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PFAS Chemicals: Potential Regulations and Restrictions for Generator Industry

Per and Poly-fluoro alkyl substances, also known as PFAS, are a group of chemicals whose use is currently under regulatory review by various government agencies including EU ECHA, EPA and many States' Environment, Health and Safety Department (i.e., Maine, Massachusetts, California, Illinois).

While the definition of PFAS is under debate, the current trend is to include any chemical with fluorinated carbon atoms, such as PTFE, PFA, FEP, PVF, PVDF, PCTFE, HFC, PFOA, PFOS, and over 12,000 others. The most well-known of these is PTFE, commonly known as Teflon, which comes in the form of monomers, pre-polymers, and crosslinked-polymers, and can be found in solid, coating, and aerosol forms. As carbon-fluorine bonds are extremely strong, these chemicals do not degrade easily and are also known as forever chemicals.

Several PFAS chemicals are of immediate concern, including Perfluorooctanoic acid (PFOA) and Perfluoro Octane Sulfonate/sulfonic acid (PFOS). Extensive medical studies have established or proposed strict drinking water thresholds for these chemicals, and other PFAS related to PFOA and PFOS are currently under study.

These PFAS chemicals of most concern come from longer carbon chain monomers with hydrophilic heads and hydrophobic tails. They are more reactive, more bioactive, and water-soluble due to the hydrophilic head which enable absorption into blood stream through the wall of intestine. These chemicals have traditionally been used as surfactants for the synthesis of other PFAS.

Perfluorooctanoic acid



Perfluorooctanesulfonic acid





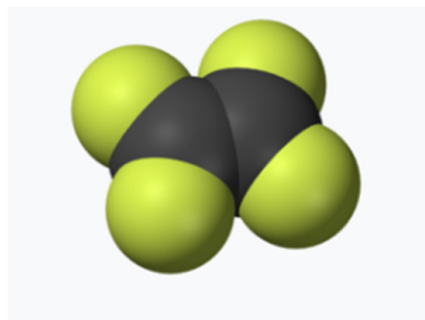
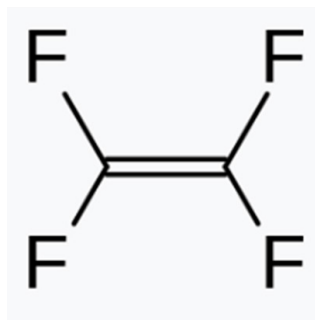
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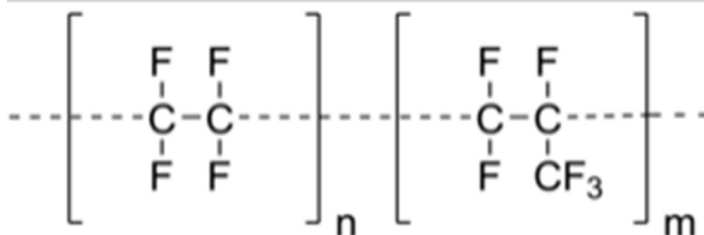
PFAS chemicals used in insulation for the electrical industry fall into the TFE class. They have shorter monomer carbon chains, such as fluoro-ethylene and fluoro-propylene, are more chemically and biologically inert, fully hydrophobic and water-insoluble and are not likely to be absorbed by the human body. PTFE, FEP, and PFA of the TFE class are commonly used in the electrical industry for their insulation properties.

If one examines the chemical structure, TFE class is at the opposite end of the PFOA and PFOS class amongst the PFAS chemicals.

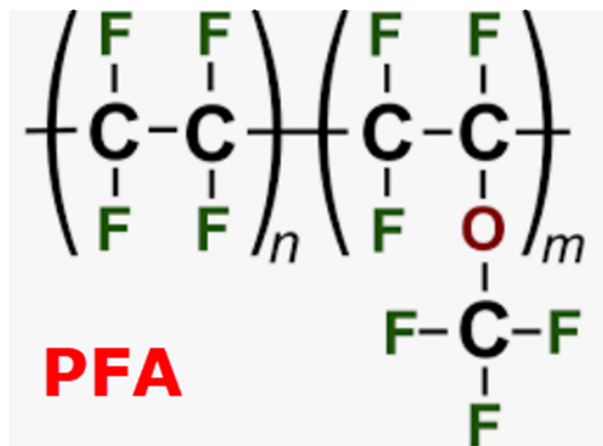
Tetrafluoroethylene



FEP



Polytetrafluoroethylene



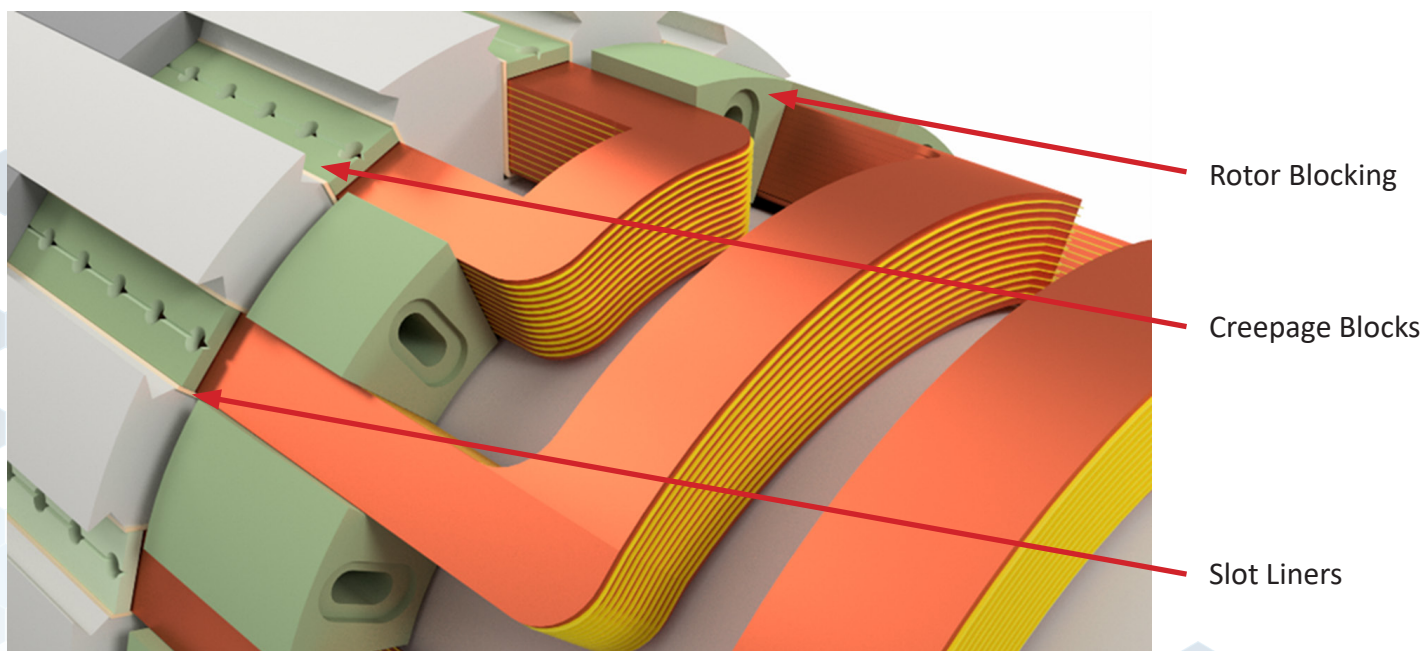


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The regulation and restriction of PFAS chemicals has implications for the generator industry, as many rotating machine components are coated with PTFE, and the electrical industry also uses closely related molding grades - FEP and PFA. This could lead to potential supply chain interruptions, and reporting requirements for any intentional added PFAS in products down the supply chain.

Items commonly seen to have Teflon coating are typically found in the rotors. Creepage block, top packers, slot liners and even some rotor blocking will sometime employ a bonded Teflon surface or a sprayed-on Teflon surface. The Teflon is used to help during thermal expansion and contraction of the copper during operation of the generator. The “cycling” of generators increase these expansion/contraction cycles and Teflon helps to reduction friction during the cycling.





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Even if TFE itself class is eventually excluded from regulations, it could suffer collateral supply chain interruption from other affected PFAS chemicals used in its manufacturing process. For example, 3M is considering getting out of the PTFE coated wire business and St, Gobain Performance Plastics is closing its PFAS plant in New Hampshire due to environment pressure from local government.

The Government of Maine has already passed legislation that bans all PFAS in carpets and drapes after January 1, 2023, with a plan for no PFAS in any products after January 1, 2030. Reporting requirements for all products with any intentionally added PFAS have been set for January 1, 2025. This is a shotgun approach.

This legislation has also migrated to 10 other states, the EPA, State Agencies, Health Canada, and EU ECHA. Thanks to lobbying effort by NEMA and other organizations, the US Congress has drafted legislation to oversee PFAS investigation and proposal to ensure there will be a balanced, no shotgun approach with consultation of all stakeholders

Link HERE to US Senate MAZ23283 [5759AB0088AF5D0C4BEA4DEBCB507C1F.pfas-bill-section-by-section-final.pdf](https://www.senate.gov/legislation/bills/2023/5759AB0088AF5D0C4BEA4DEBCB507C1F.pfas-bill-section-by-section-final.pdf) ([senate.gov](https://www.senate.gov))

PFAS chemicals are a group of chemicals with broad definitions and numerous variants. Some of these variants are of immediate concern due to their water-solubility and bio-activity, while others are less concerning. The generator industry and electrical industry may be effected affected by regulations and restrictions on PFAS chemicals. The electrical industry needs to raise concerns about the current shot-gun approach. Industry organizations need to also use their size and strength to put forth concerns about limitation in using PFAS and prevent any shotgun approach like a total ban as the demand for electrical power continues to grow each year.

As of late 2023, the EPA has included PFAS reporting as part of the Chemical Data Reporting (CDR) Database. Reporting includes the TFE/PTFE class often used by the electrical and many other industries for further study on environment and industry impacts. This requirement could lead to an exodus of manufacturers from the industry.

The United States Toxic Substances Control Act (TSCA) is a federal regulation that allows the Environmental Protection Agency (EPA) to comprehensively manage chemicals in the U.S. Commerce (what?...Department?). This includes reporting requirements under TSCA section 8(a)(7), which applies to perfluoroalkyl and polyfluoroalkyl substances (PFAS) as of late 2023.

TSCA mandates the reporting of certain information from U.S. manufacturers of all PFAS chemicals, including PFAS created as manufacturing byproducts. Reporting is also required for PFAS imported into the United States, whether on their own or as an incorporated component.

PFAS are a large and complex group of chemicals; TSCA PFAS requirements apply to all types of PFAS used in U.S. commerce, as defined by the EPA's Chemical Data Reporting (CDR) database.

Data supplied above are typical values and are not to be considered specification values. All of the information, suggestions and recommendations pertaining to the properties and uses of the products herein are based upon tests and data believed to be accurate; however, the final determination regarding suitability of any material described herein for the contemplated application, the manner of such use, and whether the use infringes any patents is the sole responsibility of the user. There is no warranty, expressed or implied, including, without limitation warranty of merchantability or fitness for a particular purpose. Under no circumstances shall we be liable for incidental or consequential loss or damage.