FAQ PFAS and halocarbon gaseous fire extinguishing agents

What are PFAS?

PFAS means “Per- and polyfluoroalkyl substances” and are a group of synthetic organofluorine chemical compounds that have multiple fluorine atoms attached to an alkyl chain.

The regulatory definition varies in different chemical legislations:

European Chemicals Agency (ECHA) PFAS Restriction Proposal

The definition of PFAS in the proposal for a Universal PFAS Restriction (U-PFAS Restr.) under REACH (= regulation (EU) 1907/2006 on Registration, Evaluation and Authorization of Chemicals, the EU’s major chemical law) follows the OECD definition of PFAS which is also used by ECHA:

Any substance that contains at least one fully fluorinated methyl (CF3-) or methylene (-CF2-) carbon atom (without any H/Cl/Br/I attached to it).

United States Environmental Protection Agency (EPA)

The definition of PFAS in EPA’s Toxic Substance Control Act (TSCA) PFAS reporting rule is as follows:

PFAS means any chemical substance or mixture containing a chemical substance that structurally contains at least one of the following three sub-structures:

(1) R-(CF2)-CF(R’)R”, where both the CF2 and CF moieties are saturated carbons

(2) R-CF2OCF2-R’, where R and R’ can either be F, O, or saturated carbons

(3) CF3C(CF3)R’R”, where R’ and R” can either be F or saturated carbons.

Are there restrictions for PFAS?

Certain PFAS are already restricted. In the European Union PFOS (perfluorooctanesulfonic acid, C8), PFOA (perfluorooctanoic acid, C8) and PFHxS (perfluorohexanesulfonic acid, C6) and long-chain C9-C14 perfluorinated carbon acids (PFCAs), their salts and related substances are restricted, initially by REACH Regulation and then by the EU’s adoption of the UN agreements on persistent organic pollutants (Stockholm Convention on Persistent Organic Pollutants).

The Stockholm Convention on Persistent Organic Pollutants has also agreed to restrict uses of certain PFAS internationally, as have several international legislations (Australia, USA, New Zealand, ...).

Are halocarbon gaseous fire extinguishing agents included in these current PFAS restrictions?

No, so far they are not included in these PFAS restrictions, but most of them are included in the F-Gas regulation (latest version REGULATION (EU) 2024/573), due to the global warming potential.

How are halocarbon gaseous fire extinguishing agents affected by a Universal PFAS Restriction in the European Union ?

The Annex XV Restriction Report proposing the universal restriction of PFAS was submitted January 2023 by Germany, the Netherlands, Denmark, Norway, and Sweden as a and proposes to restrict all non-essential uses.
The proposal includes more than 10000 substances and also the following halocarbon gaseous fire extinguishing agents, common in fixed fire extinguishing systems:

- HFC-227ea, example tradenames: FM-200TM, MH227®, FE-227TM, Solkaflam®227
- HFC-125, example tradename: Ecaro-25®
- FK-5-1-12, example tradenames: NovecTM1230, Dukare®1230, Noah®5112, MH5112®
- HB-55, example tradename: Solstice®Quench 55

At what date is the publication of the PFAS regulation planned?

The publication was originally planned for end of 2024 . Due to the high number (more then 5600) of comments and the many different applications of PFASs, ECHA decided to divide the work into groups of applications.

March 2024 Meetings: Consumer mixtures, cosmetics and ski wax

June 2024 Meetings: Metal plating and manufacture of metal products

September 2024 meetings: Textiles, upholstery, leather, apparel, carpets (TULAC); Food contact materials and packaging; and Petroleum and mining.

After September 2024: Applications of fluorinated gases; Transport; and Construction products.

When will a possible ban take effect after the PFAS restriction comes into force?

The proposed transition period for the regulation is 18 month after EiF (entry into force). The proposal states different derogation periods, depending on the application. The shortest one is none, then 5 years and 12 years.

What is the further procedure for the PFAS restriction proposal?

Comments submitted in response to the public consultation are currently under review by the ECHA Committee for Risk Assessment (RAC) and ECHA Committee for Socio-Economic Analysis (SEAC). Once they have completed their review, SEAC will publish the first draft opinion which (amongst other) assesses whether the proposed restriction is the appropriate measure to

address the risks presented by PFAS substances. This opinion is the subject to the second period of public consultation.

Once finalized, the compiled RAC and SEAC opinions are the basis for the European Commission's restriction proposal which then would go to the European Parliament and -Council for final approval.

Is there a statement concerning the proposed transition time for halocarbon gaseous fire extinguishing agents, included in the PFAS regulation proposal as clean fire suppressing agents?

A forums advice by the Working Forums Group to ECHA was adopted 23.10.2023 proposing: Clean fire suppressing agents where current alternatives damage the assets to be protected or pose a risk to human health until 13.5 years (18 month transition plus 12 years derogation) after EiF.This confirms the transition period of 13.5 years which was already included in the original proposal of the Annex XV Restriction Report from March 2023.

What are the key arguments to support the longest possible derogation time?

The ANNEX XV RESTRICTION REPORT, PROPOSAL FOR A RESTRICTION mentions the following arguments for the proposed 12-year derogation for clean fire suppressant agents:

"Potential alternatives are available, however, there are drawbacks (e.g. they can cause health effects, or may destroy equipment, or are not considered clean) and therefore fluorinated gases used as fire suppressants are not easily replaceable in the short-term.
For clean fire suppressant agents emission data are available. There is therefore sufficiently strong evidence to evaluate expected emissions in case of a derogation. A 12-year derogation of all fluorinated gases used in fire suppressants will lead to only slightly higher emissions than emissions under a ban of fluorinated gases. Given this evidence it can be concluded that additional emissions of the proposed derogation will account for about 14% of emissions under the maximum additional emission scenario (i.e. a derogation of all fluorinated gases)."

This is also in line with the Eurofeu submission to ECHA, stating that the installation of halocarbon gaseous fire extinguishing agents is typical non-emissive unless they are deployed in case of a fire. Installed and unused agent is fully recyclableand can be re-used in case of system decommissioning.

What are the main unique properties or unique combination of properties of a FK5-1-12 system?

- It is a clean agent (no residue, not electrically conductive, not corrosive)
- It does require much less storage space than Inert gases
- It has a fast extinguishing time. FK5-1-12 has approx. 10 second pre warning time and 10 seconds discharge time. Fast extinguishing reduce the damage and reduce the

amount of combustible products created from the fire which could be a mixture of extreme harmful chemicals
- It is safe for people for limited exposure time and a only very low reduction of the oxygen level
- Regulation of FK5-1-12 would have negative impact on the protection level for so called critical infrastructure (data storage centers, server farms, computing centers, ...), as long as there is no product or system with the same properties available.

Is there information about environmental fate and potential long-term effects on the environment on FK-5-1-12 available?

Eurofeu did a scientific research about of perfluoro(2-methyl-3-pentanone) (in short PFMP), the chemical name for FK-5-1-12. The scientific opinion states that PFMP is very low persistent and very low bioaccumulative, has very low acute or chronic aquatic toxicity and is neither PBT (persistent and bioaccumulative and toxic) nor vPvB (very persistent and very bioaccumulative) according to REACH criteria.
The main degradation product is TFA (trifluoroacetic acid). TFA is considered a P/vP and vM (very mobile) substance, but is not bioaccumulative or toxic. So it is also neither PBT nor vPvB.

What does the PFAS regulation proposal state about existing halocarbon gaseous fire extinguishing systems?

This is not explicit addressed in the current U-PFAS regulation proposal. In an ECHA web meeting it was confirmed that *"so far there is no intention to restrict the use of clean fire suppression agents in existing systems including the refill option."*
There are limitations by the F Gas regulation for agents with global warming potential like HFC-227ea.

What does the announcement of 3M to discontinue the production of NovecTM in 2025 mean for the supply chain?

Other manufacturers of the so-called generic FK-5-1-12 are available and tests have verified the same agent properties as NovecTM1230.
Therefore no shortage in the supply for FK-5-1-12 is expected so far.

What are possible extinguishing system alternatives?

Depending on the application, e.g. inert gases or water mist can be alternatives. However, due to the unique properties of the halocarbon gaseous fire extinguishing agents, there is no "one solution fits all" alternative available.
When alternatives are available for an application it is of course recommended to use these alternatives.

A next generation chemical gaseous fire extinguishing agent is so far not foreseeable. It would require a huge investment and significant time to develop a new chemical gaseous extinguishing agent with a high risk of not being successful in the end.

What are the next Eurofeu activities?

Eurofeu continues to support ECHA and their Committees for Risk Assessment (RAC) and Socio-Economic Analysis (SEAC) with information about halocarbon gaseous fire extinguishing agents and to provide information to environmental authorities on the importance of halocarbon gaseous fire extinguishing agents for protecting people and high-value assets from fire.

Eurofeu also continues to monitor legislative and regulatory activity on PFAS (and other chemicals of interest to fire protection), not only for halocarbon gaseous fire extinguishing agents, but also for foam extinguishing agents and other possible PFAS substances in fire extinguishing / suppression systems or portable / mobile fire extinguishing equipment.