K21045 SCP10 Cleaning Fire Protection Systems from PFAS-foam
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Guidance document cleaning Fire Protection Systems from PFAS-foam

kiwa

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2. Introduction

This guidance & interpretation document for Fire Protection Systems has been accepted by the Board of Experts Fire Safety (BoE FS), in which all relevant parties in the field of Fire Safety are represented. The Board of Experts also supervises the activities and where necessary requires this scope to be revised and additional interpretation is needed.

Technological developments do not wait for laws, regulations and standards. These laws, regulations and standards are following the developments. This "Interpretation document" embodies the technological and market developments. The purpose of this document is to clarify the context by drawing up new definitions on certain themes and subjects. This clarifies to persons and market parties what the preconditions are when determining compliance with the applicable requirements. It also explains developments that play at the level of standards and how they fit the developments in the market and are in line with legislation and regulations.

A interpretation document is typically a formal written explanation or clarification of the meaning, intent, or application of a specific policy, regulation, law, standard, or contractual clause. It helps ensure consistent understanding and implementation across stakeholders.

Key characteristics of an interpretation document:

- Clarifies ambiguous language in a source document.
- Provides context or background to support the interpretation.
- May include examples or scenarios to illustrate how the interpretation applies.
- Is not legally binding unless issued by an authoritative body (e.g., a government agency or standards organization).
- Supports compliance by guiding users on how to apply rules or standards correctly.

Common uses:

- In legal or regulatory contexts: to explain how a law should be applied.
- In technical standards: to clarify how specifications should be interpreted.
- In contracts: to resolve disputes or misunderstandings about terms.

To make an interpretation document legally binding under Dutch law, you need to integrate it into the contractual framework in a way that courts will recognize and uphold. See certification scheme K21045/02: Clause 11.9.

This interpretation document has been drafted to set two goals:

- To give Guidance in the context for the design, installation and operation of Fire Protection Systems and is marked with the letter “G”;
- In matters whereby the requirements in the standard are not clear on the implementation of the requirement itself, this document is giving an interpretation, explanation or clarification of the requirements of the standard. These Requirements are marked with the letter “R”.

Version	About	Date
1	First setup of the document – not published	2024/10/10
2	Update of items	2025/02/13
3	Update of items based on the 2e version of the Specific Certification Program 10	2026/02/11

Table 1

This document is specially developed for specific certification program 10 - Cleaning of Foam Systems in context with PFAS.
This is now a separate document, but I can be incorporated later in the general Guidance document for TIC – scheme K21045.

3. Frequenty asked questions SCP10 “G”

3.1. Shall cleaning according to the document SCP10 – K21045 become mandatory?

The SCP is not a mandatory guideline. There are options to make it mandatory, for example by including it in legislation or permits. But until decided otherwise, it is not mandatory.

3.2. Is it clear that executing the process in document SCP10 – K21045 is not the same as the compliance scope in context with POP, REACH or other regulations?

Yes, that is clear. The document SCP10 – K21045 arranges a safe, risk-resistant, cost-effective and high-quality cleaning process; one does not automatically comply with all laws and regulations.

3.3. Can my fire protection system be certified according to the document SCP10 – K21045?

The document SCP10 – K21045 enables certification of the cleaning organisation, who then arranges that the extinguishing system is cleaned in a safe, risk-resistant, cost-effective and high-quality manner. This with supervision of Kiwa based on audits and inspections.

3.4. How is the risk of rebound (recontamination by possible residual PFAS residues) dealt with?

In principle, this is up to the competent authority. The document SCP10 – K21045 assumes cleaning to below the concentration standards set by the EU. At the moment, there is little to say about the risk of rebound, because hardly any statistic or scientific research has been done on this. The object of the SCP is to use best effort and -practices principles.

3.5. What maximum permitted PFAS values are used and why?

PFAS legislation is a regulation from the European Commission. The EU regulations determine the maximum permitted PFAS values. These values apply to the entire European Union. The document SCP10 – K21045 is in line with these values.

3.6. Is the document SCP10 – K21045 a static document?

The document SCP10 – K21045 is operated and maintained by Kiwa FSS, which can certify organizations that want to perform cleaning processes in accordance with the document SCP10 – K21045. KIWA and organisations from the advisory committee have agreed to periodically evaluate the document SCP10 – K21045.

3.7. What is the scope for cleaning and what parts of the extinguishing system are cleaned?

The document SCP10 – K21045 provides a scope to assess this per extinguishing system, parts of systems that have not or only very limitedly come into contact with PFAS can be left out of cleaning. In case study no. 1 is this set in a broader perspective.

4. Case- & user studies

4.1. Threat of having components in Fire Protection system contaminated with PFAS.

Not all components of a fire protection system have the same time of contact with a foam containing PFAS. Therefore is risk based assessment a tool to define the need for this. Based on the function of the component, the likelihood can be assessed. Based on this likelihood, the impact of contamination can be determined.

Likelihood	Low	Common	High
System part			
Tank			Normally filled
Pump		After use flushed with water #	
Mixer / injector		After use flushed with water #	
Pipe	After use flushed with water #		
Valve	After use flushed with water #		
Spray head	After use flushed with water #		

Table 2 - # use in context with inspection(s), testing and maintenance.

Based on the above likelihood assumption is the following classification possible.
Contamination likelihood low has an indication for non-cleaning.
Contamination likelihood common has an indication for cleaning.
Contamination likelihood high has an need for cleaning.

4.2. Threat using industrial water of a plant contaminated with PFAS.

Not all plants make use of drinking water for fire protection systems. It can also make use of surface water or ground water. The likelihood of this water being contaminated with PFAS varies.
After cleaning a fire protection system from PFAS, it is to be advised to check regularly these background PFAS levels of this water to have proper damage- and pollution assessment after a repressive action of the fire protection system.

4.3. Threat of a repressive action of the fire protection system in an environment contaminated with PFAS.

Industrial plants can be situated on a sites with a background PFAS level in ground and ground water higher than is specified in the ECHA requirements.
After cleaning a fire protection system from PFAS, it is to be advised to check regularly these background PFAS levels to have proper damage- and pollution assessment after a repressive action of the fire protection system.

4.4. Recycling of steel contaminated with PFAS.

Case study 1 sets a direction for cleaning. In situations whereby the need for cleaning is defined, but the internal environment demonstrates that cleaning to execute and that levels are hard to achieve whereby the effect of rebound is to be expected, can the question be to replace the steel components. Before making this decision with (third) parties should the possibility of the recycling of the steel to be examined and the environmental impact of this recycling. This can lead to different perspective of the situation and an adjustment of the decision.

4.5. Sampling methods of PFAS

Sampling is a method used to collect material from a surface to test for the presence of contaminants, microorganisms, or chemical residues. Here's a breakdown of sampling based on rinse, swab, and surface methods, commonly used for detecting contaminants like PFAS.

4.5.1. Rinse Sampling

Method: A known volume of clean solvent (usually water) is used to rinse the internal surfaces of equipment, tanks, or piping.

Purpose: Captures residues that are loosely bound or soluble.

Advantages:

- Good for assessing overall contamination in fluid-contact areas.
- Easy to quantify PFAS in the rinse water.

Limitations: May miss PFAS bound to surfaces or embedded in materials.

4.5.2. Swab Sampling

Method: A sterile swab (cotton or synthetic) is rubbed over a defined surface area.

Purpose: Detects PFAS or other residues directly from surfaces.

Advantages:

- Useful for hard-to-reach areas or small components.
- Can target specific zones (e.g., welds, joints).

Limitations:

- Limited surface area coverage.
- May require multiple swabs for larger areas.

4.5.3. Surface Wipe Sampling

Method: A clean wipe (often pre-moistened) is used to collect residues from a defined surface area.

Purpose: Measures contamination on flat or accessible surfaces.

Advantages:

- Covers larger areas than swabs.
- Often used in environmental and occupational health assessments.

Limitations: May not capture residues in crevices or porous materials.

4.5.4. Choosing a method:

- Use rinse sampling for internal systems like tanks and pipes.
- Use swab sampling for small or intricate surfaces.
- Use surface wipe sampling for broad, flat areas or general contamination checks.

4.6. Sampling steps

Following validation of the cleaning process by the cleaning provider and approval of the cleaning method and controls by Kiwa, the cleaning provider shall define and document its sampling and control procedures.

Initial Sampling: A baseline sample shall be taken prior to cleaning to determine the concentration of PFAS components present in the tank and piping systems.

Final Sampling: A post-cleaning sample shall be collected to assess the effectiveness of the cleaning process in removing PFAS residues from the tanks and piping.

Intermediate Sampling: The cleaning provider shall establish, within its internal quality control framework, the timing and methodology for any intermediate samples taken during the cleaning process.

Sampling Methods: The protocol shall specify which sampling techniques—such as rinse sampling, swab sampling, or surface sampling—are to be used at each stage, along with the corresponding analytical methods selected for PFAS detection.

4.7. Analysis methods for PFAS

A comparison between TOP Assay and Target Analysis in the context of PFAS (Per- and Polyfluoroalkyl Substances) detection.

4.7.1. Target Analysis

Definition: A method that detects and quantifies a **specific list of known PFAS compounds** using validated standards.

Technique: Typically uses **LC-MS/MS** (Liquid Chromatography with Tandem Mass Spectrometry).

Scope: Limited to compounds for which analytical standards exist—usually around 40–50 PFAS.

Strengths:

High accuracy and precision for known PFAS.

Suitable for regulatory compliance and routine monitoring.

Limitations:

Cannot detect unknown or unlisted PFAS.

Misses **precursors** and transformation products not included in the target list.

4.7.2. TOP Assay (Total Oxidizable Precursor Assay)

Definition: A method that **oxidizes PFAS precursors** into measurable perfluoroalkyl acids (PFAAs), revealing hidden or unlisted PFAS .

Technique: Uses chemical reagents and heat to generate hydroxyl radicals that break down precursors into stable PFAS like **PFCAs**.

Scope: Captures a broader range of PFAS, including **precursors** not detectable by target analysis.

Strengths:

- Reveals **PFAS "dark matter"**—compounds not included in standard suites.
- Useful for assessing total PFAS burden in complex matrices (e.g., soil, biota, water).

Limitations:

- Results are **semi-quantitative** and depend on oxidation efficiency.
- Not all PFAS precursors are amenable to oxidation.
- Method standardization varies across labs, affecting comparability.

4.7.3. Choosing a method?

Use **Target Analysis** for:

- Regulatory reporting

- Monitoring known PFAS
- High-precision quantification

Use **TOP Assay** for:

- Investigating unknown or hidden PFAS contamination
- Evaluating total PFAS burden
- Screening for precursors in legacy contamination or AFFF residues

The cleaning provider can use these methods based on its own defined process. At the end should the evidence be concluding the quality of the cleaning process. Also new mobile equipment can be used if the evidence be concluding the quality of the cleaning process.

4.8. Pratcical insight for effective mechanical cleaning in pipes

The key elements for the success of the cleaning process are characteristics of the cleaning fluid itself, the high temperature of the cleaning fluid applied during the process and the hydraulic pressure / force / shock applied during the cleaning process.

For longer piping can also mechanical cleaning methods be considered. Below some (commercial) links on this topic.

Pipe Pig Cleaning: Understanding Pipe Pigging Systems & Uses

What are Pigs for Pipeline Cleaning, and How Do They Work? - Pigtek

https://www.4pipes.de/www_GB_2019_NEU/index-gb_htm_files/Pigs_GB_2024.pdf

Pigging Municipal Water Mains | APS — American Pipeline Solutions

Why Pigging Out Is A-OK When It Comes to Cleaning Pipelines

5. Background literature

On the topic of cleaning tanks and piping for extracting PFAS is literature available next to the documentation on EU- and ECHA platforms.
Below so links for further information.

Document & link	Publisher	Date & version
Updated Fact Sheet Euralarm response to ECHA proposal for restriction of PFAS. Updated Fact Sheet Euralarm response to ECHA proposal for restriction of PFAS	Euralarm	2023
Characterization of per- and polyfluoroalkyl substances on fire suppression system piping and optimization of removal methods. Characterization of per- and polyfluoroalkyl substances on fire suppression system piping and optimization of removal methods - ScienceDirect	Science Direct	2022
Method 1633, Revision A. Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS. method-1633a-december-5-2024-508-compliant.pdf	EPA	2024
Decontamination and Surface Analysis of PFAS-Contaminated Fire Suppression System Pipes: Effects of Cleaning Agents and Temperature. Decontamination and Surface Analysis of PFAS-Contaminated Fire Suppression System Pipes: Effects of Cleaning Agents and Temperature | Environmental Science & Technology	ACS	2025

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