



PERFLUORINATED AND POLYFLUORINATED CHEMICALS

Other Names Perfluorooctane Sulfonate (PFOS)
Various Perfluorooctanoic acid (PFOA) and its salts & esters

CAS Number	Substance
2795-39-3	Perfluorooctane Sulfonate (PFOS)
3825-26-1	Perfluorooctanoic acid (PFOA) and its salts & esters

May Be Found In

- Textile or leather finishes for water, oil, or stain repellency)
- Paper protection (e.g. oil resistant)
- Performance chemicals (fire-fighting foams, mining/oil well surfactants, floor polishes, insecticides)
- Mold release (injection molding process)
- Food contact materials (cups, containers)

Perfluorinated and Polyfluorinated Chemicals (PFCs) belong to the perfluoroalkyl family of substances. PFCs are synthetic short-chain polymers that do not occur naturally in the environment.¹ PFCs are substances with special properties including fire resistance and oil, stain, grease, and water repellency that have hundreds of important manufacturing and industrial applications.^{2,3}

Uses in the Supply Chain

PFCs have been used for many years as repellent finishes applied to fabrics or garments. The fluorinated finishes provide a highly durable repellent effect against water, soil, and oil. The repellent effect has historically been achieved using chemistries which have a chain of 8 carbons, each with multiple fluorine atoms attached. These “long-chain” substances can contain trace amounts of PFOA or PFOS as impurities, which come from the manufacturing process. PFOS is both intentionally produced and an unintended degradation product of related chemicals.² PFOA is present, mainly at residual levels or as an unintended by-product.³ In recent years, shorter chain PFCs and non-fluorinated repellent chemistries have been in use as the C8 variety is phased out globally. There is still some potential for PFOA or PFOS in the shorter chain PFCs due to contamination or poor manufacturing control.

Why PFCs are Restricted

- Legislation in major markets around the world restricts the presence of PFCs in finished products. Some states in United States, such as Washington, Oregon, Maine, and Vermont, have reporting requirements for PFOS on children’s products.
- PFOA and PFOS are very toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment.
- PFOA and PFOS are very persistent in the environment and have the potential to bioaccumulate in humans and other mammals.
- Above certain exposure levels, PFOA and PFOS primarily affect the liver, may impair human fertility, or cause harm to unborn children.^{2,3}
- PFOA and PFOS may result in the development of cancer above certain exposure levels.^{1,4}
- Many brands and retailers have banned the use of PFCs.



Sourcing Compliant Materials from Your Suppliers

- Contact your suppliers and explain that you require their manufactured materials to be compliant with the current AFIRM RSL limits.⁵
- Require suppliers to submit a confirmation of material compliance or a test report from a third-party laboratory.
- When materials are received, consider performing risk-based testing to ensure the current AFIRM RSL limits are met.
- Share this information sheet with your material suppliers so they have full visibility and understand your sourcing requirements.

Sourcing Compliant Formulations from Your Chemical Suppliers

- For all formulations, request SDS documentation that meets current GHS requirements.
- Contact your suppliers and explain that you require formulations to be compliant with the current ZDHC MRSL limit whenever applicable.⁶
- Discuss with your chemical supplier whether any safer alternatives are available that are suitable substitutes for your production needs.
- Other questions that will help with substituting a new repellent:
 - Is the level of performance requested applicable to the usage of the specific material or product?
 - Is the chemistry based on long-chain (C8) or short-chain (C4, C6) fluorinated chemistry?
 - Has the chemical been assessed by a third party such as bluesign® in the bluefinder or in finished product by OEKO-TEX® 100/1000?
- If your chemical supplier cannot answer these questions, then the repellent formulation may potentially contain substances that will break down into PFOA and PFOS or related PFCs. Work with your supplier to get clear answers.

Safer Alternatives

- Alternatives to C8 based PFCs are available for most applications in apparel and footwear.
- Fluorinated polymer finishes which are based on short-chain fluorinated chemistries that cannot chemically degrade into PFOA or PFOS are also available.
- The use of non-PFCs chemistries (such as wax, silicones, acrylic polymers, polyurethanes, dendrimers, and more) are additional alternatives depending on performance needs.
- Additionally, materials exist that are naturally repellent due to other chemical or mechanical properties.
- Any alternative chosen must be carefully vetted to ensure a regrettable substitution is not made.
- Any chosen alternative must also be ZDHC MRSL compliant whenever applicable.

Additional Information

Visit ECHA's Candidate List of substances of very high concern to view dossiers for many restricted substances <https://echa.europa.eu/candidate-list-table>.

References

¹ Agency for Toxic Substances and Disease Registry. (2015) Toxicological Profile for Perfluoroalkyls. Retrieved August 9, 2017, from <https://www.atsdr.cdc.gov/toxprofiles/tp200.pdf>

² Hohenstein Institute & Textile Exchange. (2017). Chemical Snapshots – Perfluorooctanesulfonic acid or Perfluorooctane sulfonate (PFOS). Revision 0.2. Retrieved March 17, 2017.

³ Hohenstein Institute & Textile Exchange. (2017). Chemical Snapshots – Perfluorooctanoic Acid (PFOA). Revision 0.2. Retrieved March 17, 2017.



Chemical Information Document

⁴ OECD/UNEP (2013): Synthesis paper on per- and polyfluorinated chemicals (PFCs)

https://www.oecd.org/env/ehs/risk-management/PFC_FINAL-Web.pdf

⁵ Apparel and Footwear International RSL Management Group (Ed.). (2018, January 31). Restricted Substances List (RSL). Retrieved <http://afirm-group.com/afirm-rsl/>

⁶ Manufacturing Restricted Substances List (Publication). (2015, December). Retrieved

<http://www.roadmapzero.com/programme/manufacturing-restricted-substances-list-mrsl-conformity-guidance/>