GLOBAL PFAS TESTING

Ensure market compliance for PFAS in electrical and electronic equipment

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4.4
million tonnes
estimated environmental PFAS pollution in next 30 years
(ECHA, 2023)

Per- and polyfluoroakyl substances (PFAS) are a diverse and expanding group of synthetic chemicals that do not degrade, leading to the name ‘forever chemicals’. Their key properties of flame retardancy, chemical inertness, hydrophobicity and dielectric strength mean they are used throughout the electronics industry.

Now recognized as harmful to human and animal health, many governments around the world are introducing stringent regulations to restrict their use.

We offer comprehensive compliance solutions to help you meet PFAS requirements, mitigate risk, ensure product differentiation and build consumer trust.

Forever chemicals

PFAS are a group of more than 10,000 chemicals which, according to the Organisation for Economic Co-operation and Development (OECD), contain at least a perfluorinated methyl group (-CF3) or a perfluorinated methylene group (-CF2 -)

Inert and resistant to high temperatures due to their strong carbon-fluorine bonds, they do not degrade, leading to the term, ‘forever chemicals’.

Many PFAS are now recognized as carcinogenic, toxic to reproduction (reprotoxic) and harmful to fetus development and the endocrine system. Since they are bioaccummulative and very persistent, once these harmful substances are in the environment they will ultimately end up in the water we drink and the fish, animals and plants we eat.

PFAS sources

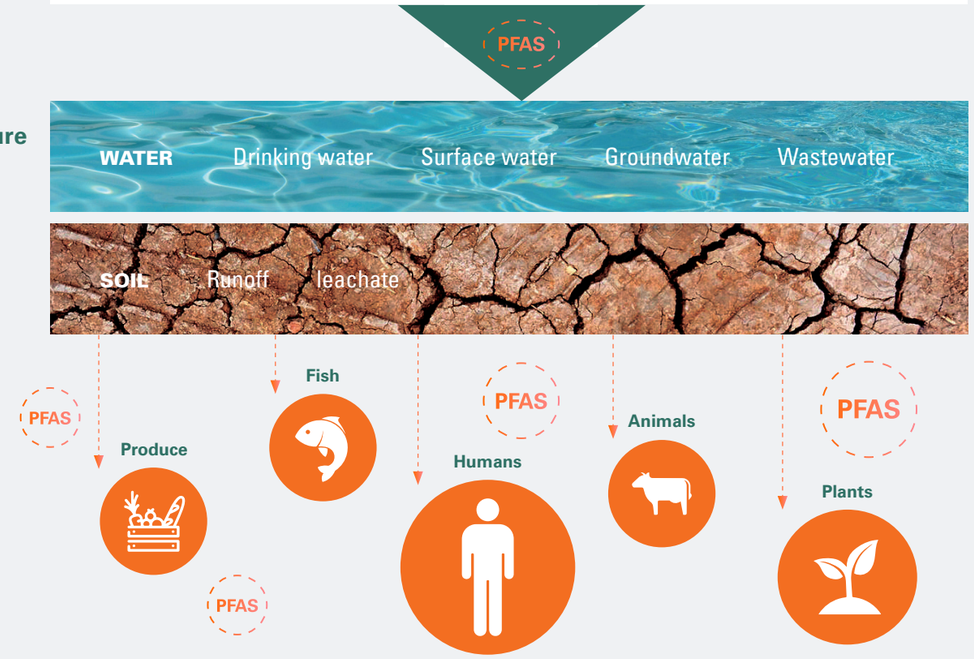
MANUFACTURING PROCESSES
- Semiconductors
- Petrochemicals

ELECTRICAL AND ELECTRONICS MATERIALS
- Printed circuit boards
- Electronic coating and adhesives

ELECTRICAL AND ELECTRONICS EQUIPMENT
- Liquid crystal displays (LCD)
- Smartphones and tablets
- Wiring and cables

ENERGY STORAGE
- Batteries
- Solar panels
- Fuel cells

PFAS exposure



Cover image: Electrical and electronics laboratory, Shanghai, China

PFAS in the electronics and semiconductor industries

PFAS are used in a wide variety of electrical and electronics (EE) equipment, including:

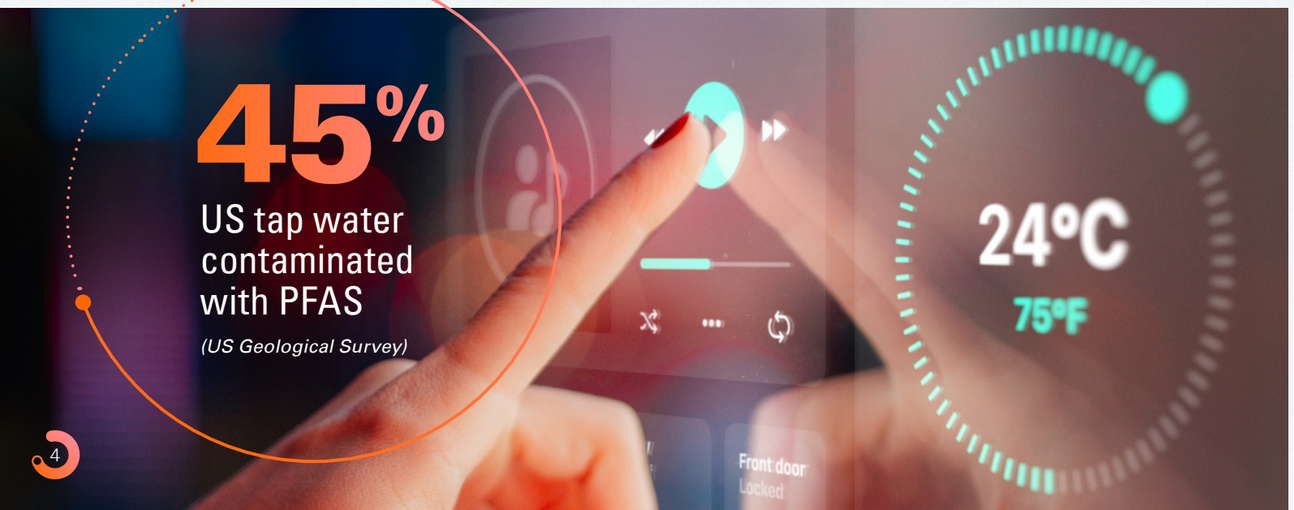
- **Printed circuit boards** – applied directly in the laminate material of the board for flame retardant and dielectric properties or as a protective layer on the finished product for protection against moisture, temperature and dust
- **Capacitors** – as dielectric films
- **Acoustical equipment** – may contain fluorinated compounds to provide a dipole moment and stabilize the conformation
- **Liquid crystal displays (LCD)** – applied directly in the laminate material of the board for flame retardant and dielectric properties or as a protective layer on the finished product for protection against moisture, temperature and dust
- **Flat panel displays** – in the light management film that controls brightness
- **Wiring and cables** – may be found in the insulating layer around the wire or cable
- **Solar panels** – fluoropolymers can be used to aid resistance to dust, corrosion, ultraviolet light and weather
- **Fuel cells** – in the proton-exchange membrane that separates charged particles
- **Lithium-ion batteries** – polyvinylidene fluoride (PVDF) is used as a binder and separator material
- **Smartphones and tablets** – fluoropolymers (e.g. PVDF) are used in radiation curable coating added to glass, metal and plastic parts to make them easy to clean and resistant to scratches and corrosion

They are also used during the manufacturing process in:

- **Heat transfer fluids**
- **Cleaning products**
- **Solvents, carrier fluids and lubricants**
- **Dielectric fluids**
- **Testing compounds**
- **Piezoelectric ceramic filters**
- **Pulsed plasma nano-coatings**
- **Packaging**

In the semiconductor industry, they are used in:

- **Photolithography** – as a thin layer of photoresist material
- **Antireflective coatings** – to reduce reflection
- **Developers** – to facilitate the control of the development process
- **Rinsing solutions** – to remove the photoresist of the wafer
- **Etching** – PFAS can be found in both wet and dry etching methods
- **Wafer thinning**
- **Vacuum pumps** – in the working fluids
- **Vapor phase soldering** – acts as a heat transfer medium
- **Components** – in some micromechanic semiconductor components (MEMS)
- **Inert equipment** – used when a process requires components to be chemically inert and stable



Global response to PFAS

Governments around the world are responding to the risk from PFAS by tightening controls. Without global collaboration, businesses need to understand the ever-changing regulatory landscapes enforced in each target market.

European Union

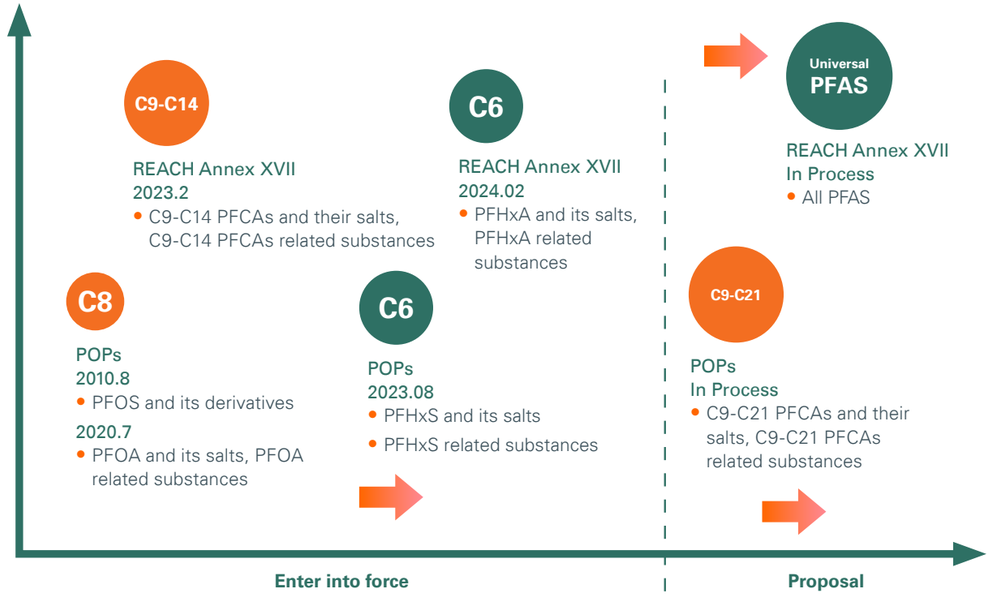
In force

- **Regulation (EU) 2019/1021** on persistent organic pollutants (POPs):
  - Perfluorooctanoic acid (PFOA), its salts and related compounds
  - Perfluorohexane sulfonate (PFHxS), its salts and related substances
  - Perfluorooctanesulfonic acid (PFOS) and its derivatives
- **Regulation (EC) No 1907/2006 (REACH):**
  - Perfluorohexanoic acid (PFHxA), its salts and related substances
  - C9-14 perfluoroalkyl carboxylic acids (PFCAs), their salts and related substances

Proposed

- **POPs regulation** – C9-C21 PFCAs, their salts and related substances
- **REACH (universal-PFAS)** – all PFAS (proposal by the European Chemicals Agency (ECHA))

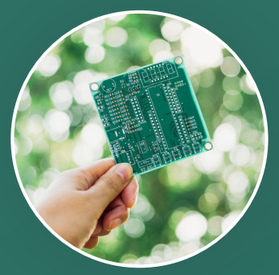
Restriction of PFAS in EU



Between 2023 and 2024, Enforcement Forum ran a pilot project to check for the presence of restricted PFCAs and their related substances in consumer products.

It should be noted that the proposal by the ECHA to restrict all PFAS includes controls on fluoropolymers and side-chain fluorinated polymers will have a significant effect on the fluorine chemical industry and downstream consumer goods sectors.

Multiple jurisdictions in the US also enforce standards for PFAS:



United States

- **Toxic Substances Control Act** – reporting and recordkeeping requirements for PFAS
- Environmental Protection Agency (EPA) requires manufacturers and importers of PFAS or PFAS containing articles to electronically report information regarding their uses, production volumes, disposal, exposures and hazards

Other regions

- **Stockholm Convention** – many countries regulated PFAS such as PFOA, PFOS and PFHxS under this framework, including Albania, China, Japan, New Zealand, Norway, South Korea and Switzerland
- UK and Canada have released plans to regulate all PFAS by following the EU's universal-PFAS proposal

Solutions

Meet PFAS regulations and buyer requirements, mitigate risk and enhance credibility in global markets with our comprehensive compliance solutions.

Raw materials testing

Targeted assessment of raw materials for PFAS. Choose one of three methodologies, depending on your product and level risk:

- **Target PFAS quantitative analysis** – covers over 545 common PFAS, letting you ensure compliance with REACH and POPs regulations
- **Total fluorine and total extractable organic fluorine** – a preliminary check for raw materials where there is a low risk of PFAS
- **Non-targeted PFAS-screening analysis** – covers more PFAS, ideal for high-risk raw materials

Finished product verification

A range of finished product verification services specifically developed for individual product types. Evaluate the risks associated with different materials in the finished product and valid finished products for PFAS compliance at a lower cost and higher efficiency.

Green product training program

Professional PFAS compliance consultation and training services for brands and suppliers to support the introduction of a low cost/high efficiency PFAS control system to IECQ QC080000.

Data management

A single online database enabling global supply chain management and report reviews. It accepts data in all formats to facilitate complete supply chain information disclosure, empowering management efficiency improvements as you move towards green compliance.

PFAS certification

Demonstrate your commitment to product quality and safety and show compliance with regulatory and buyer requirements via the SGS PFAS Screened Mark. Available only to products with no targeted PFAS detected, each mark contains a QR code giving access to the product's test results, thereby building transparency and trust in your supply chain.

Global affiliates

Wherever you operate in the world, we are ready to help you achieve PFAS compliance for your products. Our global network of state-of-the-art facilities, accredited to ISO, Australian, European and US standards, offers accurate, innovative PFAS testing solutions on a wide range of consumer products. Whether you require short-list remediation analysis or wider investigations of tissue and serum matrices, our capabilities are available with short turnaround times, ensuring your project is completed efficiently and accurately.

Why SGS?

We are the world's leading Testing, Inspection and Certification company. Our brand promise – when you need to be sure – underscores our commitment to trust, integrity and sustainability. Our comprehensive solutions provide full-circle benefits, helping you to develop and deliver safe and sustainable products that conform to internationally recognized standards and market requirements.

When you need to be sure

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