

VDMA Power Transmission Engineering Statement to the Per- and Polyfluoroalkyl Substances (PFAS) Restriction Proposal under the REACH Regulation

1. Introduction

Drive technology describes technical systems where forces or motions are transmitted, or forces are converted into motion and vice versa. Thus, it does not only include the process of power generation, but also the complete powertrain from the source of the power up to its application regardless of its design as a mechanical or electrical solution. Drive technology is of enormous importance both in business and in everyday life. It is the basis for the operation of machines and devices and forms an essential part of the generation of renewable energy and the shaping of a green industry.

The VDMA Power Transmission Engineering Association represents the interests of more than 220 European manufacturers of drive elements, gearboxes, electrical drive technology and linear technology with over 92,300 employees. The industry stands for a turnover of 18.2 billion euros and the VDMA member companies generate over 80 percent of the estimated production in Germany and 20% of the worldwide exports of drive technology products.

2. Evaluation of the Restriction Proposal

In general, the power transmission engineering industry supports the efforts of the European Union to reduce hazardous substances through the REACH regulation. However, the scope of the proposed restriction on PFAS is very broad and has a significant impact on the industry as a whole. No differentiation is made with regard to the over 10,000 substances concerned and their different properties and risk profiles. A comprehensive evaluation of the individual substances and their areas of application would be necessary. The proposal equates substances of low concern with substances with proven hazards to the environment and humans in a general group of substances. Fluoropolymers are an example. For instance, Polytetrafluorethylen (PTFE), Fluorethylenpropylen (FEP), Ethylen-Tetrafluorethylen (ETFE) and Perfluoralkoxy (PFA) are fluoropolymer substances and evaluated as "substances of low concern", because they have a high molecular weight and are extremely stable. Furthermore, the proposal does not sufficiently distinguish the usage of PFAS between applications in a consumer sector (B2C) and an intended use in the field of an industrial sector e.g., drive technology (B2B), where a negligible emission may exist under professional handling in closed production processes and when used in products.

3. Effects of the Restriction on Power Transmission Engineering Industry

The power transmission engineering industry would be strongly affected by a ban due to the lack of important chemicals/materials to produce drive technology components and by the lack of indispensable supplier products for drive technology products.

Furthermore, the proposal ignores the area of spare parts for existing products. The Ecodesign for Sustainable Product Regulation (ESPR) is focusing on durability and reliability, reusability, upgradability, reparability, maintenance and refurbishment, energy and resource efficiency. The lack of consideration of spare parts as well as refurbished used products (second-hand market) seems to be in contradiction with the targets of the sustainable and resource-saving approach of the EU's ESPR and will directly lead to a premature life cycle end of existing products and the impossibility to maintain existing production lines.

4. Product Component Level

4.1. Bearings

PTFE and PFPE are used for coatings as their resistance against extreme temperature (e.g., induced by high pressure, circumferential speed and friction of shafts in motion) and extreme environmental conditions is required. Currently, there are no appropriate substitutes on the market. A substitution would lead to a limitation of surface resistance and durability ending up in a shorter lifetime of the bearing itself, higher maintenance effort of the final product and higher material consumption for replacements. In some applications, the use of PTFE and PFPE is the technological basis.

4.2. Brake Pads

PTFE is used in brake pads to resist extreme temperatures and to reduce wear. These brake pads are used for elevators (safety function), in mechanical engineering products as well as in wind industry (renewables). Experience shows that the conversion of friction linings including asbestos to asbestos-free solutions in the past took 10 years.

4.3. Couplings

Fluoroelastomere are used because of their thermal resistance.

4.4. Hoses

PTFE or FKM are used to resist aggressive chemical substances (e.g., contact with adhesives).

4.5. Sealings

The choice of sealing material depends on the application of the product and its surrounding conditions. To provide appropriate resistance to extreme temperatures, aggressive chemical substances, wear and the reduction of susceptibility to dirt, FKM and PTFE is often used due to the fact that no appropriate alternatives exist at this time.

4.6. Lubricants, Additives, Hydraulic Fluids

Estimates suggest that friction and wear cause annual losses of between 2 and 7% of gross national product to the respective economies of industrialized countries.¹ Lubrication is essential in all applications of power transmission.

PTFE and PFPE are ingredients of lubricants used in gearboxes or geared motors resisting extreme environmental conditions (vacuum, high temperatures, high pressure), supporting the reduction of the influence of surface roughness, ensuring a minimum of lubricant film thickness during power transmission, and leading to defoaming of the lubricant. Fluor oligomer, Perfluorocarbon and Fluorocarbon rubber are used in additives and hydraulic fluids supporting the lifetime of the lubricants.

A defined time frame of a derogation of lubricants is not suitable, because at this time no estimation related to reliable timeline exist for an appropriate substitution by PFAS free lubricants.

4.7. Wiring Harnesses

PVDF, FEP, FKM or ETFE is used as isolation materials because of their thermal resistance. A short-term substitution is not feasible.

Products intended to be exported to overseas markets will not meet certification requirements (e.g., UL certification).

4.8. Electronic Parts

PFAS have a variety of purposes that serve the electronic industry and electronic parts. They are used within electronic devices, the manufacturing process of electronic devices as well as for semiconductors and their manufacturing. The usage of PFAS substances is necessary based on the very good chemical resistance in aggressive media, a high temperature resistance, low friction, minimal wear (particle minimization) and further specific properties.

5. Product Level

5.1. Gearboxes

FKM and PTFE are used in sealing systems. The sealing material is dependent on the application of the gearbox. In terms of extreme temperature, FKM and PTFE can resist the temperatures resulting from circumferential velocity. Current substitutes of FKM allow only one third of the required circumferential velocity. Most applications exceed this limitation by non-FKM seals easily. Moreover, available substitutes have a significant influence on load density and product life. The risk of leakage increases while the efficiency of the products decreases.

FKM, PTFE resist aggressive chemical substances and have a high resistance to wear. Sealings must be compatible with the respective mineral and synthetic oils. The lack of availability of appropriate sealing leads to a threat of the ability to deliver gearboxes. In

¹ [Was ist Tribologie? - Gesellschaft für Tribologie e.V. \(gft-ev.de\)](http://www.gft-ev.de)

addition, FKM reduces the susceptibility to dirt. Gearboxes currently can be operated under extreme environmental conditions with limited influence on tightness and wear.

If spare parts of the sealing system in future are made from different materials either the performance of the gearbox needs to be reduced (see influence on circumferential velocity) or the design of the sealing has an influence on the future of the existing gearbox (upgradability) if possible.

Coatings on surfaces of sliding and rolling parts (bearings) reduce power loss induced by friction, reduce wear, and therefore increase the product's lifetime as well as decrease the risk of leakage by resisting high temperature differences.

PTFE, PFPE and Fluor oligomers as part of the lubrication regimes inside gearboxes ensure the operation of industrial and wind turbine gearboxes at high power density. Increased power density in gearboxes leads to a reduction of resource consumption in total compared to products with less power density. Consequently, in the wind industry a lower mass on the top of a windmill leads to slimmer construction of the tower and reducing material consumption on a second level. Furthermore, PFAS-substances reduce the aging of the lubricant, optimize the oil change intervals and reduce the risk of gear failures.

PTFE and FKM used for hoses can be applied to lubrication systems inside the gearbox housing because of its resistance to aggressive chemical substances. This kind of lubrication system is an inherent solution avoiding environmental pollution by lubricants in the case of leakages.

5.2. Geared Motors / Motors

In addition to the aspects already mentioned under gearboxes, FKM, PVDF, FEP or ETFE is needed for the electric and electronic parts e.g., cable isolation or cable glands to ensure the operation under conditions where fire resistance and requirements related to potentially explosive atmosphere are requested.

6. Socio Economic Issues and Summary of the use of PFAS in Power Transmission Applications

With regard to the production of power transmitting products, PFAS are used during the production process in various sub-areas, such as PTFE-coated hoses and valves containing FFKM- O-rings in gluing machines (closed system without adhesive contact with people) or fluorinated gases in compressors. In addition, PFAS are contained in various operating materials (e.g., PTFE within lubricants) for production due to the technical framework conditions. A ban on all PFAS would restrict production technology in the European Union and possibly lead to a relocation of production sites to third countries and existing jobs being jeopardized. Production of PFAS-containing products in third countries often with less restrict requirements is expected not to achieve the desired outcome of the EU's restriction proposal. In addition, the EU will lose product and production knowledge in the long-term perspective.

In many cases, the design of drive technology products is based on the individual requirements of the user-specific application. PFAS are chemical substances designed to resist specific requirements. Their use is carefully chosen by the manufacturer of power transmitting products for their final application and does not represent a standard configuration. PFAS have the following key attributes, which give these substances a unique characteristic in the application field of drive technology:

- High-temperature resistance,
- Chemical resistance,
- Long-term stability,
- Optimal sliding properties,
- Mechanical strength,
- Non-combustible,
- Nonexplosive,
- Low evaporation loss,
- Creep and extrusion resistance,
- Low temperature suitability,
- Moisture repellent,
- Adjustable permeation (gas permeability),
- Electrical insulation,
- Elastic shape recovery,
- Compression set,
- Radiation resistance (UV, ionizing radiation),
- Wetting,
- Vacuum applicability, and flexural strength.

Substitutes being able to provide the same performance as PFAS substances are subject to research. They would first have to be researched, extensively tested, verified, and validated. Therefore, the transition periods as proposed are not sufficient for a successful implementation of new technological solutions.

The ban on parts containing PFAS will have a direct impact on the product lifetime (reduction e.g., due to higher wear), the design (e.g., larger size, due to necessary cooling) and power density (increasing material consumption) of drive technology products. Particularly regarding a change in product design or size, it will partly be impossible to supply replacement products in the event of a failure, which would be a major problem for existing machines or applications not only related to the products itself but to the production lines of manufacturers too. However, this is contrary to the objectives of the Green Deal and the planned Ecodesign for Sustainable Products Regulation (ESPR).

7. Demands of the VDMA Power Transmission Engineering Association

VDMA Power Transmission Engineering Association fully supports the goal of no longer allowing PFAS classified as very hazardous to enter the environment. In this respect, regulation of these PFASs classified as very hazardous is fundamentally correct. It is also understandable to group the PFASs sensibly and in terms of their risk potential in order not to have to regulate each of the 10,000 substances individually.

But from a drive technology point of view, we refer to the following essential demands:

- In manufacturers opinion, the regulation must be more differentiated. A comprehensive scientific risk assessment must be carried out for the restricted substances, and groups of substances must be shown to have the comparable hazardous properties. The risk-based approach must be maintained so that uses that do not pose a relevant risk remain possible.

- Applications where currently no substitutes exist and alternatives will lead to a loss of performance, of safe functioning, or the safety of products, an unlimited derogation is required.
- The general exemption of fluoropolymers, which are considered "polymers of low concern" according to the OECD definition.

Substances, such as monomers and processing aids, which are necessary for fluoropolymer manufacture and its production must be exempted from the ban, provided that safe use is ensured.²

- Substitutability

For applications with extreme conditions (vacuum, high or low temperatures, high pressures, UV radiation, high frictional resistance, aggressive chemicals or a combination of these) there are no suitable alternatives to PFAS-containing products. The high price of fluoropolymers minimizes their use, consequently these unique materials are generally only used in industry when necessary.

- Pathway into the environment

Some PFAS are mobile and enter the environment. The environmental pathway of different PFAS subgroups must be considered. Exceptions must be made where there is no relevant (environmentally hazardous) entry into the environment.

- Exception for spare and used parts

For the placing on the market of spare, wear and used parts, exceptions to the restriction are necessary for the purpose of sustainability and economic efficiency (repair as produced principle). These are to be granted for an unlimited period or at least for a significantly longer period than the transitional periods currently provided for.

- Exception for the industrial sector

Industrial actors (B2B) can ensure that PFAS, PFAS-containing materials and products are handled professionally throughout the life cycle through professional risk management in contrast to consumer goods (B2C).

The proposed transition period is too short for industrial applications. A period of several years is needed to test the possible alternatives for functionality and safe use, as well as to qualify them for series use and, in many cases, to approve them under EU legislation. Thus, the general transition period would also have to be several years.

To avoid possible applications that are not considered, an uncomplicated and unbureaucratic application for future exemptions would have to be made possible. The experiences from the ROHS Directive with the severely delayed exemptions have shown that this is necessary.

The chemical scope of the restriction must be communicated transparently by means of a list of affected substances (including IUPAC names, CAS numbers, EU numbers) so that companies can gather the information along the international and widely ramified supply chain.

For sustainability and economic efficiency, exemptions from the restriction are necessary for the placing on the market of spare, wear and used parts (repair as produced principle).

² <https://www.hse.gov.uk/reach/assets/docs/pfas-rmoa.pdf>

These should be granted for an unlimited period or at least for a significantly longer period than the transitional periods currently provided for.
Consistency and coherence with other EU regulations must be ensured (in particular the new F-Gases Regulation, (EU) No 517/2014).