



Preface

restrictions in their use.

By now, many companies and governments are familiar with the problem of the fluorine components (PFAS) in fluorinated firefighting foam. The long-term adverse effects on the environment and human

health of fluorinated firefighting foams are leading to increasing

Awareness of the adverse effects of fluorinated firefighting foams leads to concrete action in some places, while in other places, the possibilities and consequences of switching to alternatives to fluorinated firefighting foams are being considered. In the industry, the number of parties wanting to make the transition to a fluorine-free foam concentrate is accelerating.

But: how do you make a responsible transition? Which stakeholders are involved and what are their interests? What are the technical challenges of the transition? Where can you find up-to-date, impartial and complete information?

The foam transition requires customisation per organisation. The process and end result are always different. This means that no ready-made step-by-step plan is applicable.

The fact that there is no bite-sized solution does not mean that the transition can't proceed orderly. On the basis of 4 roughly defined phases, we help to make a responsible transition to a fluorine-free foam concentrate. Based on experience with industrial firefighting, firefighting foams, practical tests and advisory processes, H2K and Kappetijn Safety Specialists (KSS) have come to a practical whitepaper on the Foam Transition.

Together with KSS, H2K previously wrote a whitepaper on the problems with the use of fluorine in foam. Now that more and more parties are on the eve of a transition to fluorine-free firefighting foam, it is time for a whitepaper focused on the practicalities of the transition.

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Rotterdam, autumn 2020

PFAS

PFAS is the collective name for poly and perfluoride alkylated substances. This group includes PFOS and PFOA. This substance group is unique because of a number of things: it hardly bonds with other substances, resists very high temperatures and promotes flow behaviour. An ideal substance to add to firefighting foam. PFAS also has many other applications. Examples include: anti-stick coating in frying pans, as an impregnating agent for textiles and for making paper and cardboard water and grease repellent.

However, this substance group is toxic and possibly carcinogenic even in very low concentrations. It barely breaks down in the environment and accumulates in living organisms. That is why there is great concern worldwide about the spread of these substances in the environment.

Within the European Union, PFOS has not been used in firefighting foam since 2011. The phasing out of PFOA has been initiated. A total ban or restriction on the use of all PFAS is currently being examined. This has implications for the long-term availability of fluorinated foam concentrate. More and more organisations therefore want to get rid of fluorinated firefighting foam.





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European Regulations

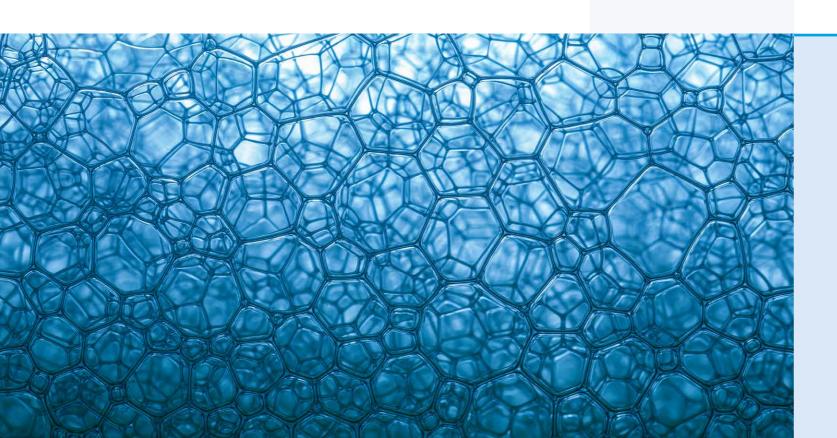
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One of the main drivers in the ban on fluorine components in foam concentrates is the tightening of European regulations.

The following timeline is used in European legislation*.

A distinction is made in C8, with 8-fold carbon chains, C6, with 6-fold carbon chains and all PFAS, where no distinction is made in the number of carbon atoms in the molecule.

Each of these substances has its own timeline. The timeline for regulations on C8 is final. The years included for C6 and PFAS are the probable starting date for restrictions on the use of these substances.



2011	Use of PFOS prohibited
2020	All C8 (other than PFOS), e.g. PFOA, ban on manufacturing, testing and selling. Standard for use in < 25 ppb for C8.
2021	Mandatory registration of use and storage (> 50 litres) for all C8-containing foam concentrate.
2022	Use of C8 foam concentrate only within containment (e.g. tanks and tank bunds).
2023	C8-containing foam concentrates must be removed if foam collection cannot be guaranteed upon use. Prohibition to sell products with > 25 ppb C6.
2024	All use of C8-containing foam prohibited.
2025	All C8-containing firefighting foams must be disposed of and incinerated. Probable effective date for prohibition of sale and use of all PFAS. Possible use of PFAS allowed in case of fire > 500 m2 as collection is guaranteed.

^{*=} on the basis of the information available in December 2020

Problem and background

In recent decades, a closely interwoven (fire) safety system has emerged, with rules, working methods and 'common practice' in which highly effective firefighting foams with fluorine components are an important factor. The effectiveness of an extinguishing agent is one of the crucial factors on which other parts of that safety system depend. Switching from one concentrate to another has effects on the foundations of repressive and stationary fire protection systems.

The combination of rapid developments in the global firefighting foam industry and the diligence with which the parties are working on this dossier can lead to a switch being made too quickly and too unilaterally.

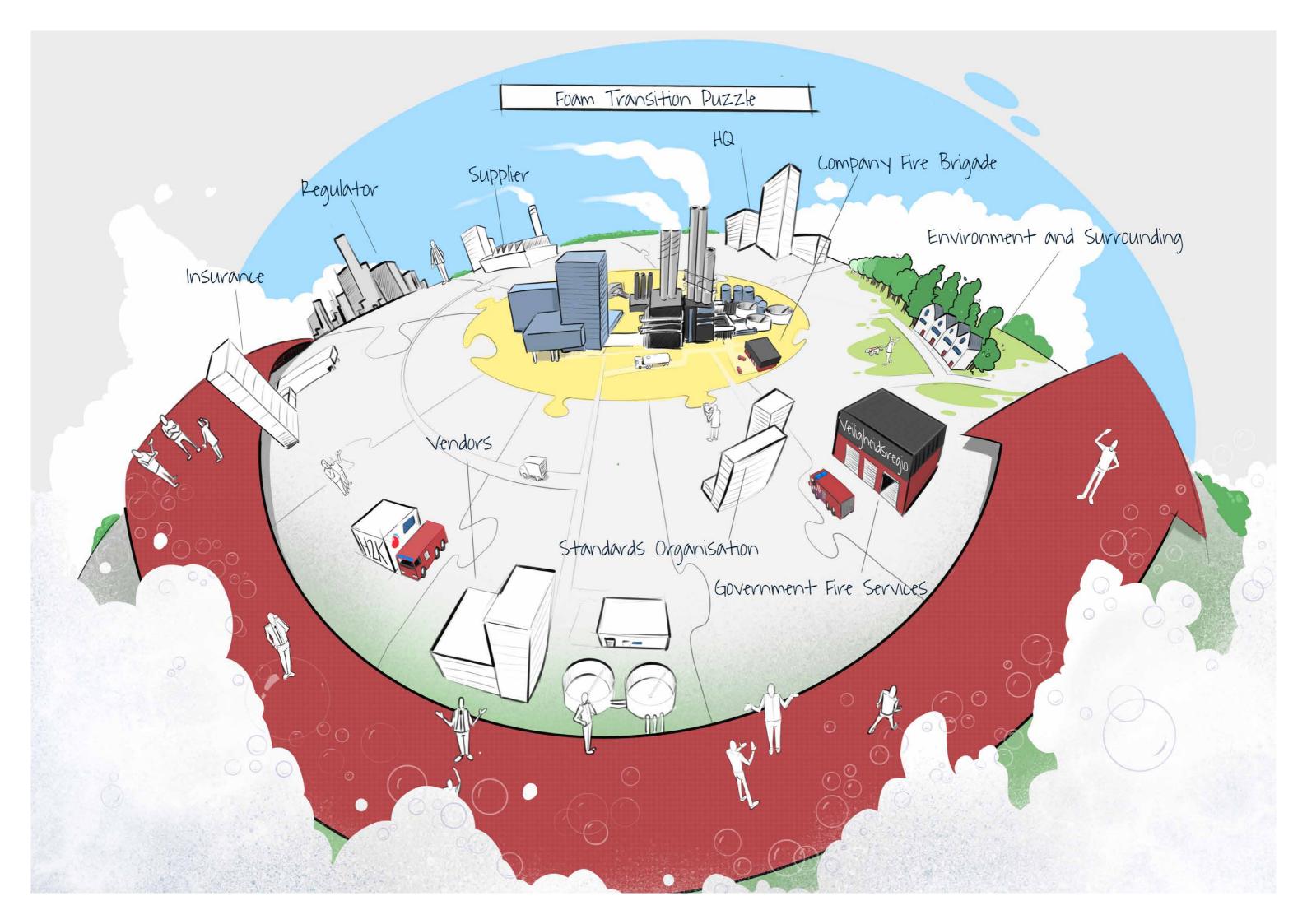
Although in many cases the transition seems to happen carefully, facets are nevertheless overlooked. This makes it uncertain whether the same level of safety will be achieved after the transition as before. This may lead to unsafe situations for emergency responders, public safety, costly installations and sometimes even the protection of critical infrastructure.

Company X replaced fluorinated foam for a fluorine-free variant, but did not consider the limitations of the new foam to be applied. The extinguishing effect was therefore insufficient and the normative scenario could not be combated. Company Y filled the vehicle foam tank with fluorine-free foam concentrate without sufficient cleaning, the pump system silted up completely.

Internal and external stakeholders need to be involved in the considerations and practical problems. A careful and complete analysis of all opportunities and limitations with a practical test is a prerequisite for a responsible foam transition.

Switching to another (fluorine-free) foam concentrate is more than just a theoretical exercise, but it can certainly not be done without preparing 'on paper'. Developments in the foam market are rapid and if the transition is started with outdated information, major surprises may occur at the end of the ride. In short: the transition to a different foam concentrate is a process that must be run through carefully and from an up-to-date information position.

Phase 1	Define the motives Starting point: identifying relevant themes Identifying current safety levels Stakeholders and their interests Starting position defined
Phase 2	Exploration of possible options Testing of possible options Understanding test results Exploration completed
Phase 3	Decision-making Transition plan Transition phase Delivery of new system
Phase 4	Transition aftercare Education, training, practice Inspection, testing and maintenance Transition completed



Management of Change

As stated, replacing foam concentrate is not a pit stop: old tyres off, new tyres on. Although the pit stop is an attractive thought (fast and efficient), in this case, it is not effective or safe. In practice, the transition appears to entail much more. To stay in the example: the new foam has a different tyre size, requires different brake discs and the handling does not match. This cannot be remedied during a pit stop, so the car has to be re-adjusted and tested by the manufacturer.

Simply replacing foam concentrate directly is therefore not an option. This means that the full impact of the new foam on business operations must be properly assessed. Think beyond just the work field of the company emergency organisation and also look at the impact on, for example, the operational department, maintenance programmes, environmental consequences, consequences for the scenarios to be combated, recalibration of the starting point document with regard to fire safety, etc.

An operation of this size with so many interests and parties requires a solid project-based approach. The industry usually uses a Management of Change (MOC) procedure for this. The purpose of a MOC is to secure cross-links and interfaces in the relevant themes, so that the integrity of the overall system is safeguarded.

The external stakeholders are not always given a place in the standard MOC, but that is certainly desirable in the case of the foam transition. For many companies, for example, the strength and effectiveness of incident management is part of limiting the impact on the environment and surroundings. Foam plays an important role in this. As they are monitored by external inspectorates, they should also be involved.



The aim is to match or exceed the old safety level after the transition. After all, the transition goal is to switch from the old well-functioning system to a new well-functioning system with a different foam concentrate. A tight (project) structure and performance-based approach helps with that!

Performance-based approach

In recent decades, thanks to fluorinated foams, enormous steps have been taken in the controllability and management of incidents. Because fires have been extinguished in practice and escalation has been prevented in many cases, the market has accumulated a lot of knowledge. We know together what works and what doesn't, and that has slowly evolved into a proven system.

This history is missing when it comes to fluorine-free foam concentrates. Although these have always existed, they have not been widely used in high-risk industries. Due to the lack of such knowledge, during the foam transition, one cannot fall back on historical data. Parties are forced to make choices based on assumptions.

In the case of performance-based work, the assumptions are thoroughly tested before they are implemented. Performance-based work is all about comparing the performance of the new system with that of the old system. From the current proven working system to the new demonstrably working system.



Phase 1: Start

Define the motives

Starting point: identifying relevant themes

Phase 1: Identifying current safety levels

Stakeholders and their interests

Starting position defined

Motives

It is important to identify the motives prior to the transition. Changing regulations will not always be the only driver. Sometimes, new construction, change of business process, replacement of equipment (such as foam pump, sprinkler, vehicle, etc.) is just as important a reason to start a foam transition as the upcoming change in laws and regulations.

The choice of foam type influences the fire safety system, just as the choice of system (of fire safety) sets a framework for the foam concentrate to be used. Is a foam concentrate being sought that functions within the system, or is the system being modified based on the choice of a particular concentrate?

In order to be ahead of the chicken-and-egg discussion during the later process, it helps to properly record the motives or reason for the transition. This can then be used when making a final decision.

Starting point: the relevant themes

Subsequently, a broad analysis of the playing field is needed. This provides more insight into the relevant themes that apply to the transition. In most organisations, it will become apparent that there is an overlapping and coherent system with which fire safety is properly arranged. The underlying components are closely attuned to each other.

Phase 1

• Phase 2

• Phase 3

O Phase 4

For the relevant themes, formulate the stakeholders and their interests. Discuss the upcoming changes and outline the consequences for each stakeholder.

This step is most underestimated in practice. Forming a good picture and assessment of the playing field and the consequences of the transition requires both a broad and deep insight into the complete fire safety system. This requires a proactive approach and open vision that goes beyond the view of the original problem owner.

Unfortunately, there are known examples where a fluorine-free foam has been implemented without reviewing agreements with the neighbouring company on mutual foam use, (firefighting) personnel have not been informed and trained regarding the new foam and no tests have been carried out to determine whether the new foam performs adequately in the company-specific incident scenarios.

Current safety level

In addition to the relevant themes, a picture must also be obtained of the existing safety level. In every high-risk company (e.g., SEVESO) there are performance requirement documents, pre-fire plans, company fire brigade reports, etc. from which this information can be accessed. For the public fire services, these matters are described in repression plans, coverage plans, etc. The practical implementation of fire brigade instructions or policy documents are always subject to current developments. This creates nuance differences between the procedure on paper and the approach in practice.

Therefore, it is important to determine to what extent the practical implementation corresponds to the paper reality. During the transition, the question will arise as to what the benchmark will be: the theoretical fire brigade instruction or the practical situation. Reference tests are an excellent vehicle to determine this. Later on, this will also be a major topic of discussion with one of the most important stakeholders: the regulator and external inspectorates.



Stakeholders and their interests

With the relevant themes in mind, the various stakeholders and their interests come into the view. It is important to be clear about their needs and motivation. That picture will not always unequivocally point in the same direction.

Phase 1

Sometimes these will be organisational problems, for which organisational solutions will have to be found in the transition phase. Sometimes these will be technical questions, these need to be answered technically. A timely response to this need is essential for a successful transition.

Stakeholder X: 'We do not have sufficient insight into what the new foam concentrate means for proportioning systems, monitoring and, for example, the expansion of the foam?'

Stakeholder Y: 'Does this foam sufficiently extinguish with a particular fuel?'
Stakeholder Z: 'On what timescale and at what cost will the transition take place?'

It will often become apparent that stakeholders do not have the same information position with regard to new foam concentrates. Premature judgments about solutions, limitations and contradictions complicate the transition. Prevent that by engaging with parties, provide them with equal information and organise, for example, stakeholder demonstrations. The most important thing is that the stakeholders are constantly actively involved in the transition, rather than being confronted with the outcome afterwards.

Knowledge of the subject matter

Due to the increased demand for fluorine-free firefighting foams, manufacturers are rapidly introducing new, ever-improving foam concentrates into the market. Because knowledge about new foam concentrates outdates fast due to swift developments, it is necessary to keep in touch with that market. Not only is contact with suppliers important here, but the experiences of other end users also help. H2K and KSS are in the middle of this network.

H2K is regularly asked by clients to provide insight into differences in practical performance. This happens on both a small and large scale.

There are also questions among supervisors and enforcing bodies about the way in which the transition is brought about among individual end users. A structured process can help here. This creates overview and confidence for all parties, so that a well-founded and weighted discussion can take place. H2K and KSS provide both end users and supervisors with tailored advice.

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Starting position defined

The starting position of the transition is clear and demarcated with the determination of motives, the inventory of relevant themes, a definition of the existing safety level and the view of stakeholders and their interests. In addition, it has become clear in this phase what open questions stakeholders still have.

The starting position can be formulated concisely with the answers to these four questions:

- Why do we need a foam transition?
- Which stakeholders are involved and what are their interests?
- Which themes are relevant for a successful transition?
- What is the current safety level that needs to be matched?

This not only formulates the starting position of the transition, but also makes it clear which issues need to be addressed in the follow-up phase.

Phase 1



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Legal frameworks for a foam transition:

Procedures and Registration

Fluorine-free foam concentrate usually does not have the general and broad application qualities that fluorinated foam concentrate has. The best choice of foam concentrate for each situation (substance, scenario, application, environment) has to be considered more than in the past.

This also enlarges the legal framework in which considerations for foam use are made. The legal framework extends the single performance criterion 'does the foam perform well?' to multiple performance criteria: 'how do extinguishing performances relate to the environment, working conditions, hygiene and health and the liability for these?'

What are the legal drivers of the transition process from the existing type of foam to a new type of foam?

- 1. For all companies: follow the foam use frameworks and procedures set out in your environmental permit and in the industry standards referred to in your own fire safety analyses. Integrate the use of firefighting foam (and the change in it) in the company's risk assessment.
- 2. For all end users of foam, both companies and government: carefully examine the policy conditions of the insurer. Consequential damage from foam use is sometimes limited or not covered (especially in the case of fluorinated foam).

- 3. For all government fire brigades: Fluorine-free foam concentrate becomes the standard. Only in extraordinary, predefined situations fluorinated foam concentrate can be an option. Consider any location where foam has been used as contaminated, to be assessed for remediation.
- 4. For companies with a Seveso/ high-risk qualification: consider the frameworks and procedures used for the elaboration of scenarios in your safety reports. Work out the transition to an alternative foam type based on the MoC procedure, one of the core elements of the Safety Management System.
- 5. For governments and companies working together in a PPP construction (Public-Private Partnership): recalibrate agreements in the event of a change of foam concentrate. Consider the mutual obligations and the change in them. Recalibrate mutual responsibilities.
- **6. For organisations requiring training in the use of foam:** only in very exceptional and pre-defined situations is practice with fluorinated foam concentrate possible. Check this use against the local environmental regulations. In all other cases: practice with training foam.

Support and document the use of a new type of foam (in any application) that does not adversely affect the safety level of the organisation. If it possibly does, ensure that management measures have been taken to mitigate that negative effect. Then document that as well.

For all uses of foam during a deployment: ensure the substantiation of a deployment decision for each foam use in a written report of an incident. Communicate about this with the site user/owner, or in case of public areas: the area or infrastructure manager and the environmental regulator.



Phase 2: Exploration: options and testing

Phase 2:

Exploration of possible options
Testing of possible options

Understanding test results

Exploration completed

Exploring the options

Once the extensive analysis of the current situation and the consequences on the relevant themes are properly identified, it is time to start exploring the options. This step is likely to be accompanied by uncertainty and unrest and, for the time being, more questions than answers. It will become clear that the 'old' and the 'new' situation differ substantially in certain respects. The consequences will be greater and more severe for some themes than for others.

This will lead to a considerable list of information questions about parts of the transition. Good research into these questions and an answer to the question: 'how to proceed?' is important. Within this phase, we look at possible options, creation of new solutions and mitigation of adverse effects on important themes.

A vaguely formulated starting position (phase 1) hinders progress, because it is not clear which parameters can be adjusted during the transition. Are parts of the system being replaced, or are conditions being sought within which certain foam types must perform, for example? So: the sharper and more complete phase 1 is elaborated, the better phase 2 can follow it.

Phase 1

Phase 2

• Phase 3

O Phase 4

In the option phase, it is necessary to properly explore the current foam market. On the basis of this exploration, starting points and assumptions are formulated for the elaboration of the various options.

In practice, it is shown that it is not easy for parties to keep up. Developments proceed incredibly fast. For example, previous assumptions about the possible expansion of non-aerated fluorine-free foam and the way it mixes with water have proven to be outdated. The performance of certain manufacturers also varies enormously. In a short period of time, average-performing foam concentrates can suddenly perform excellently after an update. Make sure to use up-to-date and independent information about the foam market.

Testing of possible options

It now appears that many fluorine-free foam concentrates give more unpredictable results than was previously the case with fluorinated foam concentrates. For example, it is clear that if a fluorine-free foam concentrate achieves a short extinguishing time on one fuel, this performance says nothing about a comparable fuel. This also has consequences for the way in which standard tests should be viewed. After all, a performance delivered on a reference fuel may create a distorted picture for

the substances included in the scenarios. This is really different than in the past, where fluorinated concentrates in a particular group of fuels had a more comparable performance in general. Testing is the only way to prove its effect.

Testing is necessary in order to be able to implement the transition responsibly. In addition to the attention that must be paid to the exact fuels in certain scenarios, the deployment strategy of the (in company) fire brigade can also be the subject of research. For example: is a different flow rate required, does new foam require different equipment, or should another technique be used? This step therefore leaves room for technical and organisational testing.

Phase 2

Expansion rate

In order to achieve effective extinguishment with fluorine-free foam, the foam needs a certain expansion. This depends on the foam concentrate, the monitors used and the fluids to be extinguished. By means of practical tests, it is determined whether the effective extinguishing can be achieved.

Testing, testing, testing

Testing during the option phase goes beyond small-scale lab testing. Although these provide valuable insights, small-scale tests are not a good predictor of the final practical situation in real life.

Lab scale tests can give an indication of the impact of the fuel on the foam extinguishing process. No other conclusions can be drawn from this, so this method does not provide a definite answer about the final functioning of the total (fire) safety system.



In order to assess the impact on the safety system, other types of tests should be carried out. For example, it can be valuable to investigate how the proportioning and nozzles influence the extinguishing with new foam concentrate. Another type of research is to determine which application method should be used. Or much more practical: can the intake in the existing vehicle handle the (new) more viscous concentrate?

Drawing up and implementing a test plan is a project in itself. Not only are there substantive questions to answer (what do I want to test), but there will also be organisational questions (how do I do that). The major interests of stakeholders mean that they too will be interested in the execution and results of tests. Their interests are therefore certainly given a place in the test plan.

Viscosity

New foam concentrates may have a different viscosity compared to their fluorinated predecessors. Usually, they are more viscous (thicker), sometimes they have non-Newtonian behaviour. This often requires modification or replacement of equipment.

An important part of a test plan is to check the required scale of the tests in order to be representative. Matters such as pre-burn time, surface, layer depth, application method, flow rate, etc. have a great deal of influence on the extinguishing and test results and must therefore be tested on a 'realistic' scale. Realism differs per (incident) scenario and test objective. Only when this type of testing has been completed, more can be said about the performance of new foam in relation to risk and incident management within a high-risk company.

Phase 2

With the new generation of fluorine-free foam concentrates, the relationship between different components (concentrate, equipment, procedures, training, scenario, etc.) in the incident management system is very sensitive. In contrast to traditional

fluorinated foams, the fluorine-free counterparts are less forgiving. This requires a more finely tuned safety system. Coherence is a very important test subject.

Although foam manufacturers often carry out standard tests and vehicle suppliers carry out delivery tests, virtually no total system tests are carried out with end users. It is good to have independent guidance in this. This system test is the core of performance-based work.

Understanding test results

Carefully performed tests provide valuable insight for the further process. Not only is there insight into the effectiveness of the extinguishing process, but it also becomes clear whether modifications to the system are necessary. A test may have shown, for example, that a higher flow rate is necessary for effective extinguishing, and that the water supply needs to be adapted for this purpose.

Case study 1

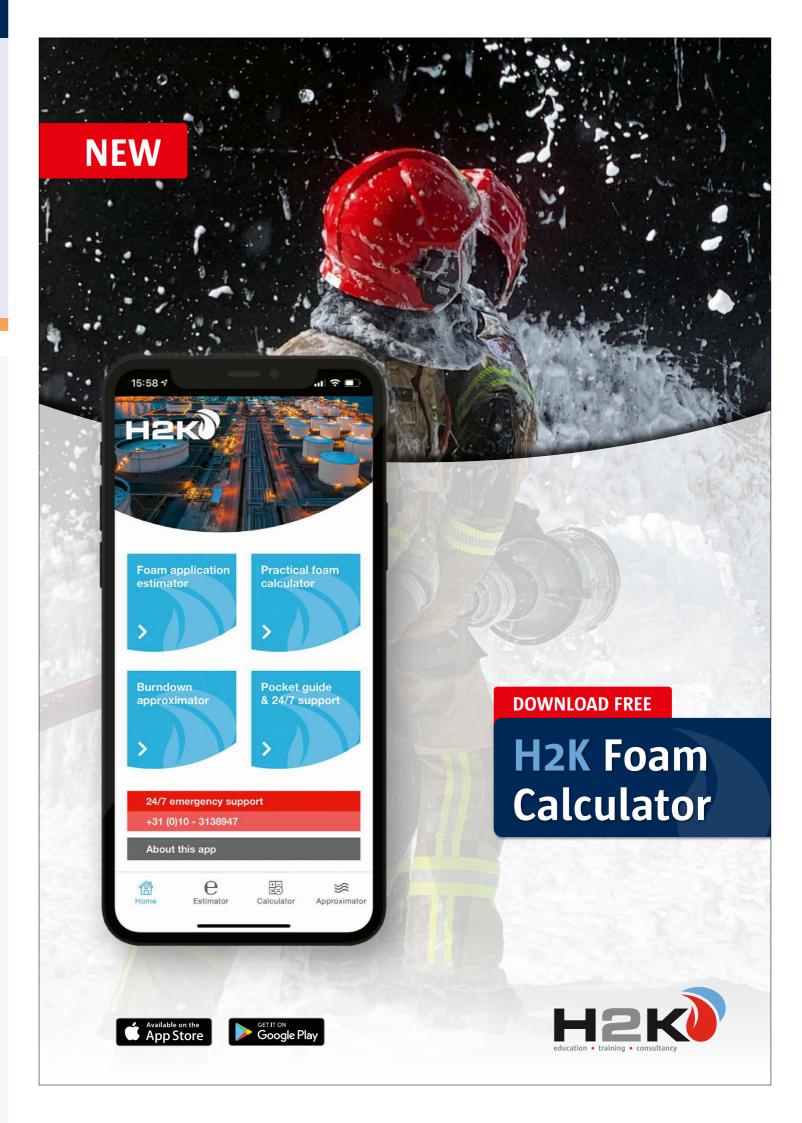
During a drill with live fire it turns out that a foam monitor is insufficiently aerated. The expected extinguishing is not happening. Although the foam meets certification and the extinguishing monitor is technically in order, the two have not been tested as a system.

Case study 2

The new supply of fluorine-free foam, is in IBCs distributed throughout the chemical plant. A test in winter conditions shows that the foam, unlike the old foam, is already unusable at -5°C. Product sheets are inconclusive about practical situations.

Case study 3

During a transition, the extinguishing effect and standards are fully taken into account. After practical use, it turns out that the water purification system is not equipped for processing the new foam. The purification experts are not involved in the process as a stakeholder.



The test results may also give rise to recalibration and revision of foam transition assumptions because the desired level of safety (then demonstrated by test results) is not achieved. In that case, the way in which the existing safety level can then be achieved needs to be further investigated. The consequences of this can be very significant. A carefully carried out independent test is of great importance to avoid unnecessarily large adjustments to the system or overall business operations.

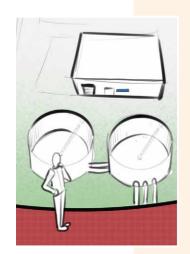
Phase 2

Exploration completed

The exploration of the possible options and the testing of the feasibility is thereby completed.

Standards and certifications

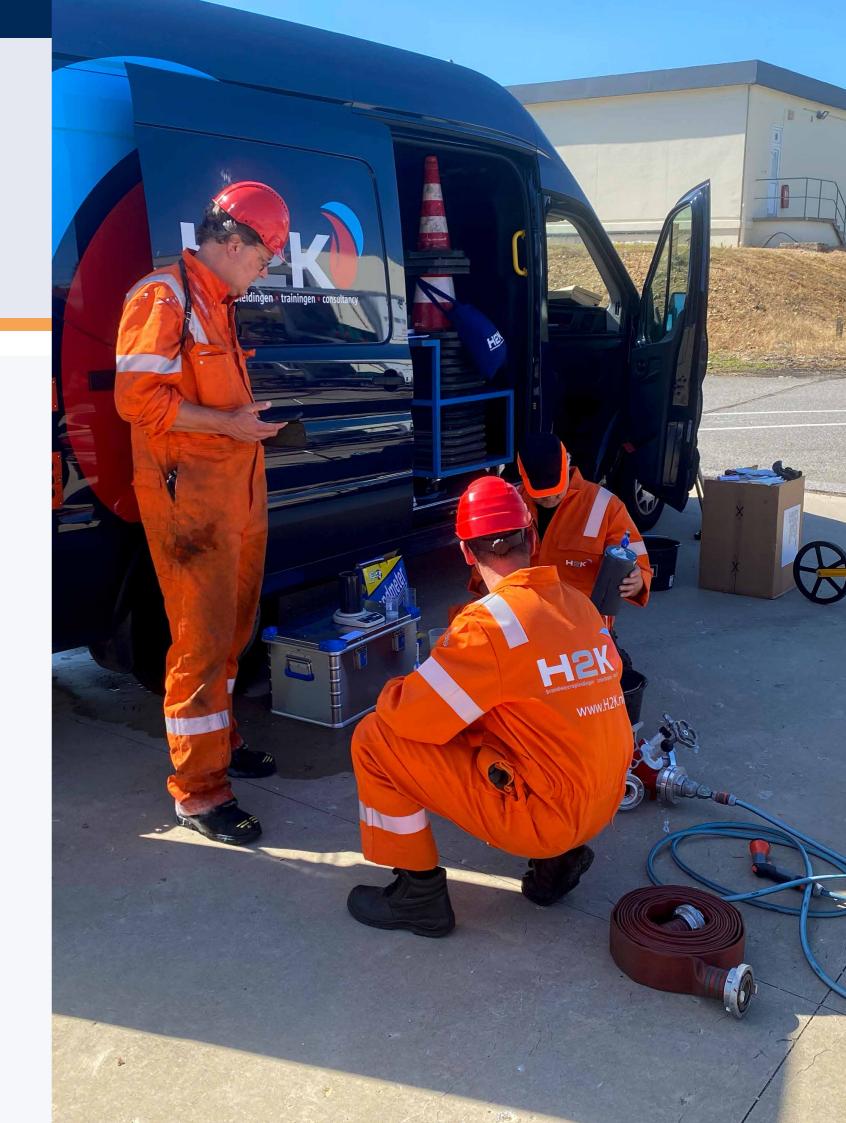
Standards and certifications play a major role in firefighting foam. Interpreting the meaning of a standard or certificate is an art in its own right. Some standards classify by result, while others only give a YES/NO result. Standards and certificates can help in the selection of foam, but it is important to check what the standard says in relation to the scenario to be combated.



Suppose the scenario is to cover a non-combustible toxic pool. In that case it is not necessary to select an firefighting foam with a good classification on extinguishing time. Perhaps a more important selection criterion is the long drain time on a specific liquid.

Standards also evolve over time, which causes test versions to change. It is possible that a foam concentrate receives a certain classification according to the older version of the standard, but not according to the new version.

Also, the U.S. defense standard (MILSPEC) required fluorine components in foam concentrates, releasing this requirement means that fluorine-free concentrates can also comply with this standard.





Phase 3: Decision-making, planning and transition phase

Phase 3:

Decision-making Transition plan

Transition phase

Delivery of new system

Decision-making

The exploration leads to a responsible preferred option that does justice to the original starting position. This preferred option will be further elaborated with the stakeholders in order to make a decision. And with that, the desired transition result is defined.

Because of the chosen structural approach, all stakeholders and interests have been taken into account. The existing safety level was closely examined. It has been tested whether the new preferred option is or has been made suitable for all these subjects.

Making a transition plan

With a final picture in mind, the transition can be prepared systematically (together with the stakeholders). The transition plan can be seen as a railway timetable describing the time and pace of the change(s) to be made. This timetable marks the start of the transition phase.

Acquisition of new equipment, parting from old materials, adjusting processes and installations, permits, manuals, training and retraining of personnel, etc. are conceived and elaborated in the transition plan. This plan also pays attention to delivery tests and their practical implementation.

Phase 1

Phase 2

Phase 3

O Phase 4

If the organisation has to remain operational during the transition, it is important to ensure the safety level during the transition phase. With all the information from the transition process, it is possible to assess how this should be organised and what role stakeholders play in this.

Transition phase

During the transition phase, the transition plan will be practically implemented. In this phase, acceptance tests take place to deliver (parts of) the safety system. The tests show that the old safety level is matched in the new situation.

No two foam concentrates are the same

The new generation of fluorine-free foam concentrates on the market function differently than the fluorinated foam concentrates. These work with a fluorine film that helps the foam. Without that layer, foam must rely entirely on the bubbles in the foam. This makes the application of the foam more difficult and the foam more vulnerable.

The effect of the foam also differs between the various fluorine-free foam concentrates. These react differently to the same fuel. The physical properties of these concentrates can vary greatly from one another. This means that a proportioning system working with one concentrate, might not work with the other. Sometimes the concentrates behave differently after mixing with water, which makes the quality of the foam very variable.

A performance test, in which these facets play a role, will be able to show with certainty whether the foam concentrates are also effective in specific circumstances. Phase 3

The transition from the old to the new situation is a grey area. After all, the old system has not yet been fully dismantled, and the new system is not yet fully operational. Adjusting the fire safety system is so complex that this transition will take a long time. During this period, parts of the fire safety system will not be available, while operating risks will remain. In that specific grey area, extra attention needs to be paid to operating and environmental risks.



Question 1: How long does it take to adapt the water treatment plant to processing the new foam concentrate?

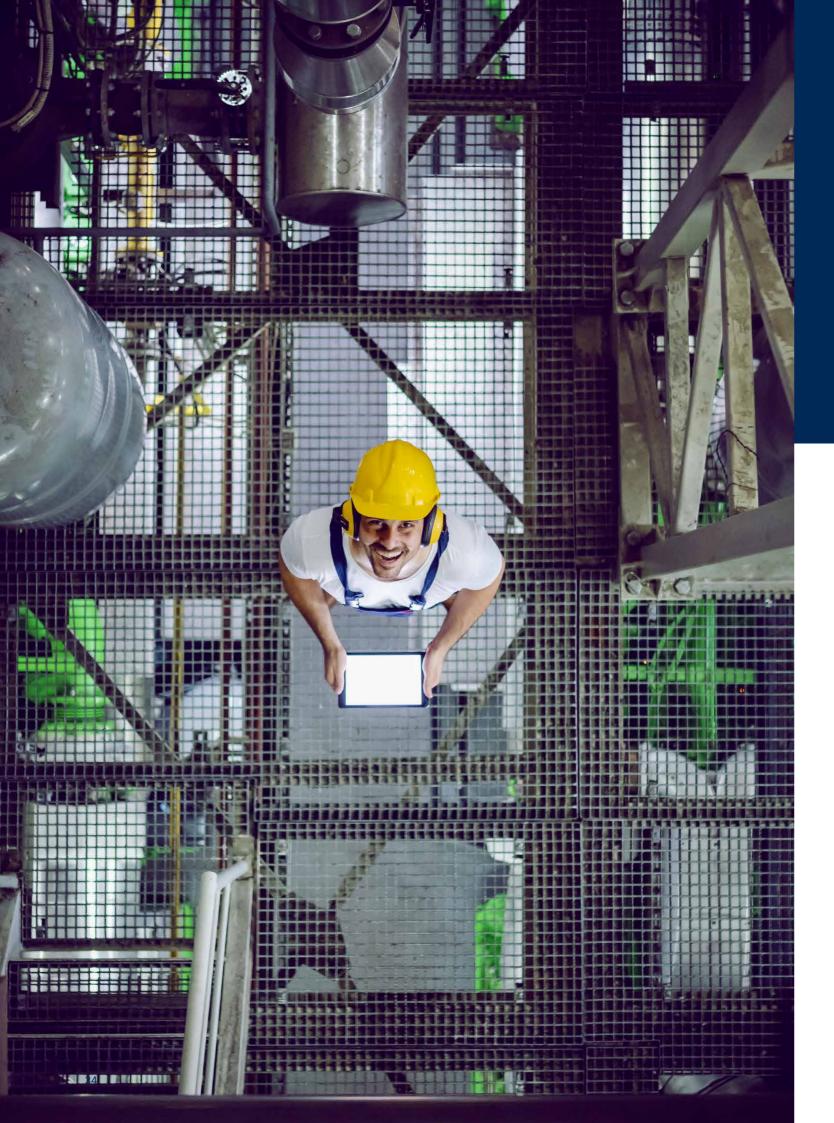
Question 2: How long does it take to rinse and clean (sprinkler) pipes?

Question 3: Where is the old fluorinated foam safely stored and how have the surrounding logistics been arranged?

Question 4: How much time is needed for installation and adjustment of new foam fittings and how does this coincide with further education and training of staff?

Delivery of new system

On completion of phase 3, the transition plan has been implemented and the new situation is operational. The old system and foam concentrate are gone, the new have been delivered.



Phase 4:

Completing transition: aftercare and control

Phase 4:

Transition aftercare

Education, training, practice

Inspection, testing and maintenance

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Transition completed

Transition aftercare

During the transition, the foundations of incident management were altered, and numerous new starting points, specifications, procedures and elaborations were introduced. In the aftercare of the transition, it is important to safeguard the innovations in the existing organisation. This applies not only to the technical aspects, but certainly also to the organisational aspects.

Education, training, practice

Emergency respond personnel who start working with other foams have been involved during the transition. They participated and contributed to the various tests. That is not enough to bring about a change in behaviour. Fluorine-free foam often requires different working methods for firefighters, this will need to be addressed in further education and training.

Further training and refresher courses are aimed at unlearning old reflexes and learning new ones. This requires specialist training, with consistent attention to the properties and use of the new foam.

Phase 1

Phase 2

Phase 3

Phase 4

Cleaning

Cleaning of tanks and pipes containing fluorinated foam concentrate is a discipline in itself. Flushing with water is not enough because residues of fluorine compounds remain, which contaminate the new foam concentrate. Sufficient cleaning can be achieved with special additives and intensive cleaning programmes.

Phase 4

Inspection, testing and maintenance

The regular activities related to the maintenance of the fire safety system are adjusted to the new situation. Now it is visible what the transition means for inspection, testing and maintenance (ITM) of the total system. This will look different from the situation before the transition.

Completed transition

With securing the system of fire safety and incident response in operational management will put an end to the transition process. Through four phases, a foam transition was made from fluorinated to fluorine-free firefighting foam.

By paying a lot of time and attention to the performance of the safety system during the process, the integrity of that system as a whole and the safety level have been taken into account. During this process, internal and external stakeholders are constantly involved and informed. This completes the entire process of changing from the existing (proven) system to the new (demonstrably working) system.





H2K annually organises multi-day Foam School

During the H2K Foam School, participants learn and experience all ins and outs on firefighting foam and current developments in the industry. Course participants gain in-dept insight into the operation of fixed and mobile foam systems. The Foam School is a mix of theory, workshops, demonstrations and practical firefighting. Participants have the opportunity to exchange views with the instructors and industry experts.

The event is an excellent opportunity for those involved in foam transitions to update their knowledge about firefighting foam, the foam concentrate industry and foam transition dos and don'ts.

More information

For more information concerning the H2K Foam School, visit our website or contact our office.

www.h2k.nl



In conclusion

The handling and transition of foam concentrates has always been a delicate matter. The switch from a fluorinated to a fluorine-free concentrate makes that process even more drastic.

Procedures, permits, working methods, planning, scenarios, etc. are all part of a complex concept. Change can only be justified with knowledge of the entire fire safety system.

H2K and KSS have experience with foam issues and can guide the transition to a fluorine-free foam concentrate for customers by combining knowledge of the market, experience in conducting practical test, a broad perspective on incident management and understanding of the way authorities and insurance companies look upon this issue.

Are you at the beginning of the transition, do you need support in an ongoing transition, or do you need more information in order to make a responsible choice? Then H2K and KSS can support, both in terms of process and content.

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Colofon

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