

Fluoropolymers and the PFAS REACH Restriction

Fluoropolymers Product Group (FPG)
of Plastics Europe





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The Fluoropolymers Product Group

The Fluoropolymers Product Group (FPG) is the voice of the Europe's leading fluoropolymer producers and experts across Europe.

FPG is the voice of the industry across in Europe and a Product Group of Plastics Europe,.

A product group of Plastics Europe, headquartered in Brussels, the group's members are: AGC, Arkema, Chemours, Daikin Chemicals, DuPont, Gujarat Fluorochemicals, Honeywell, W. L. Gore & Associates, Syensqo and Kureha Corporation.

About fluoropolymers

- ✓ Fluoropolymers are a distinct subset of fluorinated polymers, with fluorine attached to their carbon-only backbone.
- ✓ Fluoropolymers are safe and essential.
- ✓ They are advanced materials.
- ✓ They are durable by design.
- ✓ They are critical materials in a broad range of industrial, commercial and consumer uses.

Irreplaceable fluoropolymers

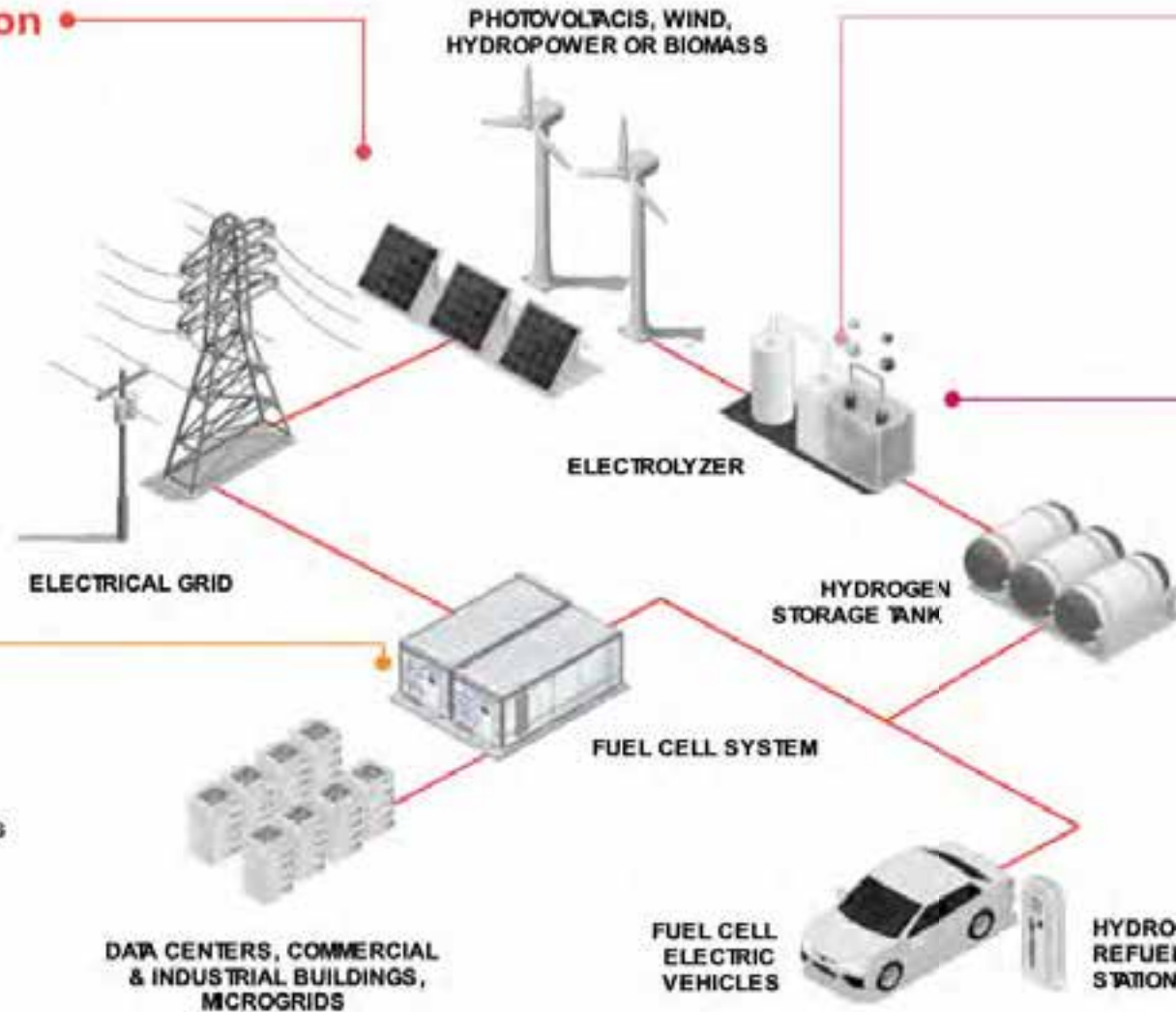


Enabling the Clean Energy Transition

Renewable Energy Production

PVDF, PTFE, FEP, ETFE, PFSA, FKM, PFPE

- Photovoltaic front sheets protection
- Photovoltaic back sheets insulation
- Junction boxes in photovoltaic vents
- Control centers for offshore wind parks
- Wind turbine paints and coatings
- Release film: support production of composite turbine blades esp. for offshore turbine PTFE bearings



Energy Storage

PVDF, PFSA, FKM, PTFE

- Ionomer exchange membranes for flow batteries
- Gaskets and seals to prevent leaks and environmental releases to reduce carbon dioxide emissions into the atmosphere
- Binder materials in the electrodes

Stationary & Mobility Fuel Cells

PVDF, PFSA, FFKM, PTFE

- Ionomer exchange membranes for PEM fuel cells
- Gaskets and seals to prevent leaks and environmental releases to reduce carbon dioxide emissions into the atmosphere
- Binder materials in the electrodes
- Component of the gas diffusion layers (GDLs)

Hydrogen Production

PVDF, PFSA, FKM, PTFE

- Ionomer exchange membranes for PEM water electrolyzers
- Tubing fluid transfer in alkaline water electrolysis hydrogen production systems
- Binder materials in the electrodes
- Gaskets and seals to prevent leaks and environmental releases to reduce carbon dioxide emissions into the atmosphere

Applications in semiconductor manufacturing

PVDF, PFA, PTFE, FKM, FFKM, AF, PFPE, HFCs, HFOs

SEMICON TOOLS

- Valves, Fittings, Tubings
- Pumps, Filters
- Lubricants
- Valve seats
- Valve sealing
- Vacuum pump oil
- Etchant gas
- Pellicle mask
- container
- Flow measurement
- Thermal management
- Heat transfer fluids

PFA, PTFE, FEP, PVDF, FKM, FFKM, HFOs

CHEMICAL DISTRIBUTION SYSTEM

- Valves
- Fittings
- Heat exchanger/insulation
- Flow measurement
- Tubing chemicals primary
- Tubing chemicals secondary containment
- Water system tubing
- Pumps
- Filters
- Seals
- Electronic cleaners



PVDF, FEP, ETFE, HFCs, HFOs

INFRASTRUCTURE

- Duct coating
- Air conditioning
- Humidity control
- Fire protection

PVDF, PFA, FKM

WAFER TRANSPORT

- Wafer carrier
- FOUP sealing

PVDF, PTFE, PFA

CHEMICAL PACKAGING

- Container lining
- Drums
- Tanks lining

Advancing the Next Generation of Transportation - ICE

ELECTRICAL SYSTEMS, WIRES, CABLES, AND SEMICONDUCTORS

- Semiconductor chips
- Lambda/O2 sensor conduit & grommet
- Electric mirror lubrication
- DC motor bearing lubrication
- Oxygen/NOx Sensor
- Heated seat wire
- Diesel pump wire
- ABS transmission brake sensor wire

- High tension ignition cable
- Battery terminal wire
- Convoluted wire harness conduit
- Cable tie wraps
- Xenon/bi-xenon headlight wire
- Throttle body injection wire
- ABS sensor cables
- Printed Circuit Boards

PVDF, PTFE, FEP, PFPE, PFA, FKM

PVDF, PTFE, FKM, PFPE

TRANSMISSION & TRANSAXLES

- Internal shift seal ring/clutch piston ring
- Clutch pilot and release bearings
- Clutch bearing lip seals
- Dual mass flywheel replacement
- Auto ORC decoupler for alternators
- Driveshaft: CV joint lubrication

PVDF, PTFE, FEP, ETFE, FKM

FUEL SYSTEMS

- Fuel line: feed return, vapor
- Fuel line quick connector seals
- Interconnect hoses
- Filler neck hose
- Fuel rail crossover
- FIORs
- Fuel sender seal
- Connector-rings
- Diaphragm pressure regulator
- Anti-expulsion tank valve
- Pressure injection bushing
- EV battery cooling

ENGINE & POWERTRAIN

- Head cylinder & oil pan gasket
- Transmission & crankshaft seals
- Valve stem seals
- Bearing lubrication
- Flexible Oring & piston skirt coating
- Front engine accessory drive Throttle body bearings & lubrication
- ETC lubrication
- Actuator assembly; valve belt tensioner
- Air intake manifold gaskets
- Turbocharger hoses
- EV binder for batteries and seals

PVDF, PTFE, FKM, PFPE

CHASSIS

- ABS interconnected hose
- Hydraulic brake lines
- Impulse hose at wheel
- Brake pad clips, shim and wear indicator
- Insulating foams and sound dampening
- Shock struts/absorber piston seals
- Dry Lubricant bearing door hinges

PVDF, PTFE, PFA, PFPE, FKM, HFCs, HFC

- Axle seals
- Adhesives
- NVH busing- lubrication
- Steering ball bushing incl. lubrication
- Steering ball joint insert and shaft steering splines
- Steering assist pump piston rings
- Cabin comfort cooling and heating



Advancing the Next Generation of Transportation - EV

PVDF, PFA, PTFE, FKM

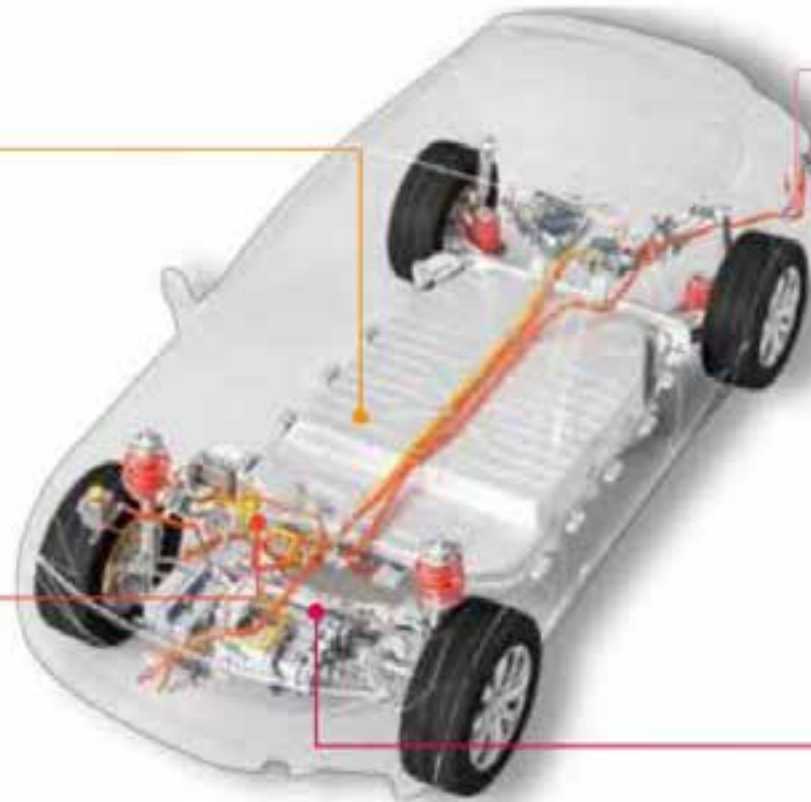
LITHIUM-ION BATTERY

- Electrode binders
- Separators
- Cell gasket
- Coating for active material manufacturing equipment

PVDF, PTFE, FEP, PFPE, FKM

ELECTRICAL SYSTEMS, WIRES, CABLES, AND INVERTERS

- High voltage power cable
- Busbar insulation
- Oil sensor seal
- Electric pump Gring
- Coolant valve lubrication
- Ethernet cable



PFPE, FKM

BATTERY CHARGING

- High voltage power cable
- Grease for charging port latches
- Grease for charging cable connector Gring

PVDF, PTFE, FEP, FKM

ELECTRIC MOTOR & E-AXLE

- Bearing seal and Gring
- Rotor shaft seal
- Temperature sensor cable
- Resolver cable
- Water jacket seal

Fortifying Medical & Healthcare Technologies

Medical devices and applications

- Surgically implantable medical devices such as vascular grafts
- Surgical mesh
- Heart patches
- Catheters
- Carrier fluid for the deposition of lubricants on medical devices and catheters
- Dielectric insulators in defibrillators, pacemakers
- Diaphragm pumps
- Membranes for filtering and venting purposes
- Sterile container filters, needle retrieval systems, Tracheostomy, catheter guide wire for laparoscopy, valves, fittings, pumps, tubing and medicine inhaler canister coatings
- Labware
- Medicine Packaging
- Items that need sterilization
- Metered Dose Inhalers

PVDF, PTFE, FEP, PFA, ETFE, HFCs



Infrastructure

PVDF, HFOs, HFCs

- Transport and stationary refrigeration systems
- AC, heat pump, & humidity control for:
 - Patient rooms
 - Special areas (OR, ICU, etc.)
- Thermal management for labs and equipment
- Refrigeration and insulation for Food Services and distribution of vaccines and pharmaceuticals
- Cleaning of supplemental oxygen systems for breathing air
- Foam insulation for cryogenic tanks
- Thermodynamic sanitary hot water tanks
- Fire protection



PVDF, PTFE, FEP, PFA, FKM, PFPE, HFOs

Medical imaging & analysis

- Semiconductor chips
- O-rings, gaskets, seals
- Coating for wire & cable
- Tapes, wires, and cables
- Bearings and assemblies
- Degreasing

The proposed “universal” PFAS REACH restriction

CIRKUS LOGIC
3302-90HC-D
1-803CK
OFE-S

PFAS REACH Restriction

Broad PFAS definition

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)

Total ban proposed

The dossier submitters propose a total ban over time on the use of all fluoropolymers in all applications

No differentiation between PFAS

The dossier submitters believe that all PFAS have the same hazard profiles and behave the same. Therefore, they should be grouped and regulated together



Critical uses overlooked

Many critical applications using fluoropolymers are not proposed for derogation

Alternatives insufficiently assessed

Inadequate information on alternatives risks regrettable substitution to inferior alternatives

FPG supports alternative regulation



The concerns of persistence raised in the restriction proposal can be appropriately managed through the existing regulatory frameworks together with responsible manufacturing and End-of-Life (EoL) risk-management practices.



Regulatory frameworks such as the Industrial Emissions Directive (IED), the Waste Framework Directive (WFD), BREF, and Occupational Health Safety Directive can address the concerns related to fluoropolymers effectively and in an expeditiously manner compared to the REACH restriction.

European Fluoropolymer
Producer actions through
the lifecycle of its
products



Control emissions throughout life-cycle

The industry is committed at reducing potential emissions and to address concerns around emissions related to its products at different phases of their lifecycle should be addressed

European manufacturers have been implementing state of the art technologies to lower potential emissions to the environment and launched a specific Manufacturing Program

We are actively initiating research on contribution of fluoropolymers to the circular economy.

We are committed to informing downstream users on safe handling.

FPG Manufacturing Programme

The Manufacturing Programme includes a concrete commitment to minimize emissions of non-polymeric PFAS residues from polymerization aids to the environment from fluoropolymer manufacturing by the following FPG member companies: AGC, Arkema, Chemours, Daikin Chemical Europe, W. L. Gore & Associates and Syensqo

An industry-led commitment to achieve Average Emissions Factors for non-polymeric PFAS residues from polymerization aid technology that is used in the fluoropolymer manufacturing process

- By end 2024: 0.009% to air; 0.001% to water
- By end 2030: 0.003% to air; 0.0006% to water

A platform to promote the adoption of commercially available state-of-the-art technologies to minimise non-polymeric PFAS emissions in our manufacturing.

A commitment to inform downstream users of fluoropolymers on their safe handling and use in the Guide for the Safe Handling of Fluoropolymer Resins.

The manufacturing programme is anchored in three pillars and its implementation will begin no later than 31 Dec. 2023

Beyond durability - End-of-life management

Prevention

Fluoropolymers contribute to waste prevention by enhancing the durability of products, making them last longer and reducing the need for frequent replacements

Reuse and Recycling Initiative

The FPG has recognized the importance of fluoropolymer reuse and recycling and initiated research to increase its viability. Reuse and recycling of fluoropolymers should continue to be explored and developed.



Incineration

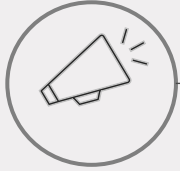
Approximately 84% of fluoropolymers end up in waste to energy incinerators today. Recent studies have demonstrated that incineration is an effective way of disposal under permit conditions, ensuring that PFAS substances of potential concern will not be released.

Landfilling as the last resort

13% of fluoropolymers are currently landfilled, serving as a last resort for managing some fluoropolymer waste when necessary. Existing data and published literature confirm that this practice can be conducted safely under appropriate conditions.

Conclusion

There is no one-size fits all to regulating PFAS



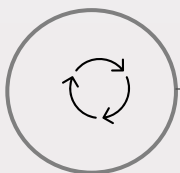
Responsibility across life-cycle of fluoropolymers starts with us. Fluoropolymer manufacturers in Europe commit to the highest industry standards for manufacturing worldwide. Fluoropolymers can be safely and sustainably managed at end of life



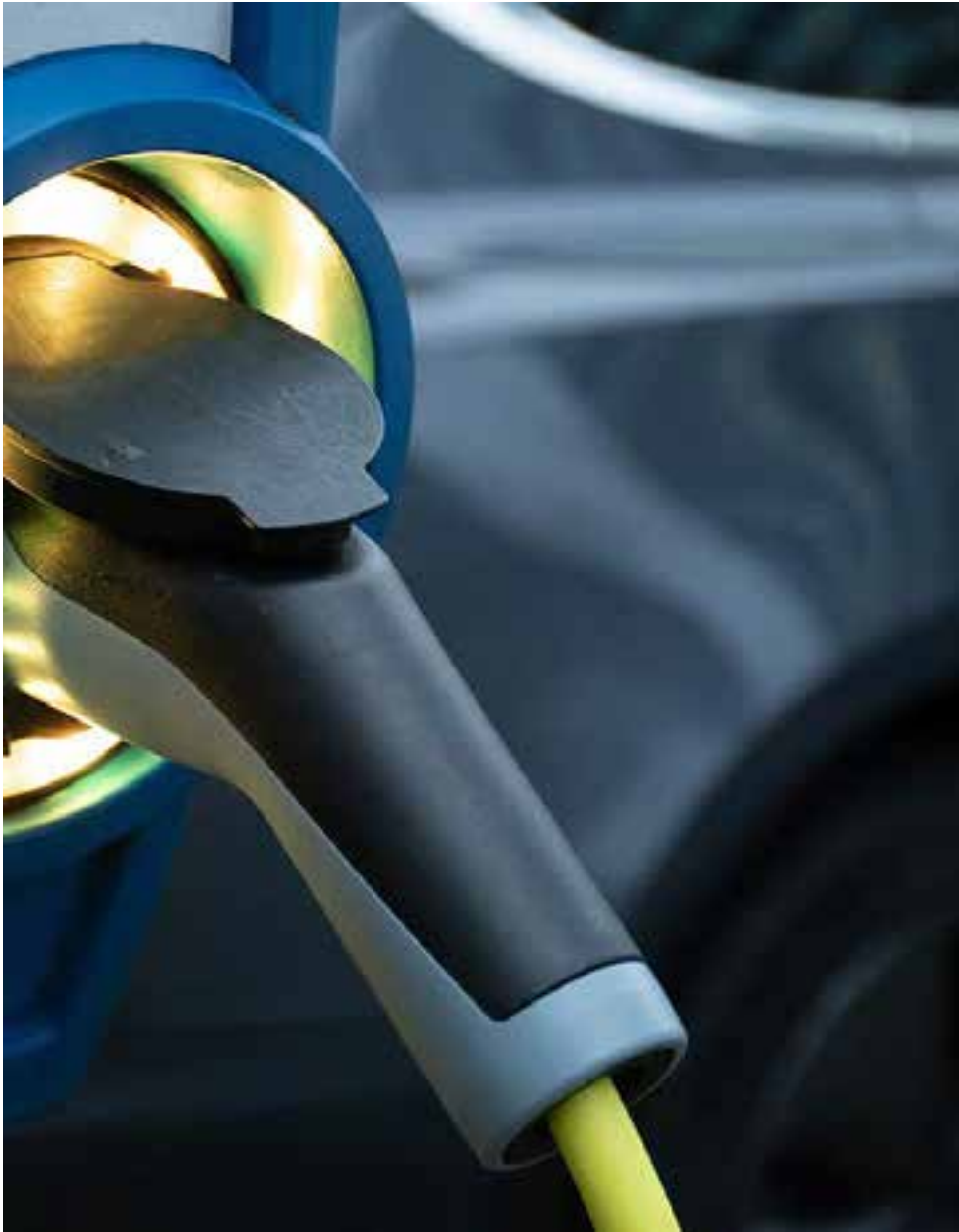
During the REACH restriction process, alternatives must be fully scrutinised and assessed for their risks to human health and the environment, their technical and economic feasibility as well as their availability on the market.



Fluoropolymers are safe and essential playing a critical in the European innovation and competitiveness of the EU industry.



Fluoropolymers do not pose a risk to human health or the environment as they are non-toxic, not bioavailable, non-water soluble, non-mobile and do not bio-accumulate.



Talk and share with us



Visit our website <https://fluoropolymers.eu> to know all the fact and figures and use them for your own advocacy

Join us on LinkedIn

<https://www.linkedin.com/company/fluoropolymers-product-group> and follow us on Twitter
https://twitter.com/FPG_EU

Read our regular newsletter to keep abreast of the latest developments at EU level. To subscribe visit our website or send an email to acumenfpg@acumenpa.com

Nicolas Robin - Director Fluoropolymers Product Group - Plastics Europe nicolas.robin@plasticseurope.org

Annexe



References

- [Fluoropolymers vs. side chain fluorinated polymers](#)
- [Fluoropolymers product group views on essential use](#)
- [The fluoropolymer industry in Europe](#)
- [Socio Economic Impact Assessment \(2023\)](#)
- [Fluoropolymers are Advanced Materials](#)
- [RMOA for fluoropolymers – final report](#)
- [A critical review of the application of polymer of low concern regulatory criteria to fluoropolymers \(2022\)](#)
- [FPG response to public consultation](#)
- [Statement on ECHA's Enforcement Forum advice on the enforceability of the PFAS restriction proposal](#)
- [Fluoropolymers end of life](#)