Trusted above all.

How PFAS legislation will affect your foam system designs

Fire Sprinkler International 2023 – Session 2 - Foam

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Place: Amsterdam

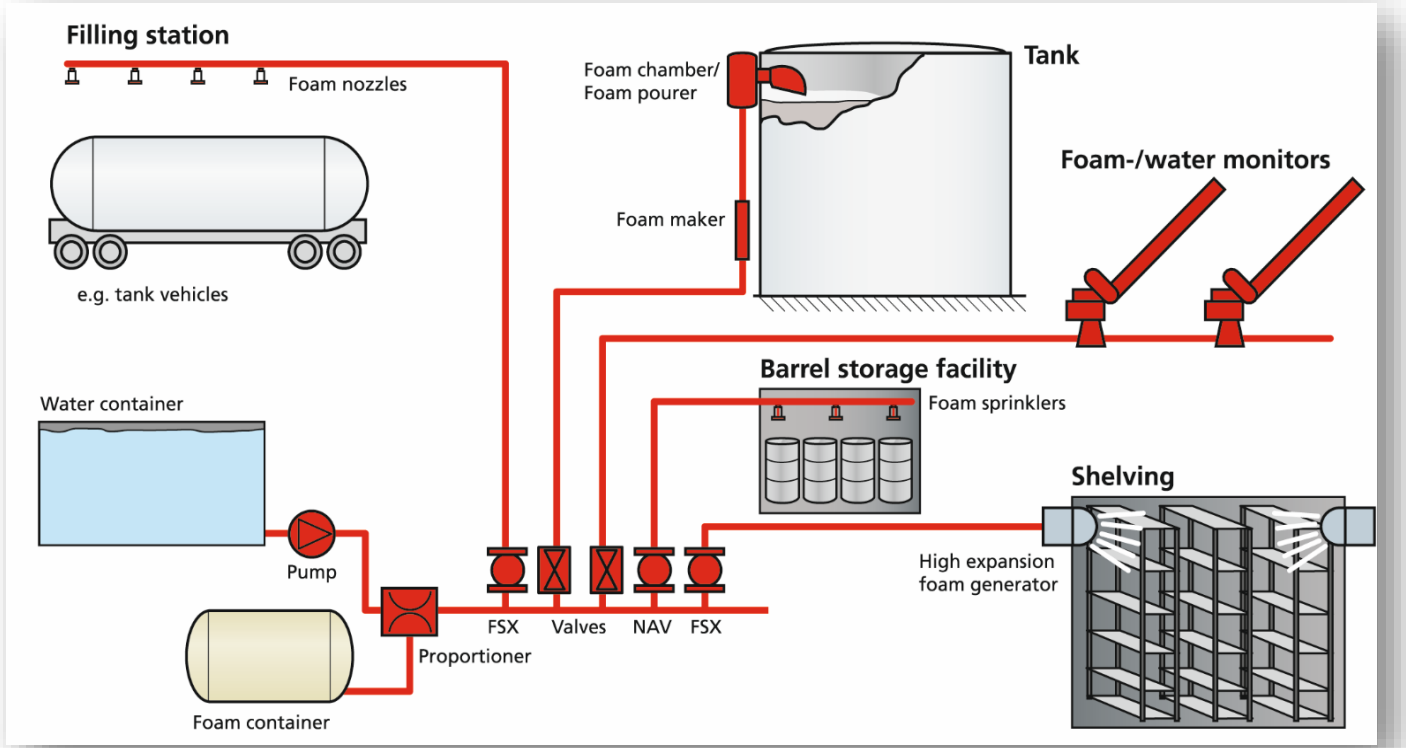
Introduction

COMPANY BACKGROUND

- **Viking is a manufacturer & distributor of fixed foam system equipment.**
- **R&D team & facilities in Europe & USA**
- **Extensive line of FM and UL Listed products under our Viking and KCA brands.**
- **Additionally, many local approvals and certifications.**
- **Own manufacturing facilities in Europe and USA.**
- **Strategic supply and development partnership with Fomtec of Sweden.**
- **One of 4 manufacturers offering FM and/or UL Listed SFFF system solutions.**

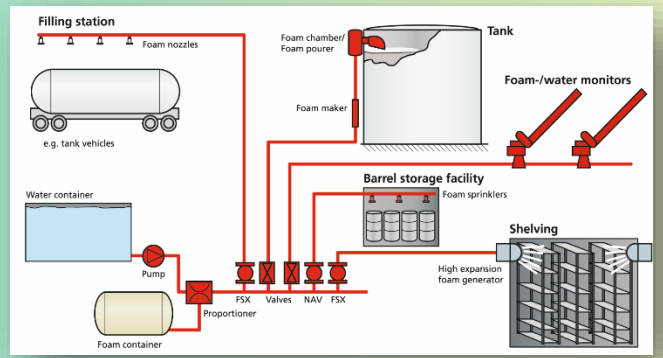
FIXED FOAM SYSTEM - BASICS

- **Fire fighting foam in fixed fire protection systems is predominantly used where ignitable (ClassB) liquids are present.**
- **This is because water alone is often ineffective in suppression or extinction or because adequate drainage and containment of spilt fuel is not present.**
- **-Foam concentrate is mixed with water to produce a foam solution.**
  -This solution is distributed around the fire protection system.
  -It is then transformed into finished foam once it is discharged from specific devices in the fire area.



Background – Foam System Approach

FOAM SYSTEM APPROACH



Europe has mixed approach to the design and performance reassurance of fixed foam systems.

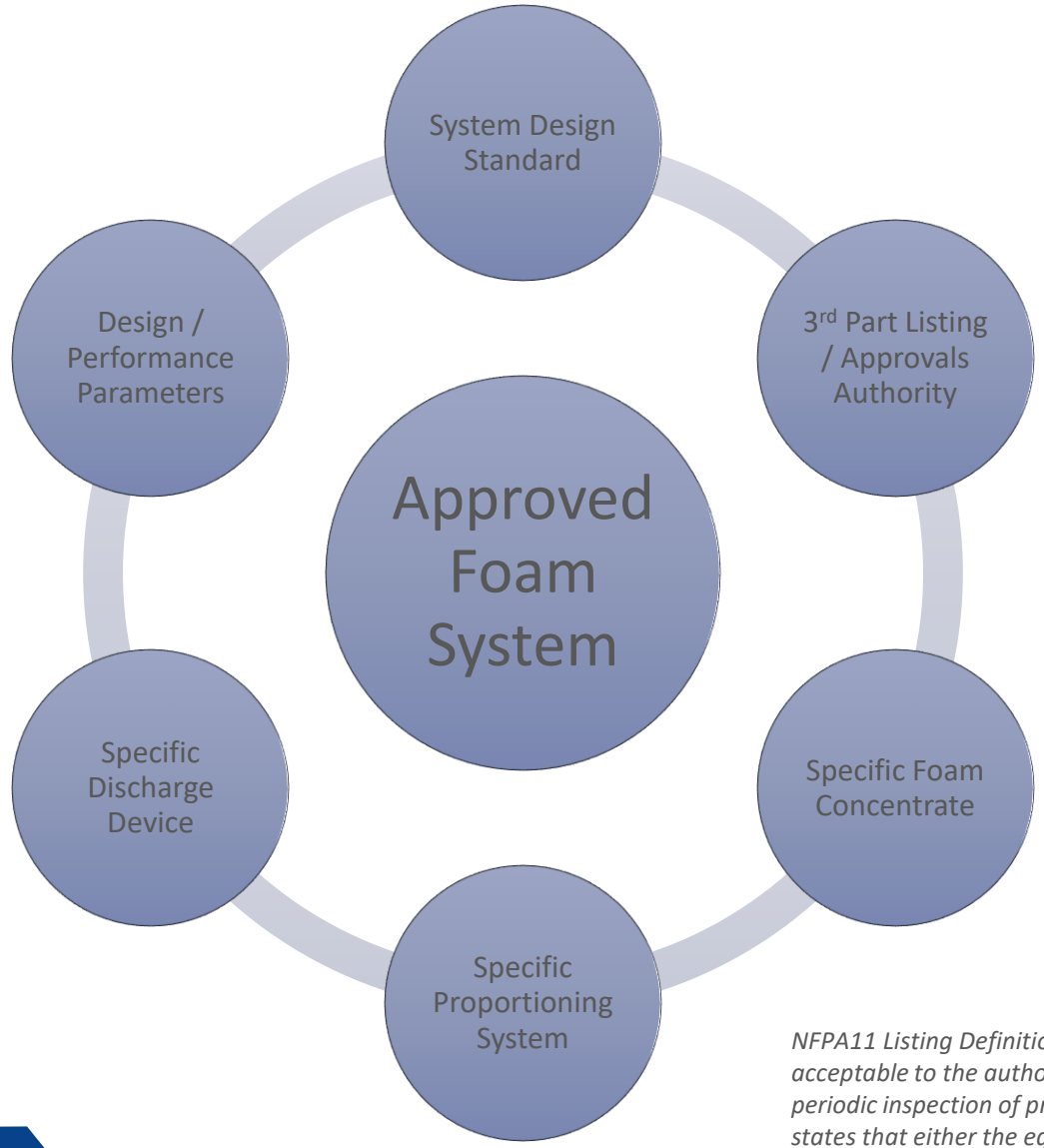
“Approved” Foam Systems.

and

“Non-Approved” Foam Installations.

This is different to the USA where the use of NFPA codes drives the market to “Approved” Foam Systems.

“APPROVED” FOAM SYSTEMS



- NFPA11 is the design standard for Low, Medium and High Expansion fixed foam systems. It requires the use of “Listed” equipment.
- The predominant 3rd Party Authorities used are Factory Mutual (FM) and Underwriters Laboratories (UL).
- FM5130 and UL162 are their respective test standards for foam system components.
- Both require that specific components are brought together and tested as a system with defined design criteria such as discharge pressure, application densities and flow rates.
- Different categories of ignitable liquids are defined.
- System designers / integrators have clear parameters for their design. AHJs have a clear basis for system acceptance.
- (FM also has several occupancy design standards).

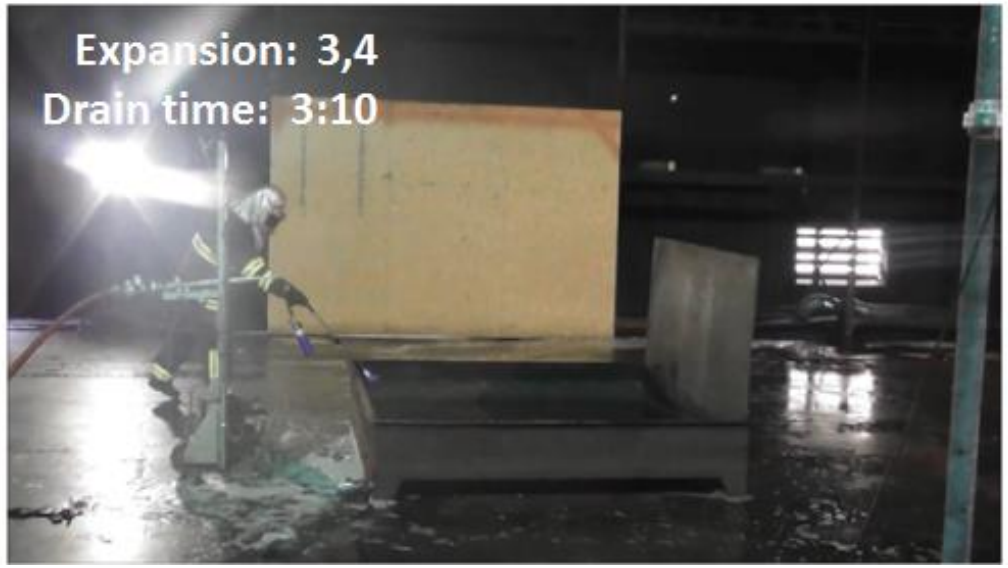
NFPA11 Listing Definition = Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

“NON-APPROVED” FOAM INSTALLATIONS

- Predominantly EN1568 certificated foams.
  EN1568 is a foam concentrate certification and does not give any performance indicators for use with discharge devices.
- Design standard EN13565-2 does give application density guidance but does not stipulate that concentrate and device need to be independently tested together.
- When non-aspirated sprinklers are used, there is no design parameters given. Manufacturer shall be consulted but what must the manufacturer confirm???
- There is no regard for different ignitable liquid types.
- In general the design basis is straight forward but actual parameters are unknown. Fire performance is also unknown.
- AHJs have a more difficult time to decide what is acceptable. Increasingly in the SFFF age, manufacturers’ input is required.
- This should be data-based advice not opinion.

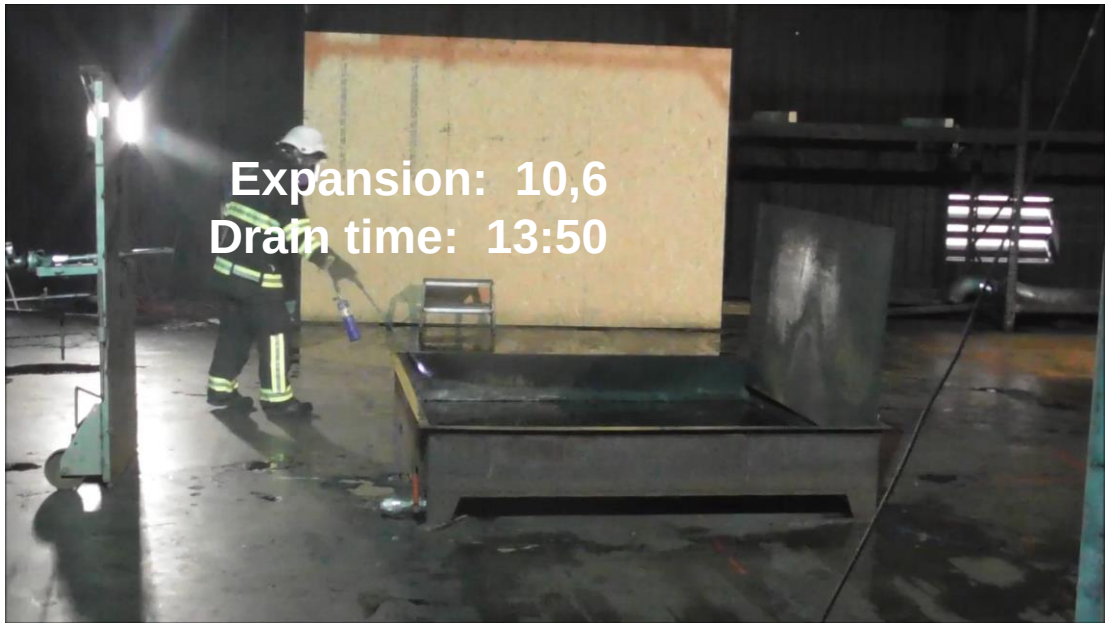
PERFORMANCE PARAMETERS

- **These videos show a comparison between a good foam quality and a low quality.**
- **(Quality = Expansion & Drainage Time)**
- **The foam quality is primarily dictated by the discharge pressure combined with foam type and device.**
- **Approved system components are tested at various pressures to give a design range parameter.**
- **This is the same test and same foam – only difference is the expansion / drainage and highlights why it is important to use approved equipment – in line with the approval parameter.**



PERFORMANCE PARAMETERS

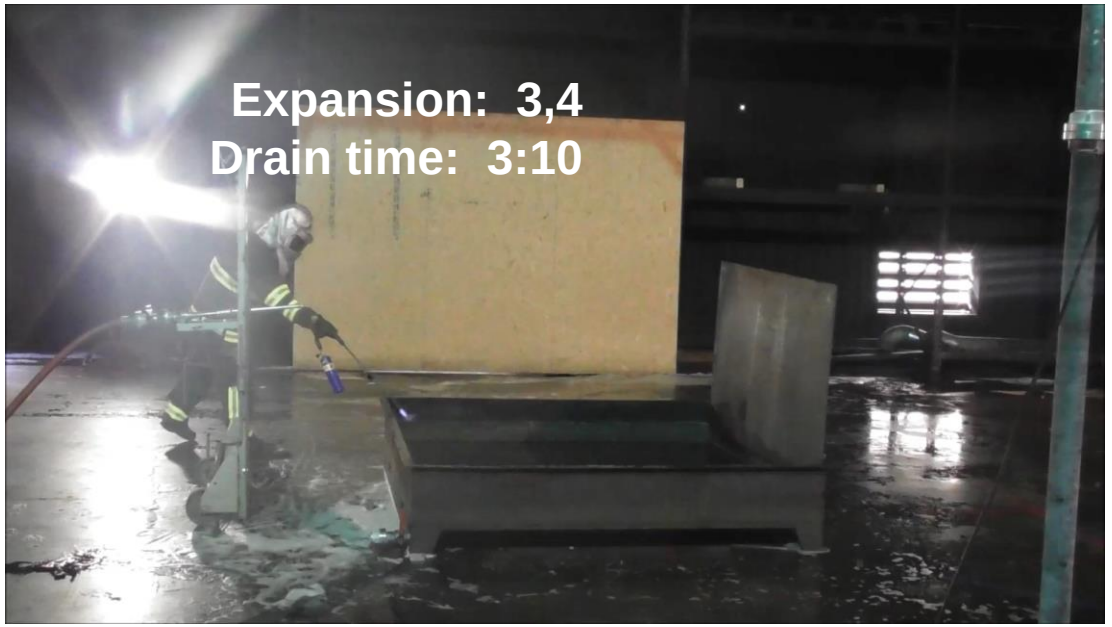
”High” FQ



Impact of Foam Quality

Fuel: Acetone
Flow rate: 23,3 l/min

”Low” FQ

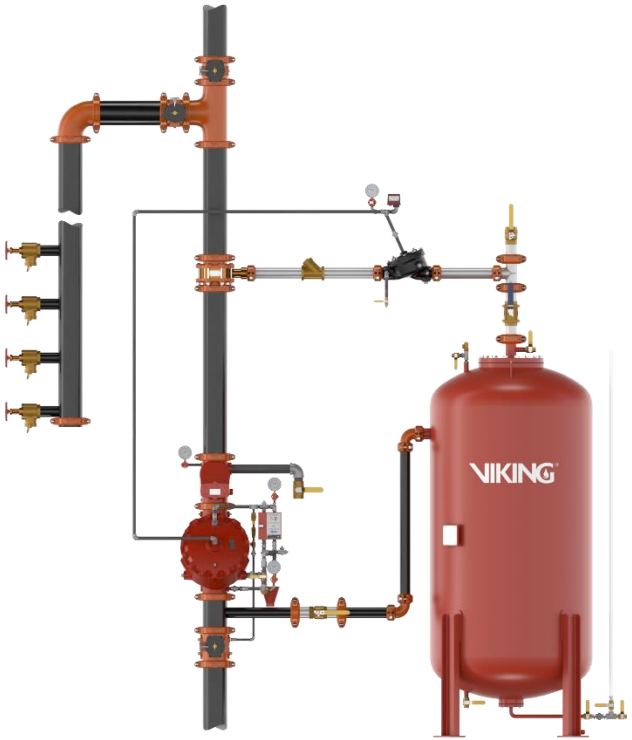


- SFFF = Synthetic Fluorine Free Foam
- **Although SFFFs have been around for almost 20 years, only in the past 5 years have we seen a more global emphasis from the market.**
- SFFFs work but it is clear that the removal of the fluorinated surfactants (PFAS) has an effect on performance.
- **Assumptions should not be made based on past "knowns" coming from the fluorinated era.**
- SFFFs generally have more variance across ignitable liquid types.
- **To compensate for the challenges in foam concentrate technology, system design and the use of known design parameters should be tightened.**
- ***The following experience and advice is based on the "Approved" system approach.***

System Design Considerations

NEW SFFF SYSTEMS

1) New systems are relatively straightforward.
2) There is no difference to the approach compared to fluorinated foams.
3) A design standard should be selected.
4) The risk(s) should be identified.
5) A system type and discharge device should be selected which has test / approval data suited to the risk
6) Special attention shall be given to the proportioning system.
7) Selected equipment should be used within its listed parameters.
8) Cost differences between AFFF- and SFFF-based systems are negligible.



- The past year has seen many in-progress projects converting to SFFF.

This is due to the increased awareness of legislative impacts, availability of verified products (often with the same design requirements) and future-proofing by end users, insurers and AHJs.

TRANSITIONING OF EXISTING SYSTEMS TO SFFF

- Existing systems that need to be transitioned due to PFAS legislation pose a greater challenge.
- The effort and investment involved is often unbudgeted so the most cost-effective approach is often key.
- Many large multinationals are fully engaged with transitioning due to regulation or corporate sustainability policies.
- Many end users are planning transitions as budgets need to be secured.
- There are many considerations when planning an SFFF transition……

TRANSITIONING OF EXISTING SYSTEMS – FAQ's

- What type of fluorinated foam is in the system and what are the legal obligations?
- Is the driver for SFFF due to regulation, end user policy, future proofing?
- What design standard is being used?
- What approvals are required?
- Are the end user and AHJ requirements consistent with each other?
- Has the client had other SFFF transition projects?
- What fuel (ignitable liquid) is being protected?
- What if there is no approval or test data for that fuel? (testing, small-scale test)
- What are the existing discharge devices?
- What is the existing proportioning system? Can it be re-used?
- What is the equivalent length of the foam concentrate line?
- What to do with the old foam?
- Cleaning v complete change….
- Is my supplier experienced with SFFF-based systems and product compatibility?

CASE STUDY

CS#1: **Retrofit of Foam System in Bulk Storage Area and Loading Area**

Client: **Global Chemicals Company (USA)**

Driver: **Legal situation related to PFAS**

Benefit: **Ahead of legislation, Public Perception, Zero PFAS**

Scenario

Client had an existing tank containing pentane in small bunded area with drain to remote retention pit plus a truck unloading area. Existing system based on AFFF and foam makers and spray nozzles (loading rack)
Corporate policy dictated a move away from fluorinated foam concentrates irrespective of future legislation.
Mandate was ZERO trace of PFAS in fire systems.

Key Challenges - Solutions

1) Zero PFAS – client replaced complete system bladder tank, deluge valves, pipework and discharge devices.

2) Foam concentrate – Initial design based on standard SFFF but at the time no listed bladder tank (which AHJ would not accept). Changed to AR-SFFF which also had foam makers and sprinklers Listed. (*note – listing evolution*).

3) Discharge Pressure – The existing pressure for the new foam makers was not sufficient (to meet the Listing).
As the pump was 25 years old, a replacement was installed to increase end pressures.

CS#7: Completed retro-fit (how not to do it)

Scenario

Client has transitioned their existing system from AFFF to SFFF and now has some issues….

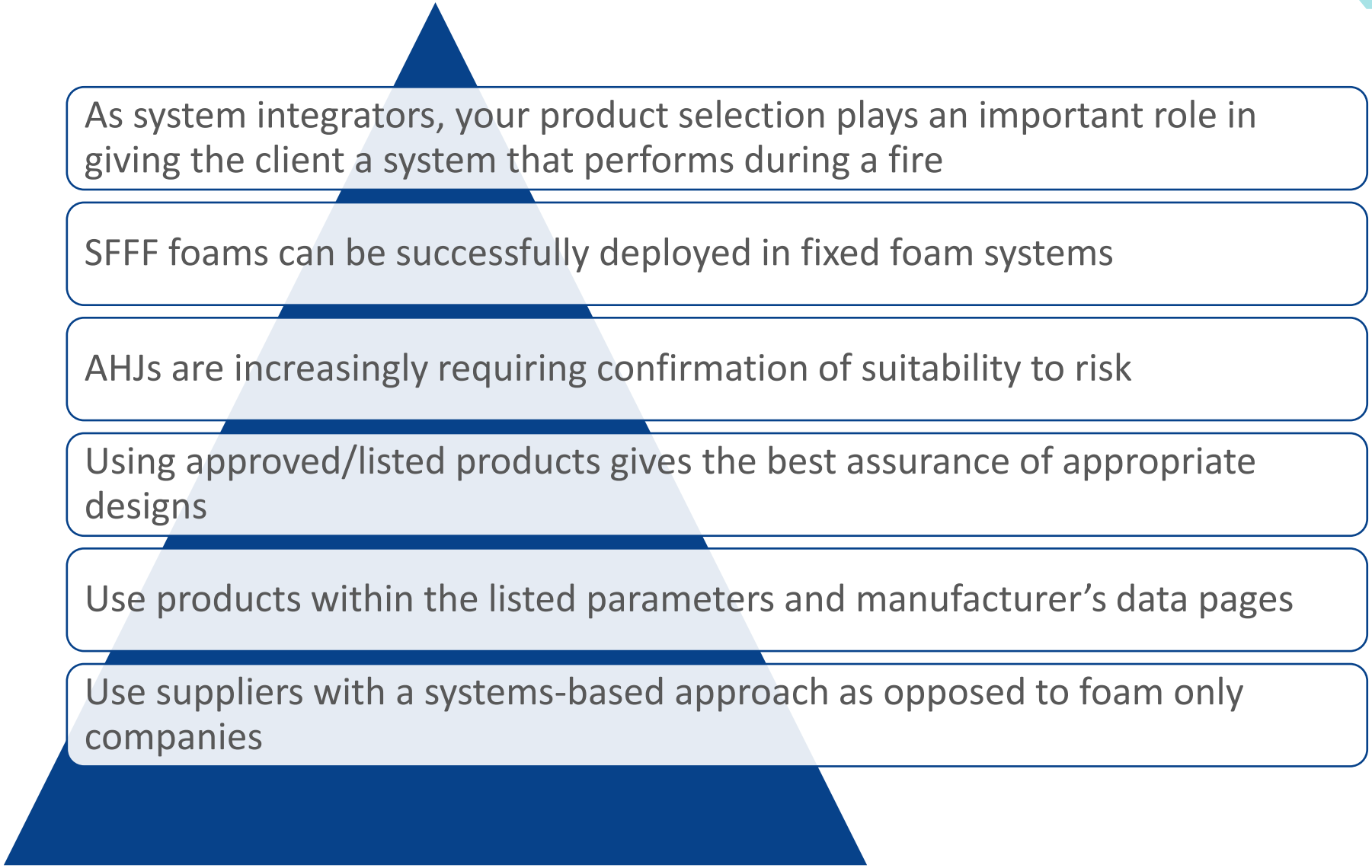
Key Challenges - Solutions

Client had an AFFF-based FM/UL compliant system
They removed the AFFF and replaced with fluorine-free foam
The proportioner was not changed.
The bladder was not changed.

Result

Now the system is no longer FM/UL Approved. (chosen manufacturer has no approvals).
The proportioner is mixing incorrectly (because of the viscosity change)
SFFF added to the tank is now contaminated with PFAS foam because there is no way to sufficiently clean the bladder.
This is where system manufacturer knowledge and guidance could have helped.

CONCLUSIONS



Thank you