

TI-064 - Regulations of per- and polyfluorinated substances in Europe

Per- und polyfluorinated¹ Substances

Substances of this type are so called fluoro-organic compounds – chains of carbon atoms which are partly or completely surrounded by Fluorine atoms. They are very stable against chemical and biological degradation processes hence persistent. This group of substances is often referred to as PFCs (perfluorinated carbons) or PFAS².

Some specimens have meanwhile been identified to be hazardous to human health. This prompted various authorities globally to act on regulating PFAS. Europe's Commission being at the forefront of those initiatives.

REACH as the Bases

Each member of the European Union is empowered to propose substances considered hazardous to the Commission for regulation under REACH³.

Within a RMOA⁴ the Legislator evaluates if the hazards to the environment and human health resulting from the use of the substance require it to be regulated and if so to what degree respectively in which way.

The legal instruments regulating substances cover limitations, permission requirements or even a complete ban for the manufacturing or use of individual substances or an entire substance group. To date two PFC-type substances - each as lead compound of a substance group - have been identified to require being regulated:

PFOS⁵:

PFOS was the first substance of the PFAS group which was regulated in Europe: In December 2006 the EU Commission adopted the regulation (EG) 2006/122 (amending regulation (EC) 76/769) prohibiting the manufacturing and placing on the market of PFOS and its precursors⁶ in the EU and installing a threshold limit of 50ppm (=mg/kg) PFOS and /or its precursors in articles and mixtures.

In August 2010 PFOS was put on the POPs⁷-List by the Stockholm Convention. The Commission enforced as European law by amending regulation (EU) 850/2004 with 757/2010 reducing the threshold from 50ppm to 10ppm. Both regulations were covered and replaced in June 2019 by the new (EU) 2019/1021 on *persistent organic pollutants*.

As part of the harmonization of legal provisions, Delegated Regulation (EU) 2025/718⁸ adjusted the definition of the compounds concerned and the maximum permissible limits for PFOS and its salts and for all precursor substances.

Status Quo:

Since **December 3rd, 2025 this limit will be reduced to 25ppb for PFOS and its salts and 1ppm for the entirety of PFOS-related substances.**

Firefighting foam agents having manufacturing dates before that may need to be analysed for their respective content of PFOS.

Any firefighting foam agent exceeding these limits must be disposed of in agreement with the provisions for a safe disposal set out in (EU) 2019/1021, Article 7. Any further use is prohibited and may become subject to severe fines.

PFOA⁹

The second substance of the PFAS type having been regulated in Europe is the *Perfluoro Octanoic Acid*. This compound is considered to be the end-point of degradations of any so-called C8-compounds¹⁰ hence is defined as the lead substance for the entire group of C8-Fluorosurfactants and –polymers used in firefighting agents. In opposite to the regulation on PFOS this time not just the acid and its metal salts are covered but any molecule having a perfluorinated chain of seven or eight carbons hence literally any C8-Technology.

The provisions of regulation (EU) 2017/1000 from July 13th concerning: "*Perfluorooctanoic acid (PFOA)*

¹ The term per-fluorinated means that all Hydrogen atoms in a hydrocarbon molecule are replaced by Fluorine. In poly fluorinated carbons not all Hydrogens were replaced by Fluorine.

² PFAS = Perfluoro alkyl substances

³ Regulation (EG) 1907/2006 on „ Registration, Evaluation, Authorisation and Restriction of Chemicals“

⁴ Risk Management Options Analysis – Analysis of Options to minimise the risk caused by a chemical substance or substance group to the environment or human health

⁵ Perfluorooctylsulfonic Acid (C₈HF₁₇SO₂; CAS 1763-23-1)

⁶ Precursors are any substances having the potential to release the particular lead substance during their use or degradation.

⁷ POPs = Persistent Organic Pollutants, list of substances identified as persistent organic pollutants according to the Stockholm Convention.

⁸ See also https://eur-lex.europa.eu/eli/reg_del/2025/718/oj/eng

⁹ Perfluorooctanoic Acid (C₈HF₁₅O₂; CAS 335-67-1)

¹⁰ Fluorine containing firefighting foam agents are either of the C8-type having a chain of eight carbons all of which are surrounded by fluorine. Or they are of the C6-Type (such as the 6:2-Telomers) having a chain of only six perfluorinated Carbons. According to recent studies C6-Type fluorocompounds are reported to be significantly less hazardous yet still persistent.

CAS No 335-67-1 EC No 206-397-9" and its precursors being "Any related substance (including its salts and polymers..."¹¹ generally prohibit the manufacturing or

Status Quo

PFOA and related substances shall not be manufactured nor placed on the market in the EU after July 4th, 2020. Articles or mixtures **must not contain more than 25ppb (=µg/kg) PFOA respectively in total 1000ppb¹² (=1ppm=1mg/kg) of the totality of precursors.**

Until 3rd December 2025 fire-fighting foam agents exceeding above limits, were allowed to be used "for liquid fuel vapor suppression and liquid fuel fire (Class B fires) already installed in systems, including both mobile and fixed systems" if 100% retention of all effluents is granted.

The new regulations state that "fire-fighting foam for liquid fuel vapour suppression and liquid fuel fire (Class B fires) already installed in systems" may contain up to **1 ppm (1 mg/kg) for the totality of PFOA and its salts and up to 10 ppm (10 mg/kg) for the sum of all precursors until August 3rd, 2028,** provided it is "already installed in systems".

Additionally, the same content limit applies to the totality of PFOA, its salts and precursors "where they are present in fluorine-free¹³ fire-fighting foam and originate from fire-fighting equipment which has undergone cleaning in accordance with the best available techniques."

For foam agents filled into existing systems - which again must have been cleaned according to state of the art technologies techniques prior to backfilling with fluorine free foam agents - a significantly higher limit of up to 10 ppm of the sum of PFOA, its salts, and precursors now applies.

Impact of the PFOA Regulation on foam uses

Stocks of firefighting foam agents that exceed the limit values but benefit from one of the aforementioned derogations must be treated in accordance with Article 5 of (EU) 2019/1021. This includes, among other things, an annual reporting obligation to the competent authorities regarding the "nature and size" of the stockpiles. This reporting obligation

has been in force since June 2020 and ends when the derogation period expires.

Stocks exceeding the limits in extinguishing systems and vehicles that are refilled with new firefighting foam agents (meeting the requirements of (EU) 2017/1000) **must comply with the limits since December 3, 2025.** Whether refilling with firefighting foam agents (that exceed the limit values) from stock (e.g., IBC, canister, or barrel goods) is permissible requires legal clarification¹⁴.

In the event of partial consumption of PFOA-contaminated firefighting foam agents, one should therefore not simply refill, but completely empty storage containers (e.g., in stationary extinguishing systems, on vehicles, skip containers, or trailers) and clean all foam-carrying system components (pumps, pipes, valves, taps, proportioners, etc.) in such a way that the limit values are complied with.

Inspection after certain storage intervals (e.g., after 6 and 12 months) is recommended.

Storage containers and media-carrying parts (i.e. pumps, tubes, proportioners, hoses, ...) on trucks, trailers or in systems must be exposed to an intense technical cleaning procedure or have to be replaced to not contaminate new filled foam concentrate beyond the acceptable limits¹⁵.

C9-C14-PFCA

This group of chemicals consists of six perfluorinated carboxylic acids all of which display similar structural elements like PFOA but have a longer perfluorinated carbon chain of 8-13 carbons.

This group of carboxylic acids "having a perfluoro group with the formula C_nF_{2n+1} - directly attached to another carbon atom, where $n = 8, 9, 10, 11, 12$, or 13 , including their salts and any combinations thereof" are subject to restrictions set out by the latest regulation (EU) 2021/1297:

Chemical products containing **more than 25ppb C9-C14-carboxylic acids including their salts and any combinations thereof, or which contain more than 260ppb for the sum of C9-C14-PFCA-related substances** shall not be manufactured, placed on the market or used from February 25th, 2023.

¹¹ "...having a linear or branched perfluoroheptyl group with the formula C_7F_{15} - directly attached to another carbon atom, as one of the structural elements. Any related substance (including its salts and polymers) having a linear or branched perfluorooctyl group with the formula C_8F_{17} - as one of the structural elements." ((EU)2017/1000)

¹² This threshold is a sum parameter i.e. the content of all possible precursors shall not exceed the given limit.

¹³ The term "fluorine free" is not defined in the regulation. See also footnote 18.

¹⁴ The wording "already installed in systems, including both mobile and fixed systems" does not seem to cover foam agent stocked in bulk or packing. However, this interpretation may not be correct.

¹⁵ This affects the cleaning for the purpose of meeting legal requirements with respect to contamination with PFOA and its precursors. The requirement to clean up systems and devices for avoiding negative interactions between two foam agents in accordance with foam manufacturer instructions remains unchanged.

Derogation for firefighting foam agents

Firefighting foam agents are allowed to be used until July 4th, 2025 (manufacturing and placing on the market remain banned!): for use on class-B-fires and for testing provided all releases can be contained (as of January 1st, 2023 foam agents exceeding the legal limit are only allowed to sites where all releases can be contained!). There is no derogation for training whatsoever!

Impact of the C9-C14-Regulation on foam uses

Since January 1st, 2023 no firefighting foam agents are allowed to be placed on the market which exceed any of the limits set by this regulation.

Fire-fighting foams that exceed any of the limits must be taken out of service and storage-/handling equipment (tanks, piping, proportioners, etc. of fixed systems, trailers or fire-fighting vehicles) must be cleaned in such a way that refills with new firefighting foam agents are not contaminated with the regulated substances in excess of their respective legal limits (similar to the situation with PFOA --> see above).

PFHxS¹⁶

The COMMISSION DELEGATED REGULATION (EU) 2023/1608 „amending Annex I to Regulation (EU) 2019/1021 of the European Parliament and of the Council as regards the listing of perfluorohexane sulfonic acid (PFHxS), its salts and PFHxS-related compounds“ prohibits substances and preparations containing more than 25ppb PFHxS or its salts.

Derogations for firefighting foam agents

For firefighting foam agents the limit is set to be 100ppb for “PFHxS, its salts and PFHxS-related substances”.

Impact on uses of firefighting foam:

The regulation is in force, no further derogations or transitions times in place.

PFHxA¹⁷

Regulation (EU)2024/2462 supplements Annex XVII of the REACH Regulation (1907/2006).

However, unlike C8-compounds¹⁰, there is no other group of fluorine compounds below C6-substances that are used in firefighting foam agents. This is why the PFHxA regulation automatically applies to all firefighting foam agents containing fluorine.

Derogations for firefighting foam agents

In addition to regulations for other uses, there are separate regulations for fire extinguishing agents:

1. firefighting foams and firefighting foam concentrates that exceed a content of 25ppb for PFHxA and its salts, or of 1000ppb for the sum of all PFHxA-related substances, may no longer be used for training and testing purposes from April 10, 2026.
Excluded from this are functional tests of extinguishing systems if all releases can be collected and disposed of.
2. The same conditions apply to use by municipal fire departments, with the exception of those that have so-called SEVESO operations in their response area.
3. furthermore, the restriction applies to firefighting foam agents for civil aviation, including civil airports, as of October 10, 2029.

The regulation was published in the Official Journal of the European Union on September 20, 2024 and will enter into force on October 10, 2024.

Impact on uses of firefighting foam:

Municipal fire departments in particular (unless derogations apply) and civil aviation (airports, helideck operators, aircraft industry) must replace any remaining fluorinated firefighting foam agents by the deadlines and clean the affected installations and vehicles in such a way that they also comply with the given limits.

One unclear point is the wording in paragraph 1.d) of the regulation: according to this, the ban also applies to “mixtures for the general public” from October 10, 2026.

Whether this wording includes firefighting foam agents in hand-held portable fire extinguishers, as it appears from the wording, is currently not entirely clear, as there are interpretations to the contrary from some European officials.

The general ban on PFAS in firefighting foam agents

The much-discussed Regulation (EU) 2025/1988, “amending Annex XVII to Regulation (EC) No 1907/2006 of the European Parliament and of the Council as regards per- and polyfluoroalkyl

¹⁶ PFHxS means Perfluoro hexane sulphonic acid, the C6-equivalent to PFOA

¹⁷ PFHxA stands for perfluorohexanoic acid and thus designates - analogous to PFOA for C8 substances - the degradation endpoint for all C6-based fluorine compounds.

substances in firefighting foams”, was published October 3rd, 2025 and entered into force October 23rd, 2025.

This is the most comprehensive regulation of a group of substances ever enacted, and it bans a family of substances that includes all fluorinated organic compounds (PFAS) containing at least one CF₂ or CF₃ group in their molecule.

This means that, in future, different chain lengths will no longer need to be considered, as all PFAS are covered by the regulation.

According to the regulation, from 23 October 2030, fire-fighting foams containing PFAS at a concentration of at least 1 mg/L¹⁸ for the sum of all PFAS may not be placed on the market or used.

Please note that all previous regulations (PFOS, PFOA, PFHxS, PFHxA and C9-C14) remain in force; the transition periods set out in this new regulation do not apply to substances that are already regulated.

All compounds, including those already regulated elsewhere, are taken into account when determining the PFAS content.

Impact on uses of firefighting foam:

The regulation distinguishes between provisions relating to placing on the market/manufacturing, and provisions relating to use.

The following transition periods apply to the placing on the market of products containing more than 1 mg PFAS/kg (1ppm PFAS):

- non-alcohol-resistant fire-fighting foams in portable fire extinguishers until 23 October 2026.
- alcohol-resistant fire-fighting foams in portable fire extinguishers until 23 April 2027
- until 23 October 2035 for:
 - Installations falling under the provisions of 2012/18/EU (excluding civil airports).
 - Offshore petrochemical installations
 - Military vessels;
 - For civilian ships with firefighting foams placed on board before 23 October 2025

The following transition periods apply to the use of products containing more than 1 mg PFAS/kg:

- Until 23 April 2027 for:
 - Training and testing (except for functional testing of extinguishing systems, provided that all releases are captured).
 - public fire services and private fire services “exercising the function of public fire services,

except where those services intervene at industrial fires at establishments covered by Directive 2012/18/EU and the use of the foams and the equipment for that purpose only”

- Until 31 December 2030 for portable fire extinguishers.
- Until 23 October 2035 for:
 - Installations falling under the provisions of 2012/18/EU (excluding civil airports).
 - Offshore petrochemical installations
 - Military vessels;
 - For civilian ships with firefighting foams placed on board before 23 October 2025

From October 23rd, 2026 all users must meet the following conditions:

- Firefighting foams must only be used to fight fires in fire class B. They must not be used for fires involving plastics, solids, or other fire classes.
- The release of these substances into the environment and human exposure must be reduced to the minimum level that is technically and practically possible.
- Separate collection and disposal of all PFAS-contaminated waste.
- A management plan must be drawn up which balances all stocks, disposals and consumption, defines measures in the event of a release and for cleaning and maintaining equipment, and establishes a binding plan or catalogue of measures for transitioning to fluorine-free firefighting foam agents.
- From 23 October 2026, stock of not-utilised fire-fighting foams, PFAS-containing waste, and wastewater containing more than 1 mg/kg of PFAS must be labelled ‘WARNING: Contains per- and polyfluoroalkyl substances (PFAS) with a concentration equal to or greater than 1 mg/L for the sum of all PFAS’. Portable fire extinguishers are exempt from this requirement.

Please note the following important information regarding grandfathering: When fluorine-free firefighting foam agents are used in systems previously operated with fluorine-containing agents, ‘the concentration of PFAS in fluorine-free firefighting foams originating from the equipment which has undergone cleaning in accordance with best available techniques, excluding portable fire extinguishers, shall not exceed 50 mg/L for the sum of all PFAS.’

¹⁸ Please note that 1 mg/l only corresponds to 1 ppm if the solution's volume weight is 1 kg/l. If the volume weight is greater, as

is the case with many foam concentrates, then 1 mg/l corresponds to less than 1 ppm.

Open questions – necessary confirmations

Some clarification is needed regarding

- the legally binding definition of the term '*placing on the market*' (does this refer to initial market placement only, or to subsequent resales?), and
- the wording '*stock of not-utilised firefighting foams*' (does this include fire-fighting foams in hand-held fire extinguishers?).

Municipal and private fire brigades are also stipulated to only use AFFF for fighting liquid fires and vapor control in *establishments covered by Directive 2012/18/EU and the use of the foams and the equipment for that purpose only*. However, this would require duplication of the equipment used for this purpose, which may not be the intention.

We are trying to clarify these issues as soon as possible through our associations. We will inform you of the results immediately.

Products by Dr. STHAMER, Hamburg

All Dr. STHAMER firefighting foam agent concentrates meet the legal requirements for the substance groups PFHxS, PFOS, PFOA and C9-C14: the levels of regulated substances and substance groups in fluorine-based extinguishing agents are at or below the quantification limit.

The situation is different for PFHxA: since the term "PFHxA-related substances" covers all substances which can release PFHxA under any circumstances, the stipulations of (EU)2024/2462 apply to all fluorine compounds used in the production of modern C6-based fluorine-based extinguishing agents and thus all AFFF, FFFP, FP as well as the respective alcohol-containing versions thereof in the aforementioned areas of use!

Regulation (EU) 2025/1988 prohibits the use of any organofluorine compounds in firefighting foam agents. This affects all products labelled as AFFF, FP, FFFP, and their respective AR¹⁹ variants!

As we have had separate production and filling facilities for firefighting foam agents containing fluorine compounds and those that do not since 2012, we

can warrant our fluorine-free products to be free of organofluorine compounds²⁰ as defined below.

Please familiarise yourself well in advance with the transition periods that apply to you, as well as the options and requirements associated with switching to fluorine-free firefighting foam agents.

We will be happy to support you in this process – please contact us!




Safety advice:

If a firefighting foam concentrate has been stored in non-disposable technical equipment, all parts of this equipment having or having had contact with the firefighting foam concentrate must be thoroughly cleaned and the cleanliness tested before they can be refilled with new firefighting foam concentrate!

Please note that any contamination of new firefighting foam agent concentrates by residues of PFOS- or PFOA-contaminated predecessor products beyond the maximum permissible content will render the new product unusable immediately!

Disclaimer

All information in this data sheet is based on our current and best knowledge at the time of publication. It does not constitute a legally binding statement or assurance regarding the general characteristics of the product beyond those specified in the relevant literature. Furthermore, this information does not constitute legal advice or a legally binding interpretation of the cited legislation.

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¹⁹ AR = alcohol resistant

²⁰ The term '*fluorine-free*' is not defined. For the purposes of this document, we understand it to mean products that are manufactured without the intentional addition of organofluorine

compounds for the purpose of improving performance. This means that they do not contain any organofluorine substances in quantities exceeding the ubiquitous background contamination in the region (e.g. in the drinking water used for production).