certified with the specific SFFF.
- Centrifugal pumps often struggle to maintain consistent flow with SFFF; Listed and Approved PD pumps are required for all foam concentrates under NFPA 20.
- Black iron pipe can no longer be used with any foam concentrate, per NFPA II.

Designers must verify that each component – foam tanks, piping, discharge devices and pumps – is certified for use with the chosen SFFF concentrate and in compliance with NFPA standards.

Steps for a successful transition

Assess the existing system and identify all foam equipment.

Select an approved SFFF that matches your hazard type and required flow rate.

Confirm approvals for every system component at the specific SFFF application rate.

Use the Darcy-Weisbach formula – not Hazen-Williams – for foam hydraulics due to viscosity effects. Work with the foam manufacturer to obtain viscosity vs shear rate information and pressure loss tables.

Recalculate the foam pump duty point since the driver horsepower, incoming power supply, PRV set pressure and potential pump size could change with different pressure. Ensure the foam supply is I5–30 PSI / I–2 Bar above water at the injection point. Overshooting this pressure can result in mechanical proportioner failure.

Calculate NPSHa using NFPA 20 guidelines and compare it to NPSHr received from the pump manufacturer. Include all pressure losses from the foam tank to the pump inlet (Darcy-Weisbach).

Performing a full acceptance test

a) Ideally using equipment and methods that do not mix foam concentrates but measure the foam concentrate with the system proportioning equipment during acceptance or annual testing. These foam proportioners must



be approved. (Note that for NFPA acceptance, some system types must show acceptable coverage during commissioning.

b) During commissioning, all systems that are required to operate during an event must be tested simultaneously to simulate actual discharge conditions, verifying operation of the system and all components as designed.

This sequence ensures you don't just meet code – you meet performance and environmental standards.

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Final thoughts

Replacing PFAS-based foam is inevitable – but doing it wrong is costly. SFFF retrofits demand a deep understanding of fluid dynamics, regulatory approval and fire performance.

With the right foam, properly sized foam pumps, NFPA 20 compliance and full-system testing, your upgraded system will be safer, more environmentally sound and futureready.

Fire Lion Global is here to help guide this process. With FM-approved solutions like our Electronic Foam Proportioner (EFP), UL Listed and FM approved PD foam pumps, tested with all major OEM SFFF foam concentrates on the market, retrofits become cleaner, faster and more cost-effective – without compromising performance.

CHANGE IS NOT EASY. WE ARE HERE TO HELP. Environmentally sound life safety solutions.

As industry continues to move towards more environmentally friendly firefighting foam systems it's important to maintain life safety standards. At Fire Lion Global our mission is to provide reliable, performance driven solutions you can count on to protect lives and property without harming the environment. Our specialized rotary gear displacement pumps are the heart of those systems handling the challenges of Synthetic Fluorine Free Foams (SFFF).

To ensure your system is environmentally safe we've also developed the Electronic Foam Proportioner Skid (EFPS). Incredibly accurate, the EFPS provides measurement of both the foam concentrate and the water supply without discharge. Thoughtful solutions for a safer world.

When your fire suppression system is needed you can count on us to deliver, protecting lives, property and the environment.





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