

Leading the way in responsible fluoropolymer management: FPG's commitment to emission reduction and sustainable practices

**PFAS Congress
June 2026, Paris**

Fluoropolymers

 Product Group of Plastics Europe

Speaker

Fluoropolymers

 Product Group of Plastics Europe



Takayuki Nakamura – Daikin Chemical Europe GmbH

Senior Technical Advisor Public Affairs Group, CSR

What is the Fluoropolymers Product Group (FPG)?

The **Fluoropolymers Product Group (FPG)** represents Europe's leading fluoropolymer producers and experts.

We ensure that fluoropolymers can continue to play their vital role in enabling innovation and sustainability while maintaining international competitiveness across key industries.

FPG Members



ARKEMA



Information about FPG, our reports, position papers and activities can be found at: <https://fluoropolymers.eu/>

FPG Focus Areas

Fluoropolymers

 Product Group of Plastics Europe

Advancing Responsible Manufacturing

FPG established the European Manufacturing Programme to ensure that fluoropolymers are produced responsibly with the lowest possible emissions, actively addressing legitimate regulatory questions and concerns regarding manufacturing emissions.

Ensuring Sustainable End-of-Life (EoL) Management

As part of industry's action on EoL, FPG initiated an independent report to build understanding of fluoropolymers and EoL. The report pays particular attention to waste reduction, incineration and recyclability of fluoropolymers.

Assessment of Alternatives (AoA)

On 30 April FPG published an independent focused evaluation of alternatives, analysing their safety, sustainability, life cycle, feasibility, and performance with the aim to contribute to the understanding on the complexities of substitution.

Fluoropolymers: Examples of Societal, Economic and Environmental Value

Fluoropolymers

Product Group of Plastics Europe



- € EU fluoropolymer manufacturing supports wider EU economic activity. EU27 fluoropolymer manufacturing directly supports approximately €620 million of output, €150 million of GVA and 2,800 FTE jobs.*
- € Once indirect and induced effects are included, the estimated economy-wide footprint rises to approximately €1.6 billion of output, €550 million of GVA and 14,500 FTE jobs.*

* Socio-Economic Assessment for the European Fluoropolymers Industry, Europe Economics May 2026

FPG Manufacturing Programme

FPG Manufacturing Programme

- A voluntary initiative adopted by six major European fluoropolymer manufacturers in September 2023.
- Built on **three pillars**: emission reduction, technology exchange, and safe downstream handling.
- Sets ambitious targets to drastically reduce non-polymeric PFAS emissions (from polymerization aid technology) to both air and water by 2024 and 2030.

Pillar 1: Emissions Reduction Commitments

Fluoropolymers

Product Group of Plastics Europe

The Programme sets strict average emission factors based on the total annual amount of fluoropolymers produced.

The established targets for non-polymeric PFAS residues from polymerisation aid technologies are:

By the end of 2024

Maximum 0.009% to air and
0.001% to water



By the end of 2030

Maximum 0.003% to air and
0.0006% to water

Equation 1. Calculation of emission factors

$$EF_{comp} = E_{comp} / m \times 100,$$

Where:


EF	emission factor of the produced/ processed PFASs	[%]
comp	receiving environmental compartment i.e.: water or air	[-]
E	Tonnes of PFASs emitted per year	[t/y]
m	Tonnes of PFASs produced/ processed per year	[t/y]

Reference: [Annex B to the Restriction Proposal](#) (page 227)

Annual emission of non-polymeric PFAS residue from non-polymeric polymerization aid technology [added and/ or generated]/total annual amount of fluoropolymers produced on site

Progress and Achievements


Fluoropolymers

 Product Group of Plastics Europe





- ✓ All participating members successfully met and maintained the 2024 emission reduction targets established for non-polymeric PFAS residues from polymerisation aid technology.
- ✓ The industry sustained these rigorous limits throughout 2025, demonstrating long-term feasibility.
- ✓ Achieving these targets required significant capital investments and complex engineering breakthroughs.



Pillar 2: Technology Exchange Platform

-  The Technology Exchange Platform (TEP) supports innovation by enabling European fluoropolymer manufacturers to share, assess, and improve emission control technologies. The TEP assess PFAS emissions to water, air and in waste.

As a core pillar of the FPG Manufacturing Programme, it drives progress through:

-  **Technology sharing:** Share information on commercially available state-of-the-art technologies to minimise non-polymeric PFAS emissions in manufacturing.
-  **Analytical standardisation:** Exchange on methods to detect non-polymeric PFAS.
-  **Operational improvement:** Ongoing exchange of best practices on emissions management, industrial hygiene, and material recovery.
-  **Stakeholder engagement:** Outcomes are shared with stakeholders and legislators.

State-of-the-Art Air Emission Control Technologies

- ✓ FPG members use a combination of advanced technologies to capture or destroy PFAS in exhaust streams.
- ✓ Continuous and targeted monitoring (e.g., LC-MS/MS, FTIR) is actively employed to track emissions and system efficiency.



- **Filtration:** Pre-treatment capturing particulate PFAS with 99–99.9% efficiency, protecting downstream systems.
- **Scrubbers:** Wet systems remove water-soluble and acidic PFAS (>90% efficiency).
- **Activated carbon:** Adsorbs PFAS with efficiency dependent on chain length (>50–99%)
- **Condensation/cryocondensation:** Extreme cooling (to -120°C) condenses PFAS vapours, up to 99% efficiency.
- **Thermal oxidation:** High-temperature (>860°C) destruction, achieving >99.99% efficiency.

State-of-the-Art Water Emission Control Technologies

- Work on the report is in the final stages.
- Similar to the report on air it will include information of the state-of-the-art technologies used to monitor and minimise emissions of PFAS to water that are utilised by members of the FPG Manufacturing Programme.

Pillar 3: Downstream User Guidance

Guide for the Safe Handling of Fluoropolymer Resins, 2025

Fluoropolymers

 Product Group of Plastics Europe

- **Materials Covered:** fluoropolymer resins widely used in various industries, including PTFE, ETFE, FEP, PFA, PVDF, and ECTFE.
- **Technical Properties:** in-depth information on the different types of fluoropolymer resins, outlining their thermal properties and specific handling requirements.
- **Temperature Reference Table:** extensive table summarising typical melting points, service temperatures, and processing temperatures for each specific polymer type.
- **Risk Mitigation & Safety Measures:** addresses potential risks by providing detailed recommendations for precautionary safe handling, corresponding safety measures, and risk mitigation.
- **Waste Management & Compliance:** provides best practices for processing and waste management to minimize health risks and environmental impacts, ensuring compliance with European regulations.

Manufacturing Programme: Next Steps under Consideration

- **New Emission Factors:** separate, technically feasible, and monitorable emission factors for air and water that cover the entire fluoropolymer manufacturing process across all EU and UK sites.
- **Expanded Technology Exchange:** The existing Technology Exchange Platform could be expanded to share outcomes more broadly.
- **New Analytical Platform:** Participants would seek to establish a dedicated Technology Exchange Platform specifically for Analytical Techniques.
- **Solid Waste Management:** Members would exchange best practices regarding the external destruction of solid PFAS waste.
- **Updated Safe Handling Guide:** A new expanded Safe Handling Guide (version 2025 covering PTFE, ETFE, FEP, PFA, PVDF, and ECTFE) that would include fluoroelastomers and specialty polymers, such as ionomers and FEVE.

Conclusion

- 1 Commitment to Responsible Production** The Programme ensures that fluoropolymers are manufactured with the lowest possible emissions using state-of-the-art technology, directly answering regulatory concerns.
- 2 Effective Risk Management** By setting and successfully meeting strict emission reduction targets, the industry demonstrates that effective risk management is already in place.
- 3 Alignment with EU Policy and IED Goals** FPG is actively fulfilling its goal of having the Manufacturing Programme serve as an input for the development of the future IED Fluoropolymer/Elastomer Best Available Technique Reference Document (BREF).
- 4 Engagement and Sharing of Progress** To ensure transparency, FPG publicly shares the Programme's developments, and will publish an update on work and progress made throughout 2025 and 2026 across all pillars of the Programme.



Thank you



FPG



fluoropolymers.org



FPG Director:
caroline.andersson@plasticseurope.org

takayuki.nakamura@daikinchem.de