

Cepi guidance on the PFAS restriction in the Packaging and Packaging Waste Regulation

Disclaimer

This guide shall serve as summary of regulatory requirements resulting from the PFAS restriction in Regulation 2025/40 on packaging and packaging waste (PPWR)¹. Additionally, it shall provide advice on how to achieve compliance with the requirements and which testing methods are suitable for paper and board. Please be aware that this document should not be considered legally binding, exhaustive, or as a definitive standard.

Legal Requirements at a Glance

The **PPWR** covers requirements for substances in packaging in article 5. Paragraph 5 provides the details of the restriction concerning PFAS:

5. From 12 August 2026, food-contact packaging shall not be placed on the market if it contains per- and polyfluorinated alkyl substances (PFAS) in a concentration equal to or above the following limit values to the extent that the placing on the market of packaging containing such a concentration of PFAS is not prohibited pursuant to another Union legal act:

- a) 25 ppb for any PFAS as measured with targeted PFAS analysis (polymeric PFAS excluded from quantification);*
- b) 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*
- c) 50 ppm for PFASs (including polymeric PFAS); if total fluorine exceeds 50 mg/kg the manufacturer, importer or downstream user as defined respectively in Article 3, points (9), (11) and (13) of Regulation (EC) No 1907/2006 shall, upon request, provide to the manufacturer or the importer as defined respectively in Article 3(1), points (13) and (17), of this Regulation proof of the quantity of fluorine measured as content of either PFAS or non-PFAS in order for them to draw up the technical documentation as referred to in Annex VII to this Regulation.*

'PFAS' means 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), except substances that only contain the following structural elements: CF₃ -X or X-CF₂ -X', where X = -OR or -NRR' and X' = methyl (-CH₃), methylene (-CH₂ -), an aromatic group, a carbonyl group (-C(O)-), -OR'', -SR'' or -NR''R''', and where R/R'/R''/R''' is a hydrogen (-H), methyl (-CH₃), methylene (-CH₂ -), an aromatic group or a carbonyl group (-C(O)-).

By 12 August 2030, the Commission shall carry out an evaluation to assess the need to amend or repeal this paragraph in order to avoid overlaps with restrictions or prohibitions on the use of PFAS laid down in accordance with Regulations (EC) No 1935/2004, (EC) No 1907/2006, or (EU) 2019/1021.

Scope: Art.5(5) applies to food-contact packaging, i.e. any packaging that can be reasonably expected to get into contact with food. Consequently, this applies only to the packaging in direct contact with food (primary packaging).

Date of application: The provision starts applying from 12 August 2026. This means that from 12 August 2026 onwards, economic operators may not place on the market any food-contact packaging which contains PFAS above the limits set out in article 5(5), regardless of the time of actual production of the packaging or packaging material by a company up the supply chain.

¹ Regulation (EU) 2025/40 of the European Parliament and of the Council of 19 December 2024 on packaging and packaging waste, amending Regulation (EU) 2019/1020 and Directive (EU) 2019/904, and repealing Directive 94/62/EC (Text with EEA relevance) (OJ L, 2025/40, 22.1.2025); <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=intcom:C%282026%293702>

PFAS definition: the legal text makes no distinction between unintentionally present and intentionally added PFAS. Therefore, both fall within the scope of the PPWR restriction, and the duty holder must ensure no PFAS is above the limit, regardless of the origin. See also the FAQ of the Commission, question 14².

Testing Strategy

The description below outlines the general testing strategy used to demonstrate compliance with the PFAS restriction set out in the Packaging and Packaging Waste Regulation (PPWR). Various methods can be used to measure PFAS in accordance with this testing procedure, which are described in the following chapter below. However, not all methods are suitable for paper and board materials. Furthermore, some methods have significant limitations that companies should be aware of. To avoid false positives and ensure accurate, reproducible results, **we strongly recommend following the testing procedure for paper and board provided on page 5 of this document.**

To demonstrate compliance with the PFAS restriction, a step-wise testing approach can be considered both sufficient and proportionate to the legal requirements outlined in the regulation.

The Commission clarified in the [PPWR Notice Guidance](#)³ the following step-wise testing approach that can be used as key reference for compliance:

1. *Total Fluorine (TF) quantification (step 1): If TF is below 50 mg/kg, sample could be considered compliant.*
2. *If TF is above 50 mg/kg, methods such as pyrolysis-GC/MS can be used to confirm whether the fluorine is organic (PFAS) or inorganic in step 2. If the organic fluorine is below 50 mg/kg, the sample could be considered compliant.*
3. *Direct TOP (total oxidizable precursors) analysis is recommended to check compliance with the 25 µg/kg and 250 µg/kg concentration limit in step 3.*

On the basis of the evidence currently available to the Commission, all samples compliant with test (1) are also compliant with tests (2) and (3).

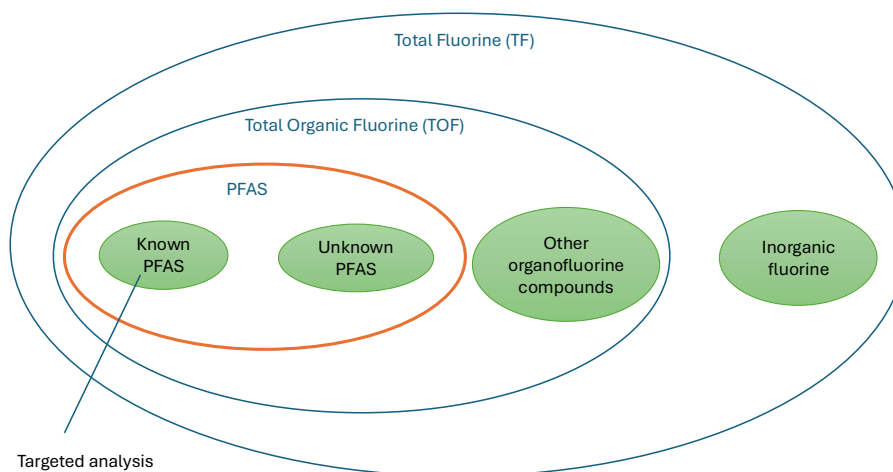


Figure 1: Graphical visualisation of the step-wise testing approach

² European Commission: Directorate-General for Environment. (2026). *Packaging and Packaging Waste Regulation (PPWR) : frequently asked questions*. Publications Office of the European Union. <https://data.europa.eu/doi/10.2779/6056528>.

³ Commission Notice Guidance document for Regulation (EU) 2025/40 on packaging and packaging waste. Document C(2026)3702. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=intcom:C%282026%293702>.

Description of testing steps:

Step 1 corresponds to point (c) of Article 5(5), which establishes a 50 ppm threshold for total fluorine and a 50 ppm limit for PFAS, including polymeric PFAS. The company performs an analysis of Total Fluorine (TF) in the packaging material.

If the TF content is lower than 50 ppm, this would automatically mean that Total Organic Fluorine (TOF) and thus PFAS, if present, would also be below 50 ppm. As stated by the Commission, **samples where the TF is below 50 ppm are deemed to comply with Article 5(5). No further testing is required.**

When a sample has measured TF above 50 ppm, it does not automatically mean that the sample is non-compliant or that the sample contains PFAS. Inorganic fluorine can often be detected in paper samples due to mineral fillers such as talc. Hence, it is important to establish in the next step, whether the total fluorine can be attributed to inorganic fluorine or organic fluorine such as PFAS.

Step 2: If the TF exceeds the 50 ppm threshold, the company performs a Total Inorganic Fluorine (TIF) or Total Organic Fluorine (TOF) measurement to detect the inorganic or organic part respectively. The total organic fluorine, which would include the PFAS, can also be obtained by subtracting TIF from TF (see section on recommended test methods).

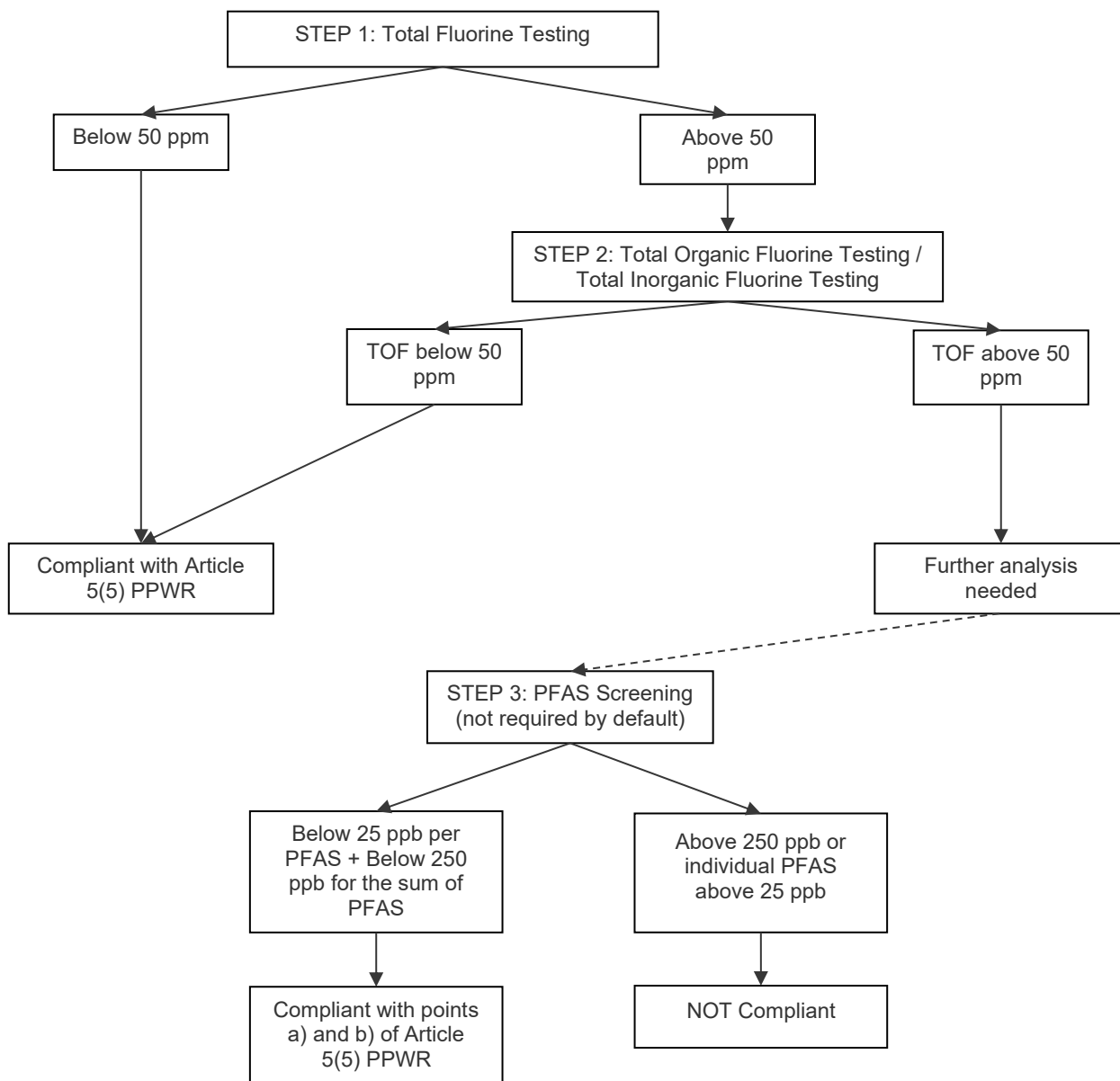
Since the 50 ppm limit is valid for PFAS, which are organic fluorine, the TOF content is of particular interest. **If the TOF content is lower than 50 ppm, the material can be deemed to comply with Article 5(5)** as stated in the Commission notice and **no further testing is required.**

Where TOF exceeds 50 ppm, further investigation is necessary to determine the amount of fluorine attributable to PFAS. TOF above 50 ppm is a strong indicator but does not by itself demonstrate that PFAS exceed the Article 5(5)(c) limit, since TOF may also include non-PFAS organic fluorine.

Step 3 concerns points (a) and (b) of Article 5(5), which define limits of 25 ppb for individual PFAS and 250 ppb for the sum of PFAS (excluding polymeric PFAS). However, **this detailed PFAS screening is not required by default. Based on the Commission notice and the evidence currently available, compliance demonstrated through the TF/TOF screening approach is considered sufficient to establish compliance with Article 5(5).**

To fulfil the requirements of points (a) and (b), it is not feasible to test for all known PFAS substances as more than 10,000 have been identified. Unfortunately, the Commission notice does not specify which PFAS to screen for. Therefore, should companies choose to conduct step 3 testing, **this guide recommends a targeted screening approach** that focuses on a subset of PFAS, which are listed in the chapter below. If the targeted PFAS analysis results are below the respective thresholds, the material is deemed to comply with points (a) and (b).

If the PFAS levels are above the limits, the material is considered non-compliant and cannot be placed on the market.



Waiver of Testing for No-Risk Products

The European Commission discussed together with Member States the possibility of exempting products that are considered to present no or only a low risk of PFAS contamination from testing requirements. **This waiver of testing is not confirmed yet.**

Nevertheless, companies may wish to take this potential approach into account when carrying out their risk assessments.

Given the large volume of food-contact packaging placed on the EU market, the current absence of a harmonised and reproducible testing method, and the limited PFAS testing capacity across the EU, a practical and proportionate approach to demonstrating compliance could be based on a risk assessment. Under this approach, economic operators would develop a risk matrix and define verification activities proportionate to the identified level of risk, building on the following complementary elements:

- **Verification of no intentional PFAS use:** Suppliers' statements or declarations may be used to confirm that PFAS have not been intentionally added at any stage of the value chain. Article 16 of the PPWR sets out the information obligations for suppliers of packaging and packaging materials.
- **Assessment of the risk of unintentional PFAS presence:** This should take into account realistic sources of cross-contamination, process-related factors, and the inherent likelihood of PFAS occurrence (for example, legacy PFAS or production carry-over).

Depending on the outcome of the risk assessment, compliance could be demonstrated as follows:

- **No-risk scenario:** Compliance could be demonstrated through suppliers' statements or declarations confirming that there is no risk of PFAS cross-contamination or legacy PFAS presence. Article 16 of the PPWR sets out the relevant supplier information obligations.
- **Low-risk scenario:** Additional verification may include supplier audits, sample testing demonstrating compliance with the 50 ppm TF/TOF concentration limit, or other appropriate analytical testing. The need for testing, and its frequency, should be determined on the basis of the identified risk.
- **Medium- to high-risk scenario:** Based on the risk assessment, manufacturers may decide to supplement supplier documentation and existing test reports with their own testing of the final article.

As stated before, this waiver for no/low-risk products is not confirmed yet. The European Commission is currently working to provide additional clarity on the Conformity Assessment procedure in relation to Article 5(5) of the PPWR. As a result, the approach outlined in this document may be amended in the future to reflect further EU guidance.

Testing Methods Recommended for Paper and Board

There are various methods that can be used to measure PFAS following the step-wise testing approach, however, not all of them are suitable for paper and board. Furthermore, some methods have significant shortcomings that companies need to be aware of.

The shortcomings of certain methods are primarily related to the presence of inorganic fillers, such as talc and kaolin, which can significantly influence the analytical results and lead to false positives. To avoid these false positives and ensure accurate, reproducible results, we strongly recommend following the testing method for paper and board described below.

Recommended for Paper and Board

For steps 1 and 2: For testing Total Fluorine and Total (In-) Organic Fluorine

The European Committee for Standardization (CEN/TC 172/WG3) is working on harmonising fluorine measurement specifically for paper and board intended for food contact. The draft for this standard for the determination of Total Fluorine (TF) and Total Organic Fluorine (TOF) in paper and board packaging already exists and will be filed as standard at the beginning of August 2026. The interlaboratory tests carried out with it show positive results with regards to the distinction between total fluorine contents and total organic fluorine contents.

We recommend using their approach for measuring fluorine in paper and board which currently includes:

- Total Fluorine (TF) in paper or board is measured on the raw sample by oxidative pyrohydrolytic Combustion – Ion Exchange Chromatography (CIC). (i.e. NOT CIC-Bomb – see below)
- Total Inorganic Fluorine (TIF) in paper or board is measured by CIC on a sample whose organic matter has been burnt off at 525°C for 2 h (optimised pre-combustion). TIF measurement by CIC is then conducted on the remaining mineral matter.
- Total Organic Fluorine (TOF) can be obtained by subtracting TIF from TF, so that $TOF = TF - TIF$.

That way, operators can determine all relevant data (TF, TIF, and TOF) using Combustion Ion Chromatography (CIC), providing a relatively cheap and more robust screening method.

For step 3: Targeted PFAS screening

As mentioned above, this detailed PFAS screening is not required by default. Nevertheless, we would like to inform about the methods that can be used should operators choose to perform this testing.

We recommend the following methods to verify the compliance of individual PFAS with the 25 ppb limit:

- Liquid chromatography–mass spectrometry (LC-MS) methods
- Gas chromatography–mass spectrometry (GC-MS) methods

A further method for the analysis for individual PFAS is being developed by the same CEN/TC 172/WG3 working group. However, it is currently less advanced than the fluorine measurement described above.

To fulfil the requirements of points (a) and (b), it is not feasible to test for all known PFAS substances. Therefore, this guide recommends a targeted screening approach that focuses on a subset of PFAS, which are listed in the chapter below.

Suitable for Paper and Board, but less recommended

Pyrolysis GC/MS

Pyrolysis-GC/MS is an emerging tool for the detection of fluorinated organic compounds in a wide range of materials, including paper and board. The technique detects characteristic fluorinated degradation products and can provide evidence of PFAS-related chemistry in a sample. As such, it is useful for investigating the origin of elevated total fluorine levels (>50 ppm).

With current instruments, Pyrolysis-GC/MS is not sufficiently sensitive to detect trace levels of PFAS. Instead, it primarily detects PFAS-related fragments when concentrations are approximately 50 ppm or higher. Consequently, if no PFAS-related fragments are detected by Pyrolysis-GC/MS, the sample can reasonably be assumed to contain less than 50 ppm TOF and, according to the European Commission's proposed approach, may be considered compliant with the PFAS restriction.

Pyrolysis-GC/MS is primarily a qualitative technique and does not directly quantify PFAS concentrations. Although it is a suitable method for paper and board (with the current sensitivity), the TOF analysis by subtracting the TIF concentration from TF concentration provides a better initial screening by indicating whether PFAS are present and in which concentration. Furthermore, if future improvements in Pyrolysis-GC/MS increase its sensitivity to detect trace PFAS levels, interpretation of the results may become more challenging, as PFAS-related fragments could then be detected even when concentrations remain below the 50 ppm compliance threshold.

Not recommended for Paper and Board

CIC-Bomb

In oxidative pyrohydrolytic combustion (CIC), the sample is combusted under a controlled flow of oxygen and water vapour. This approach is particularly suitable for paper and board because it mainly measures fluorine released from organic fluorinated substances, such as PFAS. In contrast, **CIC-Bomb** uses combustion in a closed, high-pressure oxygen bomb. The more aggressive combustion conditions can also extract fluorine from **inorganic fluorine-containing minerals and fillers**, such as talc and kaolin. As a result, CIC-Bomb often measures not only fluorine originating from PFAS but also fluorine from inorganic sources. Consequently, **CIC-Bomb may produce higher total**

fluorine (TF) values than oxidative pyrohydrolytic combustion, particularly for paper and board grades containing mineral fillers. These elevated TF values do not necessarily indicate the presence of PFAS and can lead to false-positive conclusions regarding compliance with PFAS restrictions.

TOF measuring using DIN 51723 and EN ISO 10304-1 as proposed by the Danish Ministry

While the approach of CEN described above is a reliable way of measuring the organic fluorine, we would refrain from measuring TOF using DIN 51723 and EN ISO 10304-1. The DIN 51723 specifies a method of determining the fluorine contents of hard coal, coke, brown coal, lignite, briquettes and lumpwood charcoal by Ion-Chromatography. It describes a method for total fluorine measurement in solid fuel and not total organic fluorine. Thus, for paper and board products, the DIN standard consistently gives false positives due to inorganic fillers such as talc that are also being measured.

Concerning EN ISO 10304-1, it only specifies the determination of dissolved anions by liquid chromatography of ions — Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulphate. Using this method, the combustion gases are trapped in water. The fluorine emerging from the combustion comes off as fluoride and is determined as fluoride by means of the ion chromatographic method in the trapping water. The detected fluoride value is then calculated back to the fluorine content of the sample. Hence, the EN ISO 10304-1 is rather a useful measuring method for fluoride (not fluorine) in water as such – but not in combination with DIN 51723.

Hence, the combination of DIN 51723 and EN ISO 10304-1 is not recommended for determining the total organic fluorine for paper and board packaging.

Direct Total Oxidizable Precursor (TOP) assay

We do not recommend this method for step 3 targeted PFAS testing. Experts note that the TOP assay is too complicated for routine industry monitoring, delivers little additional information, and can even create substances not originally present during the oxidation process. With the TOP-Assay method, polymeric PFAS are also detected, as the polymer compounds are broken down and oxidated by the TOP-Assay. However, points a) and b) of the PPWR PFAS restriction in Article 5(5) explicitly exclude polymeric PFAS from the quantification.

Additionally, in trials using TOP-Assay with recycling fibre paper and board grades, the LCMS measurement showed significant interferences, which were not seen with just solvent extraction or with solvent extraction under alkaline conditions. The assumption at this point is that in the TOP-Assay, substances are extracted from the recycled fibres, which are then oxidated and impair the measurement.

PFAS to Screen for in Step 3

Step 3 recommends a targeted PFAS analysis in accordance with Article 5 (a) and (b), which define limits of 25 ppb for individual PFAS and 250 ppb for the sum of PFAS (excluding polymeric PFAS).

As mentioned above, this detailed PFAS screening is not required by default. Nevertheless, we would like to inform about the individual PFAS that might be relevant to screen for should operators choose to perform this testing.

Next to the standardisation for TF/TIF/TOF measurement, CEN/TC 172/WG3 will also provide a sensible list of PFAS relevant for paper/board to screen for. Once the standard is published, we will recommend using their list and will update this guide accordingly.

Until then, Cepi recommends the following:

To fulfil the requirements, it is not feasible to test for all known PFAS substances as more than 10,000 have been identified. Therefore, should companies choose to perform a PFAS screening, this guide recommends a targeted screening approach that focuses on a subset of PFAS, namely those that are regulated by the POPs and REACH regulation and listed in the Drinking Water Directive. This pragmatic selection ensures that substances of greatest relevance and regulatory concern are adequately covered while keeping the testing scientifically and operationally manageable:

Regulation (EU) 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants (POPs)	PFOS, PFOA, PFHxS
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Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)	PFCAs (Annex XVII, entry 68), including PFNA, PFDA, PFUnDA, PFDoDA, PFTrDA, PFTeDA
	PFHxA (Annex XVII, entry 79)
Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the quality of water intended for human consumption	PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUnDA, PFDoDA, PFTrDA
	PFBS, PFPeS, PFHxS, PFHpS, PFOS, PFNS, PFDS, PFUnDS, PFDoDS, PFTrDS

In total 21 PFAS to screen for:

Perfluoroalkyl Carboxylic Acids	CAS Number	Perfluoroalkyl Sulfonic Acids	CAS Number
PFBA	[375-22-4]	PFBS	[375-73-5]
PFPeA	[2706-90-3]	PFPeS	[2706-91-4]
PFHxA	[307-24-4]	PFHxS	[355-46-4]
PFHpA	[375-85-9]	PFHpS	[375-92-8]
PFOA	[335-67-1]	PFOS	[1763-23-1]
PFNA	[375-95-1]	PFNS	[68259-12-1]
PFDA	[335-76-2]	PFDS	[335-77-3]
PFUnDA	[2058-94-8]	PFUnDS	[749786-16-1]
PFDoDA	[307-55-1]	PFDoDS	[79780-39-5]
PFTrDA	[72629-94-8]	PFTrDS	[791563-89-8]
PFTeDA	[376-06-7]		

At the same time, there are still PFAS that are currently authorized in national food contact recommendations or legislations, which can be included in the monitoring.

German BfR recommendations XXXVI & XXXVI/2 – as of 01 October 2025	2-Propen-1-ol, reaction products with 1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-6-iodohexane, dehydroiodinated, reaction products with epichlorohydrin and triethylenetetramine)	BfR XXXVI	CAS-No: 464178-94-7
	6:2 FTOH (6:2 Fluorotelomer alcohol) (3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-1-octanol)	BfR XXXVI	CAS-No: 647-42-7
	TFOA (3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl acrylate or 1H,1H,2H,2H-perfluorooctyl acrylate)	BfR XXXVI + XXXVI/2	CAS-No: 17527-29-9
	6:2 FTMAC (3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl methacrylate)	BfR XXXVI + XXXVI/2	CAS No: 2144-53-8
	Copolymer with 2-diethylaminoethylmethacrylate, 2,2'-ethylenedioxydiethyldimethacrylate, 2-hydroxyethylmethacrylate and 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl methacrylate, acetate	BfR XXXVI + XXXVI/2	CAS-No: 863408-20-2

	Copolymer with 2-diethylaminoethylmethacrylate, 2,2'-ethylenedioxydiethylmethacrylate, 2-hydroxyethylmethacrylate and 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl methacrylate, acetate and/or malate	BfR XXXVI + XXXVI/2	
	Copolymer with 2-diethylaminoethylmethacrylate, 2,2'-ethylenedioxydiethylmethacrylate, 2-hydroxyethylmethacrylate and 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl methacrylate, malate	BfR XXXVI + XXXVI/2	
Dutch Warenwetregeling – as of June 2025	Diphosphoric acid, polymers with ethoxylated reduced Me esters of reduced polymerised oxidized tetrafluoroethylene	Bijlage, Chapter II, 1.2.2, n	CAS-No: 200013-65-6

PFAS listed in REACH and POP regulations are commonly tested by laboratories. For other PFAS, standard methods may not exist as of today.

Rationale of Sample Selection and Testing Frequency

Representative samples must be selected based on a risk-based approach, taking into account the material type, the supply-chain structure, and the contamination risk. Testing must be performed at a frequency which is based on a risk assessment and relates to the likelihood of the restriction being exceeded. This frequency will depend on a number of factors, e.g. the type of raw material used, raw material variability, process variability, testing accuracy, or agreements between manufacturer and supplier. In certain cases, there may also be a need to align the frequency with external factors such as customer requirements, change of suppliers and the Declarations of Compliance (DoC). Changes in materials, suppliers, or manufacturing processes may prompt a re-testing of the materials.

Once the initial frequency has been determined, the risk assessment which determined that frequency must be reviewed at least every 12 months. This may or may not result in the actual testing frequency being changed. This criterion may be managed through the risk analysis (HARA, HACCP...) of the plant.

Laboratory Selection

Several external laboratories are capable of testing for the PPWR PFAS restriction already now. Attention should be paid to the testing methods that are being used as described above.

The European Commission recommends that laboratories as well as the PFAS methods of analysis should be accredited if possible, according to ISO/IEC 17025. However, for internal control purposes, internal laboratory testing can also be used, provided the methods are cross-checked with external labs. This ensures that manufacturers can effectively monitor their own risk management systems, provided that they are proficient in the analysis of PFAS.

Documentation

The manufacturer should document the testing rationale and frequency in the technical documentation.

As part of the risk assessment, companies may also request documentation from their suppliers concerning the non-use of PFAS. Article 16 of the PPWR sets out the relevant supplier information obligations.

Contact / Support

In case of inquiries, please contact Cepi secretariat.

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