

**Trelleborg Sealing Solutions
feedback to the
POSTING DRAFT of Chapter 90:
Products Containing
Perfluoroalkyl and Polyfluoroalkyl Substances
(Draft date December 20, 2024)**

In general:

To begin we would like to thank the Maine Department of Environmental Protection for the opportunity to provide comments and concerns to POSTING DRAFT of Chapter 90: Products Containing Perfluoroalkyl and Polyfluoroalkyl Substances (Draft date December 20, 2024)! Trelleborg Sealing Solutions as a downstream user, produces seals and polymer bearings for machines and equipment for an unimaginable segment of the entire society. These segments are both industrial as well as professional.

Fluoropolymers and fluoroelastomers are critical and essential contribution to all of society include:

- **Human and environmental health and safety e.g.**
 - Defense
 - Avoidance of major accidents
 - Chemical industry
 - Nuclear powerplants
 - Avoid catastrophes
- **Supply of** for instance
 - Energy
 - Food,
 - Drinking water
 - Raw materials
- **Healthcare e.g.**
 - Pharmaceuticals
 - Medical devices
- **Minimized energy consumption and prolonged maintenance cycles of a vast range of equipment and installations**

In general, customer requirements determine the nature of the materials used for the seals and bearings we manufacture. In cases of demanding conditions, ranging from very to extremely, of use by our customers fluoropolymers and fluoroelastomers represent the only choice. Fluoroelastomers and fluoropolymers possess unique properties. Properties such as: low coefficient of friction, chemical compatibility, wide temperature range for use (low to high), mechanical properties allowing high surface speeds, practically non-ageing, and compatibility regarding electron and gamma radiation. It is these unique properties that represent absolute prerequisites for many specific segment requirements. It is only when these unique properties are extremely essential, that fluoroelastomers and

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fluoropolymers are utilized. The high price of fluoroelastomers and fluoropolymers alone ensures that use of these materials is minimized. This fact drastically reduces the use of fluoroelastomers and fluoropolymers as well as human exposure and emissions to the environment. Additionally, the fluoroelastomers and fluoropolymers used in our products, meet OECD-criteria of “polymers of low concern.” They are neither bioavailable, water-soluble, or toxic. In essence, fluoropolymers and fluoroelastomers are safe for their intended uses.

Along with the previously mentioned, fluoropolymers and fluoroelastomers are in general, critical for innovation and for sustainability! Aims of many strategic initiatives of the United States of America like the Carbon Reduction Program, the Chips and Science Act and the Digital Government Strategy are simply impossible without the use of fluoropolymers and fluoroelastomers. For these reasons we strongly advocate for a time unlimited exemption from any regulatory action for all fluoroelastomers and all fluoropolymers. This time unlimited exemption to be added to section 4 of Chapter 90 should include all monomers and processing aids needed for manufacturing of fluoroelastomers and fluoropolymers. This exemption of safe fluoroelastomers and fluoropolymers would be much clearer compared to the current approach focusing on products and uses. It would contribute in a more than reasonable manner to limit the proposed restriction of PFAS and assure the sustainable standard and quality of living as well as future opportunities of the entire society.

Alternatives for fluoroelastomers and fluoropolymers do not exist! Consequences of a total ban of fluoroelastomers and fluoropolymers for uses of manufacturing of seals, bearings and many other products would be dramatic! This ban will greatly affect the standard and quality of living. Future opportunities of the entire society will be lost! A restriction or even ban of fluoroelastomers and fluoropolymers as irreplaceable materials would catapult us all back into the Middle Ages!

In detail

2. Definitions.

“Perfluoroalkyl and polyfluoroalkyl substances (PFAS). “Perfluoroalkyl and polyfluoroalkyl substances” or “PFAS” is defined at 38 M.R.S. §1614(1) (F).” (page 6)

The scope of this definition for PFAS is by far too broad and inappropriate. There exists an extremely urgent need for differentiation between various PFAS. Detailed comprehensive lifecycle assessments are proving that fluoropolymers and fluoroelastomers are safe! Due to lack of relevant risks for human health and for the environment fluoropolymers and fluoroelastomers as well including monomers and processing aids for manufacturing of these must be granted a time-unlimited exemption of this intention!

From our view, the current inappropriate definition of the scope of this draft forces us and many others to “guess” if and how specific activities/products are affected. Comprehensive information obligations for “intentionally added” PFAS as well as standardized analytical

methods for PFAS do not exist. Companies and authorities have no chance to evaluate the status of compliance of products and processes by paperwork nor by laboratory tests! The establishment of a comprehensive information obligation for "intentionally added" PFAS for at least five years prior to a comprehensive PFAS restriction represents the only reasonable approach. This will allow companies to become aware of PFAS probably contained in for instance raw materials or processing aids. In the meantime, standardized analytical methods for relevant PFAS could be developed.

We as a downstream user, produce seals and polymer bearings for machines and equipment for an unimaginable segment of the entire society. To provide an exhaustive list of all sectors and uses of relevance of all our activities is not possible. To allow all sectors and companies a legally secure assessment of their affectedness, the scope of the restriction must be communicated in a clear and transparent manner. A list of relevant substances containing IUPAC names and CAS numbers is required for the analysis of affectedness along global supply chains. The establishment of a comprehensive information obligation for "intentionally added" PFAS for at least five years prior to a comprehensive PFAS restriction represents, from our view, a suitable approach to control PFAS emissions and to prepare a more targeted regulation. This would also enable companies and authorities to define reasonable targeted risk minimization measures.

4. Exemptions. (starting page 11)

We appreciate that the current posting draft of Chapter 90 contains several exemptions for specific products but would like to mention that from our perspective this approach does not represent the best option. As the existing list of exemptions must be regarded as not exhaustive and not appropriate, we propose a time-unlimited exemption of fluoroelastomers and of fluoropolymers including all raw materials for instance monomers and processing aids needed for manufacturing of these. This exemption to be added to section 4 of Chapter 90 would be much clearer compared to the current approach focusing on products and uses. Trelleborg Sealing Solutions as a downstream user, produces seals and polymer bearings for machines and equipment for an unimaginable segment of the entire society. To provide an exhaustive list of all sectors and uses of relevance of all our activities is not possible as even many of our customers are manufacturers of equipment and parts for customers of many segments. An exemption of fluoroelastomers and of fluoropolymers would contribute in a more than reasonable manner to limit the proposed restriction of PFAS and assure the sustainable standard and quality of living and future opportunities of the entire society.

Reason:

Fluoropolymers and fluoroelastomers

- have documented safety profiles
- are thermally, biologically, and chemically stable
- are negligibly soluble in water
- are nonmobile, nonbioavailable, nonbioaccumulative, and nontoxic

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Therefore, they meet the criteria of the OECD for “polymers of low concern”. Although fluoropolymers and fluoroelastomers fit the PFAS structural definition, they have very different physical, chemical, environmental, and toxicological properties when compared with other PFAS. For sure fluoroelastomers and fluoropolymers are persistent, however, they do not pose a relevant risk for human health or for the environment leaving no reason to restrict or even ban these.

The manufacture of fluoroelastomers and fluoropolymers takes place only at a very small number of sites under strictly controlled conditions. Specifically, the handling of monomers as intermediates is kept rigorously contained permitting a very low risk for health of humans and the environment. In addition to monomers as intermediates, processing aids are needed for manufacturing of fluoroelastomers and fluoropolymers. In the past fluorosurfactants have been widely used as processing aids for manufacturing of fluoroelastomers and fluoropolymers. These in contrast, to monomers are not consumed during manufacturing, leading to a specific content of fluorosurfactants in the final polymer/elastomer. This does pose a risk to the health of humans and the environment. For good reason several fluorosurfactants have been restricted/banned in the past. In general, we observe that all manufacturers of fluoropolymers have changed their manufacturing processes to become fluorosurfactant-free or are in the process to do so. We expect that over the short-term all processes for manufacturing of fluoroelastomers and fluoropolymers will be changed to fluorosurfactant-free whenever feasible leading to the entire manufacturing process of fluoroelastomers and fluoropolymers may be regarded as of extremely low risk.

We are a downstream user of fluoropolymers and fluoroelastomers and to our best knowledge all polymers relevant to our activities are meeting the OECD-criteria of “polymers of low concern”. Tests performed by an external accredited laboratory using LC-MS showed e.g., for engineered plastics like Ethene-1,1,2,2-tetrafluoro-homopolymer (PTFE) or Tetrafluoroethylene-propylene copolymer (TFE/P) that no measurable low-molecular PFAS was detected with a detection limit of 10 ppb (10 µg/kg). In general, we observe that all manufacturer of fluoropolymers have changed their manufacturing processes to become fluorosurfactant-free or are in the process to do so. We expect that over the short to medium term tests results of all fluoropolymers and fluoroelastomers will show no detected measurable low-molecular PFAS.

As it is common sense that fluoroelastomers are regarded as persistent we assume that these do not pose a risk for human health and for the environment during their lifecycle. Additionally, during use products are installed leading to no exposure to people as well as to the environment. Our view is substantially supported by a detailed comprehensive lifecycle assessment executed by Gujarat Fluorochemicals GmbH in collaboration with Ramboll we are referring to as this assessment proves that fluoropolymers and fluoroelastomers are safe! Unfortunately, we are not able to provide the original report on this assessment as we have no access to it but expect the results will be published in a scientific journal over the short term.

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Unfortunately, today there is no established system for industrial scale recovery of materials like fluoroelastomers and fluoropolymers. It's our opinion that an open consortium of industrial and professional stakeholders would be the most meaningful setup to materialize recycling systems as mentioned above. Today incineration and landfilling represent the main ways to treat waste of products made of fluoroelastomers and fluoropolymers. As shown above our products made of fluoroelastomers and fluoropolymers don't pose a risk to human health and for the environment this is assumed to be valid also for landfilling. Regarding incineration we would like to refer to a study by Conversio in 2022 (German based consultant) prepared for Pro-K (Fluoropolymer Downstream User Association) and Gujarat Fluorochemicals GmbH. This study has shown that at its end-of-life approximately 85% of all fluoropolymers and fluoroelastomers end up in waste-to-energy recovery incinerators. A recent project initiated and commissioned by Gujarat Fluorochemicals, executed by the Karlsruhe Institute of Technology (KIT) in cooperation with Société Générale de Surveillance (SGS), was conducted to assess that fluoropolymers and fluoroelastomers get fully incinerated without any formation of short chain or long chain PFAS. The study clearly demonstrated that fluoropolymers and fluoropolymers are converted to inorganic fluorides and carbon dioxide. The inorganic fluorides detected were hydrogen fluoride. A large majority of samples indicated that long-chain PFAS were below levels of 1 ng/m^3 (>99% of samples associated with 860°C condition and >98% of samples associated with 1100°C condition). There were no short chain PFAS detected post incineration. TFA was non-detectable in all samples with a reporting limit of $14 \text{ }\mu\text{g/m}^3$. The results confirm that fluoropolymers and fluoroelastomers at their end of life when incinerated under representative municipal incinerators conditions do not generate any measurable levels of PFAS emissions and therefore pose no risk to human health and the environment. The study provides strong evidence that incinerating a mixture of fluoropolymers and fluoroelastomers under representative municipal waste combustion conditions leads to complete mineralization of the C-F bonds, no significant emissions of long-chain PFAS, and no significant emissions of TFA or light fluorocarbons such as CF_4 or C_2F_6 .

As mentioned above there do not exist relevant risks due to landfilling or incineration of seals made of fluoroelastomers and fluoropolymers. We work intensively on the research and development for technologies and processes for recovery of the materials of end-of-life products made of fluoroelastomers and fluoropolymers. We regard these activities as part of our activities for sustainability as well as to contribute to enhance resource efficiency.

Trelleborg Sealing Solutions as a downstream user, produces seals and polymer bearings for machines and equipment for an unimaginable segment of the entire society. The fluoropolymers and fluoroelastomers we use are listed in the table on the next page:

Chemical name	CAS No.
Ethylene-tetrafluoroethylene copolymer (ETFE)	25038-71-5
Tetrafluoroethylene-perfluoropropylene copolymer (FEP)	25067-11-2
Tetrafluoroethylene-propylene copolymer (FEPM)	-
Perfluoroelastomer (FFKM)	-
Fluoroelastomer (FKM)	9011-17-0 64706-30-5
Fluorosilicone Rubber (FVMQ)	-
Polychlorotrifluoroethylene (PCTFE)	9002-83-9
Perfluoroalkoxy polymer (PFA)	26655-00-5
Ethene, 1,1,2,2-tetrafluoro-, homopolymer (PTFE)	9002-84-0
Polyvinylidene difluoride (PVDF)	24937-79-9
Tetrafluoroethylene-propylene copolymer (TFE/P)	-
Modified Ethene, 1,1,2,2-tetrafluoro-, homopolymer (TFM)	9002-84-0

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In general, customer requirements determine the nature of the materials used for the seals and bearings we manufacture. In cases of demanding conditions, ranging from very to extremely, of use by our customers fluoropolymers and fluoroelastomers represent the only choice. Fluoroelastomers and fluoropolymers possess unique properties. Properties such as: low coefficient of friction, chemical compatibility, wide temperature range for use (low to high), mechanical properties allowing high surface speeds, practically non-ageing, and compatibility regarding electron and gamma radiation. It is these unique properties that represent absolute prerequisites for many specific segment requirements. It is only when these unique properties are extremely essential, that fluoroelastomers and fluoropolymers are utilized. The high price of fluoroelastomers and fluoropolymers alone

ensures that use of these materials is minimized. This fact drastically reduces the use of fluoroelastomers and fluoropolymers as well as human exposure and emissions to the environment. Additionally, the fluoroelastomers and fluoropolymers used in our products, meet OECD-criteria of “polymers of low concern.” They are neither bioavailable, water-soluble, or toxic. In essence, fluoropolymers and fluoroelastomers are safe for their intended uses. Seals and polymer bearings made of or containing fluoroelastomers and fluoropolymers we produce are used for manufacturing, installation, operation, and maintenance of equipment of for instance:

- Aerospace
- Defense
- Energy sector
- Chemical Industry
- Pharmaceutical Industry
- Medical devices
- Agriculture equipment
- Food Industry
- Refrigeration
- Air conditioning and heat pumps
- Trains
- Ships
- Transportation
- Semiconductors
- Electronics Industry
- Machine manufacturing
- Equipment manufacturing
- Processing equipment
- Recycling Industry
- Fluid Power
- Machine tools
- Marine
- Presses
- Robotics
- Sanitation
- Insulating gas in electrical equipment
- Construction products
- Petroleum and mining
- Textile & leather Industry

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Contact information for this submission.

Dr. Matthias Peters
Director Global Materials & Compliance

Trelleborg Sealing Solutions
Schockenriedstrasse 1
70565 Stuttgart
Germany

Phone: +49 711 7864 598
Matthias.Peters@trelleborg.com