

GUIDANCE

Substances of concern
in food packaging

PER- AND POLY-
FLUORINATED ALKYL
SUBSTANCES (PFAS)

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Key points

- Per- and polyfluorinated alkyl substances (PFAS) are synthetic chemicals that do not degrade or break down naturally and therefore remain in the environment (section 1).
- PFAS molecules can enter the body through food, creating risks for human health (section 2).
- The Packaging and Packaging Waste Regulation (PPWR, Regulation [2025/40](#)) introduces the following three cumulative maximum limits for the presence of PFAS:
 - 25 µg/kg for any single PFAS
 - 250 µg/kg for the sum of PFAS (excluding polymeric PFAS)
 - 50 mg/kg for total fluorine (PFASs including polymeric PFAS).
- PFAS can still be used in the manufacture of packaging as long as any presence of PFAS is below the set maximum limits (section 3).
- However, as PFAS is widely present in the environment, there is a risk that the set PFAS maximum limits will be exceeded even if PFAS has not been used in the manufacturing of packaging.
- PFAS analysis is currently costly, and outside the European Union (EU) there is limited access to laboratories that can competently complete this analysis (section 4).
- Consequently, food operators could adopt the following strategy:
 - Request packaging materials from suppliers that **do not include PFAS**.
 - Carefully check suppliers' documentation for use of PFAS, in particular in relation to certain materials such as water- and grease-resistant paper and cardboard, printing inks, and bottles and containers made from high density polyethylene (HDPE) (section 5.1).
 - If operators have doubts about the reliability of statements provided by suppliers, test first of all for total fluorine. If total fluorine is below 50 mg/kg, the packaging should be considered compliant. Further testing would be expected to show compliance with other PFAS limits. If organic fluorine exceeds 50 mg/kg, packaging is not compliant (section 5).
- A consolidated approach is required from the whole supply chain to remove PFAS from food packaging. In the future, the EU is expected to prohibit all intentional use of PFAS in food packaging.
- From 12 August 2026 onwards, compliance with the new PFAS limits must be demonstrated in a **declaration of conformity** (model in PPWR **Annex VIII**), which must be passed along the supply chain. This declaration of conformity is drawn up – in most cases – by the packaging manufacturer, who also prepares **technical documentation** (model in PPWR **Annex VII**) based on information provided by the suppliers of packaging components.



1. What are PFAS?

Per- and polyfluorinated alkyl substances (PFAS) include a very large group of synthetic chemicals with significantly different properties. They can be gases, liquids, or solids and are persistent in the environment, meaning that they do not degrade or break down naturally.

In its Packaging and Packaging Waste Regulation (PPWR) [2025/40](#) (Art. 5), the European Union (EU) defines PFAS as chemicals with at least one carbon atom being fully substituted with fluorine atoms.

PFAS have different properties depending on their chemical structure. Some examples are as follows.

Polymeric PFAS

One of the most important groups of PFAS are polymers. A polymer is a substance made up of many small identical pieces (monomers) forming one long molecule. Polymers can occur naturally, like natural rubber for example, or they can be created, as is the case for synthetic polymers used to produce clothes (polyester) or plastic bottles (polyethylene).

A prominent example is polytetrafluoroethylene (PTFE) – commonly known as Teflon® – which is used as non-stick coating for various kitchen and industrial ware applications. Such applications are not defined as packaging and thus do not have to comply with EU packaging rules.

PTFE waxes are sometimes used in printing inks to improve resistance to scratches and abrasions. These inks – when applied to the surfaces of packaging materials – are within the scope of the PPWR.

Another type of polymeric PFAS is formed by polymerisation of two chemicals which are listed in the EU Plastics Regulation [10/2011](#) and are used as polymer production aids. In this specific case, these PFAS reduce the friction of the polymer inside the extruder. Such polymer production aids are mainly used for manufacturing polyethylene. If the materials made from such polyethylene are intended for food packaging, they are within the scope of the PPWR and must comply with the restrictions.

Water- and grease-resistant paper and board, such as drinking cups and pizza boxes, can be manufactured using another group of polymeric PFAS. Some of these food containers are considered as packaging, for example pizza boxes, popcorn bags, or cardboard trays. Therefore they must comply with the EU packaging requirements set by the PPWR.

In these applications, the PFAS side chains are chemically attached to a polymer which itself is not a PFAS. Unfortunately, these attached PFAS side chains can easily be detached from the non-PFAS part to which they are bound. The detached small PFAS chain can be transferred into food and ingested by consumers.

Small PFAS molecules

Small molecular PFAS, such as perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), are usually not used intentionally in manufacturing processes. However, they are formed by other PFAS when they degrade into the environment. These substances are of high concern to many countries worldwide, as they remain present in the environment for a long time (“high persistency”).

Unintended PFAS generation

PFAS can also be generated unintentionally when modifying the surface of articles made from commonly used polymers through a process called direct fluorination, where fluorine gas reacts with the outside layer of a polymer.

Bottles and containers made from high density polyethylene (HDPE) do not adequately prevent the transfer of gases and chemicals from outside the packaging to inside (and vice versa), meaning that gases and



chemicals can easily pass into food. Applying elemental fluorine gas to the inner side of these containers significantly improves the barrier properties. During this process, several small PFAS molecules are generated and can be released into food. Food containers that have undergone this process, especially bottles, are considered as packaging under EU law and thus must comply with the PPWR requirements.

2. Why is the EU regulating PFAS?

The vast majority of PFAS (molecules) described in section 1 are extremely persistent in the environment. The time taken for the concentration of some PFAS molecules to be reduced by half (the half-life) can be up to 100 years. Due to their extensive use and persistence, many PFAS molecules are now present in the environment. Traces of PFAS have been found not only in nature, but increasingly in several parts of the human body like blood, liver, tissue, or mothers' breast milk.

There are growing concerns about the toxicological properties of various PFAS. Because these small molecules can easily transfer into the environment and into human bodies, there is a risk of increasing toxicological effects.

3. What are the current rules for PFAS in the EU?

The EU regulates the presence of PFAS in two distinct areas: under EU chemical legislation; and in the context of (food) packaging rules.

Chemical PFAS rules (REACH)

Several small PFAS molecules, such as PFOA and perfluorohexanoic acid (PFHxA), are regulated by the EU rules on the Registration, Evaluation, Authorisation and Restriction of Chemicals – REACH (Regulation [1907/2006](#)).

Since 2023, the EU has discussed extending REACH to regulate all PFAS. The European Commission initially proposed an almost complete ban of PFAS in all industrial areas. Exceptions are under discussion, but it is expected that the intentional use of PFAS will be prohibited in the coming years.

Packaging PFAS rules (PPWR)

The Packaging and Packaging Waste Regulation (PPWR, [2025/40](#)) sets concentration limits for both single PFAS molecules (PFOA, PFOS, etc.) and for the sum of all single molecules in packaging. These limits apply exclusively to food packaging placed on the EU market after **12 August 2026**.

According to Art. 5(5) of the PPWR, food packaging must comply with each of the following limits:

- 25 ppb (parts per billion = $\mu\text{g}/\text{kg}$) for any **single** PFAS as measured with targeted PFAS analysis (polymeric PFAS excluded from quantification);
- 250 ppb for the sum of PFAS measured as the **sum** of targeted PFAS analysis, where applicable with prior degradation of precursors (polymeric PFAS excluded from quantification); and
- 50 ppm (parts per million = mg/kg) for PFAS (including polymeric PFAS); “if **total fluorine** exceeds 50 mg/kg the manufacturer, [...] shall, upon request, provide [...] proof of the quantity of fluorine measured as content of either PFAS or non-PFAS [...]”.



Total fluorine is determined after complete destruction of the molecules, that is, after incineration of the packaging. During the incineration, fluorine salts – which may be used in packaging as fillers – can be detected. While fluorine salts are not restricted by the PPWR and may be used, the total fluorine is the sum of organic fluorine (PFAS) and fluorine salts.

$$\text{Total fluorine} = \text{total organic fluorine (PFAS content)} + \text{fluorine salts}$$

The PPWR does not prohibit processes during which PFAS might be produced (such as fluorination). However, operators must ensure that the total organic fluorine content does not exceed the PPWR maximum limits.

These restrictions apply to all types of *food packaging* (whereas the general scope of the PPWR includes *all* types of packaging). The PPWR (Art. 3(1)) defines packaging as an item that “is intended to be used by an economic operator for the containment, protection, handling, delivery or presentation of products to another economic operator or to an end user”. Under this definition, packaging includes closures, sealing films, and all types of labels. This means that the limits apply to the total packaging, including all of these elements.

EU guidance documents

In March 2026, the European Commission published a guidance document and Frequently Asked Questions (FAQs) on several aspects of the PPWR.¹ Chapter 5 of the Annex to the Communication to the Commission (guidance document) recognises the lack of harmonised methodology for PFAS analysis in food contact packaging. It proposes a stepwise approach for competent authorities to verify compliance with the PFAS limits as follows:

1. If the result for total fluorine is below 50 mg/kg, the packaging shall be considered compliant.
2. If the result of this analysis exceeds 50 mg/kg, testing should be done to see if the fluorine is organic. If the organic fluorine is below 50 mg/kg, the packaging shall be considered compliant.
3. Recommendation to also check, using a Direct TOP (total oxidisable precursors) analysis, compliance with the other PFAS limits (25 and 250 µg/kg for any single PFAS and for the sum of PFAS, respectively).

According to the EU guidance document, evidence currently available shows that where total fluorine is below 50 mg/kg, packaging also complies with the other PFAS limits.

Operators are advised to reject packaging that does not comply with the organic fluorine limit of 50 mg. If this limit is exceeded, the packaging is non-compliant and must not be placed on the EU market.

4. What are the challenges for managing PFAS?

Communication along the supply chain

The EU regulates the intentional use of certain contaminants such as bisphenol A (BPA), meaning that the supplier’s written confirmation in the declaration of compliance that such substances have not been used intentionally when manufacturing the packaging is passed down the supply chain. For further information, see AGRINFO: [Substances of concern in food packaging and food contact materials: Bisphenol A](#).

¹ European Commission:

- [Guidance document on Packaging and Packaging Waste Regulation \(PPWR\): Communication to the Commission](#) – Approval of the draft Commission Notice on the Guidance document for Regulation EU 202540 on packaging and packaging waste [Annex](#) to the Communication to the Commission
- [FAQ on Packaging and Packaging Waste Regulation \(PPWR\)](#)



The PFAS restriction under the PPWR is different. The PPWR does not prohibit the intentional use of PFAS, but sets a limit for the total content in packaging. This means that PFAS can – in principle – be used when manufacturing food packaging, provided that the total content in the packaging remains below the legal limits.

However, the limits set in Art. 5(5)(a and b) of the PPWR are so low that unintended contamination may also result in non-compliant concentration levels. This means that compliance cannot be guaranteed simply on the basis of suppliers confirming that PFAS was not intentionally used.

Moreover, the financial and technical feasibility of a PFAS analysis is problematic due to limited laboratory capacities and high PFAS analysis costs.

Testing strategy²

Total fluorine analysis

In practice, operators are advised to first undertake analytical verification of the total fluorine level, as it is generally viewed that total fluorine below 50 mg/kg also ensures compliance with the other PFAS limits.

Total fluorine is tested through the complete combustion of the packaging sample. The fluorine present in the sample is released into the exhaust gases and bubbled through a water bath in which the fluorine is easily soluble. The diluted fluorine can be analysed using a technique called combustion ion chromatography (CIC). As of March 2026, there are some limitations associated with this method, which is not standardised or harmonised, and is offered by only a very limited number of laboratories. The conditions during combustion can have a significant impact on the amount of released fluorine. The presence of calcium salts (which are, for instance, used as fillers in paper or plastic manufacturing) or talc (an approved additive for plastic packaging) can result in over- or under-estimation of results. Such uncertainties make it difficult to compare results from different laboratories, particularly as laboratories usually do not disclose details of the methods used.

Availability of testing

Analytical capacities for the analysis of PFAS are most developed in the EU and in the United States of America (USA). Stakeholders in most non-EU countries supplying the EU market may have very limited or no access to national or regional test laboratories. They may therefore need to rely on shipping samples to the EU or the USA. However, as capacity even within the EU and USA is still limited, securing access to any appropriate analysis may be complicated.

Testing costs

As analysis of PFAS is not yet common, the cost of PFAS analysis in the EU is currently very high. With the introduction of specific requirements for PFAS, demand for PFAS analysis is likely to increase, and costs are expected to reduce significantly over time.

² This testing strategy is a pragmatic one that reflects the observation in the European Commission's guidance document that, as of March 2026, the available evidence shows that compliance with total fluorine limits also indicates compliance with the other PFAS levels. However, it should be noted that packaging must be compliant with all PFAS levels, and certainty of compliance can only be guaranteed by testing for each limit.



5. How to prepare for the PFAS restriction in food packaging?

PFAS restrictions under the PPWR come into force on **12 August 2026**. After this date, all packaging placed on the EU market, whether filled or empty, must comply with the limits set in the PPWR (Art. 5(5)).

Mapping the supply chain and identifying potential risks

The food operator's primary focus should be on ensuring that all suppliers phase out the intentional use of PFAS in their respective raw materials. This includes identification of the most relevant risks, including:

- water- and grease-resistant paper and cardboard should not be manufactured with PFAS coatings
- printing inks should not contain any PTFE waxes
- polyethylene films should not be manufactured using PFAS polymer production aids
- bottles and containers made from HDPE should not be directly fluorinated (to improve barrier properties)
- direct contact between food and recycled paper and board should be avoided because recycled fibres always contain PFAS from earlier uses of paper and board.

In principle, the PPWR still allows the intentional use of PFAS provided the restrictions in Art. 5(5) are complied with. Nevertheless, food operators are recommended to request suppliers **not to intentionally use any PFAS**, or to phase out their use within a reasonable timeline.

Data collection and analysis

For the reasons outlined in section 4, analytical verification of non-intentional use or absence of PFAS is a complicated and costly process, especially for manufacturers outside the EU. Consequently, food manufacturers should prioritise analytical verification of total fluorine in food packaging in those cases where there are reasonable doubts concerning the reliability of supplier statements that PFAS have not been intentionally used. Operators should particularly scrutinise statements in relation to the materials listed above as risks. In cases of inconsistencies or implausible supplier statements, the packaging supplier should be asked for analytical test reports to support any claims that PFAS was not intentionally used.

Communication and dialogue along the supply chain

Analytical verifications of PFAS (single substances as well as total fluorine) are cost-intensive. Moreover, analytical measurements cannot provide 100% guarantees of compliance due to the limitations on analysis. As a result, the most efficient strategy for complying with the PFAS restrictions is the elimination of raw materials containing PFAS along the supply chain. This strategy must be developed in cooperation with the whole supply chain. This is the only way to ensure an affordable and reliable compliance strategy and to implement it in daily practice.



Documentation and declaration of conformity

Packaged foods sold on the EU market must demonstrate compliance with the requirements set by the PPWR. This occurs through:

- relevant technical documentation (model in PPWR Annex VII) drawn up by the packaging manufacturer, based on information provided by packaging suppliers
- written declaration of conformity (model in PPWR Annex VIII) prepared by the packaging manufacturer.

From **12 August 2026** onwards, compliance with the new PFAS limits must be demonstrated in a declaration of conformity which must be passed along the supply chain to the EU importer. This declaration of conformity is drawn up – in most cases – by the packaging manufacturer, who also prepares technical documentation based on information provided by the suppliers of packaging components.

For each packaged product, a single declaration of conformity needs to be continuously updated (in cases of changes in packaging, legal requirements, etc.).

When packaged products are imported into the EU, the declaration of conformity and other manufacturer's obligations are transferred to the EU importer.



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