Environmental Affairs and Sustainability

28 January 2025

VDMA feedback to the Chapter 90: Products Containing Perfluoroalkyl and Polyfluoroalkyl Substances Draft Rule (Draft date December 20, 2024)

In General

To begin with we would like to thank the Maine Department of Environmental Protection for the opportunity to provide comments and concerns to MDEP Chapter 90: Products Containing Perfluoroalkyl and Polyfluoroalkyl Substances Draft Rule (Draft date December 20, 2024)!

The VDMA represents more than 3,600 German and European mechanical and plant engineering companies. The USA is a significant market for VDMA members.

PFAS and PFAS-containing materials are needed in **the machinery and equipment manufacturing industry** whenever **extreme conditions** (high or low temperatures, high frictional resistance, aggressive/corrosive/toxic chemical conditions, or a combination of these) prevail. Therefore, most existing industrial uses (e. g. fluoropolymers in seals, valves, pipes, gaskets) as well as future technologies (e. g. fuel cell, water electrolysis, heat pump, solar system, batteries) **often do not have equivalent alternatives** to the expensive PFAS.

Clarifications are needed

We welcome the specific exemptions to the prohibitions for non-consumer electronics, off-highway vehicles, all-terrain vehicles, side-by-side vehicles, farm equipment, and equipment directly used in the manufacture or development of products described in subsections 5 through 12, as added to Public Law 2023, c. 630.

With regards to **non-consumer electronics** what remains uncertain is whether the mechanical and plant engineering (e.g., production machines, logistics and intralogistics applications) are excluded? Additionally, what is the status of gearboxes or other 'partly completed machinery'? According to the EU Machinery Directive 2006/42/EC, 'partly completed machinery' is defined as an assembly that almost forms a machine but cannot independently perform a specific application. This type of machinery is intended to be incorporated into or assembled with other machines or partly completed machinery to form a complete machine that complies with the directive. While some of these 'partly completed

machinery' may eventually be powered by electric drives, this is not universally the case. If a complete system encompasses more than just electrical devices, should it still be classified as 'electronics,' or should all 'mechanical' components be considered within the scope?

The exemption for non-consumer electronics shows that the primary focus should be on products that pose a risk and are more likely to impact a larger number of end-users and the environment. Industrial applications, such as the use of fluoropolymers for a seal in a mechanical and plant engineering application, do not pose a risk during their use. Otherwise there would be unnecessary regulatory burdens on this sector.

Examples of VDMA members' products

PFAS use in machinery and equipment manufacturing industry (examples, non-exhaustive list!)

Machinery and equipment manufacturing industry (examples, non-exhaustive list!)	
PFAS missing uses (description of uses/application)	**Justification for use**
Separation technologies and filter media (PVDF, PTFE, FEP, ECTFE) e.g. used in compressed air or process gas filtration	Coating filter material, cleanability, high filtration performance (fine filtration), food and pharmaceutical application, FDA and Regulation (EC) 1935/2004 conform
Gaskets (PTFE, FEP, PFA, FKM, FFKM, FPM)	High temperature, chemical resistance, mechanical properties of sliding
Shaft sealings for machinery in process technology, construction machinery, crushing machinery (FKM, FFKM)	Performance, chemical persistence
Plain bearing bushes, thrust washers, guide bands, support ring, strips, wiper (PTFE, FKM, FVMQ)	Mechanical properties of sliding, high Temperature and chemical resistance, individual machining possible
Bushings, ball, sleeves, reducers, pipe, hose, elbow (PVDF)	Chemical resistance, Price-performance ratio

Seals (PTFE, FKM, FFKM, FEPM, FVMQ, PTFE, PCTFE, TFM, PVDF, PFA, FEP) for e. g.: heat generators, welding and compressed gas technology, valves, painting / surface technology, air&process gas compressors and their systems; sensors (e.g. dust measuring instruments, gas analyzers etc.), overall mechanical engineering	Thermal resistance >150°C, high chemical resistance, abrasion resistance, water-repellent properties, reduce friction and prevent substances from adhering, extreme durability in heating systems, combination thermal and chemical resistance, sliding and emergency dry-running properties, low friction, low wear, less leakage, long lifetime
Hoses (PTFE, FKM) for e. g.: heat generators, welding and compressed gas technology, valves, painting / surface technology, compressed air systems	High resistance, water-repellent properties, reduce friction and prevent substances from adhering, extreme durability in heating systems
Valves lined with PFA/PTFE used in e. g.: chemical, petrochemical, pharmaceutical, energy sector, food and process industries, air&process gas compressors and their systems	Protection against corrosive, pure and high-purity liquids, gases and vapors
Valves/safety valves (FKM, FPM, FPDM, PTFE, PVDF) for all machines	Combination of high pressures, temperatures and various chemicals
O-rings, mechanical seals, flat and face seals, Piston and rod seals, Wipers, Circlips, Radial shaft seals, Stuffing boxes, e.g. in industrial valves for all machines (like pumps, compressors, etc.)	Long life time, tightness, reduce friction and energy consumption, sustainability, safety, high pressure resistance, chemical resistance
Sliding coatings (PTFE) e.g., machines for food&beaverages industry, oilfree rotating compressors/oilfree piston compressors (piston and compression ring)	Substitution for environmentally incompatible lubricants in sliding surfaces.
Guides (PTFE)	Long life time, tightness, low friction and energy consumption, sustainability, safety, high pressure resistance
Surface treatment (PTFE, PFA, FEP, PVDF) e.g. pistons, wipers, inner tube surfaces, guide rods	Non-stick coating, low friction, smooth running properties, chemical resistance, wear protection
Hydraulic accumulator (PTFE, FPM, FKM)	Combination of high pressures, temperatures and various chemicals and harsh environmental conditions

Hydraulic components e.g. cylinders, pumps, motors, control blocks, valves (PTFE, EPDM, FKM, PVDF)	Combination of high pressures, temperatures and harsh environmental conditions
Parts and coatings for components in refrigeration and heat pump systems (e.g. bearings, thrust washers and dynamically stressed shaft bushings, PTFE), like compressed air refrigeration dryers	Chemical resistance, temperature resistance, dimensional stability even at low temperatures, pressure and temperature fluctuations, low gas permeability and low electrical conductivity. Prevent leakage of the refrigerant e.g. ammonia. At the same time, the good sliding properties of e.g. coated surfaces enable low energy consumption. High wear resistance ensures longevity and significantly reduces the effort required for maintenance and repair
Ring and flat seals as well as packings and other sealing systems (e.g. PTFE, FKM) in refrigeration and heat pump systems (also compressed air refrigeration dryers)	Thermal resistance >150°C, high chemical resistance, abrasion resistance, ensure at various points in the plants that valves can reliably shut off, regulate and perform the safety functions. In order to meet safety requirements and reduce environmental pollution, we depend on that valves close tightly, i.e. that no refrigerant can escape into the environment, and that certain sections of the plant can be safely shut off if necessary
Electrotechnical and electronic components(sensors, electronic controls and components) - used in all machines (FKM, PVDF, FEP or ETFE)	High performance and resistance are only made possible by the use of materials containing PFAS to ensure energy-efficient operation.
Coatings of the windings in motors for many refrigeration components (e. g. refrigerant compressors, refrigerant pumps and control valves)	

Use of FKM, FFKM, PTFE, PVDF in equipment for chemical industry e.g. for polymer washing processes, production of polycarbonate, crude oils, mono ethylene glycol (MEG) within the natural gas production, aromatic heavy fuel oils & residual oils, gas oils & kerosine, diesel oils, biodiesel B100, fatty acid methyl ester (FAME), naphtha, light condensates, NGL-natural gas liquids (Alkane's), methanol, coal water from the coke production, fish processing, special degumming in vegetable oil processes, vaccines etc.(also process gas compressors)	High temperatures, strong abrasion and aggressive chemical conditions
Use of Fluoropolymers und PFPE in textile machinery; machinery equipment for the textile industry: e.g. textile machines for the production of textile materials (clothing, home textiles and technical textiles), e.g. machines for chemical fibre production, machines for nonwovens production, dyeing machines, impregnating machines, drying machines. Pressure vessels for thermochemical treatment of textile recycling material in order to enable circular economy. Fully automatic chemical dispensing systems (used in various industries apart from textile industry: chemical, pharma, food), Heat recovery systems for reduction of need for fossil fuel based thermal process energy. Wastewater treatment technology	As sealing materials to maintain function, reduction of maintenance and prevent leakage. As construction and coating materials for components to ensure energy efficiency, material efficiency of components (reduction of wear) and highest fabric quality of processed textiles. As part of lubricants with PTFE or PFPE used at high temperatures and in harsh conditions. In electrical components as part of drive and controlling to protect them against chemicals and high temperatures
bearings/sliding bushes (PTFE) in air&process gas compressors	
coatings (PTFE, PVDF) e.g. anti corrosion coating of piping and connections for process technology or in process gas compressors, for top coating of v-belts, coatings for bolts in aggressive media like in oil&gas industry	Chemical resistance
Sealing systems in leak detectors	Thermal and chemical resistance, resistance against aggressive gases, dielectric properties
sealing membranes in the valves of gas containers for technical gases, refrigerants, LPG and other	
Corrosion protection for process instrumentation (PTFE, PFA)	Chemical resistance

Tube and hose connectors, flanges, quick release couplings, tube line valves, measuring connectors (PTFE, FKM) e.g. for hydraulic fluids, vlucanisation processes, hot forging processes	
Cables, wires, plugs (PTFE, PFA) e.g. for signal transmitter, pressure and flow switches, valves	Chemical and thermal resistance
Pneumatic components e. g. valves, regulators, actuators, tubes, fittings (FKM, EPDM, PTFE, PVDF)	
Brake Pads - PTFE	
O-ring preloaded PTFE seals for pneumatic applications	Durability, tightness, low friction and energy consumption, sustainability, safety
Support rings based on PTFE for high-pressure hydraulic applications	Durability, tightness, low friction and energy consumption, sustainability, safety, high pressure resistance
PTFE-based guide elements for pistons	Durability, tightness, low friction and energy consumption, sustainability, safety, high pressure resistance
O-rings on FKM and FFKM basis	Long life time, tightness, reduce friction and energy consumption, sustainability, safety, high pressure resistance
X-rings on FKM and FFKM basis	Durability, tightness, low friction and energy consumption, sustainability, safety, high pressure resistance
O-ring preloaded translational hydraulic seals (PTFE / FKM)	Durability, tightness, low friction and energy consumption, sustainability, safety, high pressure resistance, thermal resistance
O-ring preloaded rotary seals (PTFE / FKM)	Durability, tightness, low friction and energy consumption, sustainability, safety, high pressure resistance
Radial shaft seals (FKM / FFKM)	Durability, tightness, low friction and energy consumption, sustainability, safety, chemical resistance

Lip ring seals (FKM / FFKM)	Long lifetime, tightness, low friction and energy consumption, sustainability, safety, chemical resistance
O-ring preloaded PTFE wipers	Durability, tightness, low friction and energy consumption, sustainability, safety
O-ring preloaded hydraulic rod seals (PTFE / FKM)	Durability, tightness, low friction and energy consumption, sustainability, safety, high pressure resistance
Special FKM and FFKM rotary seals	Durability, tightness, low friction and energy consumption, sustainability, safety, chemical resistance

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