

KEB – Automation KG:

Factsheet PFAS in drive technology



Product(s) of KEB sales programm:

- Products in which PFAS are used:
 - Electric motors (asynchronous, synchronous motors)
 - Electric brakes for electric motors
 - Inverters (in the power range from 375W to 800kW)
 - Automation controls
 - Cables and connecting lines
- Function of the products just mentioned:
 - Electric motor: Generation of a rotary or linear movement from electrical energy.
 - Braking: Generating a safe standstill for moving machine parts
 - Inverter: control of speed, position control
 - Automation control: Sequence control for processes in plants and machines
- Typical customer sectors where the product is used:
No limitation possible: Logistics (intralogistics, harbour cranes, airports), mechanical engineering, plant engineering, food and beverage industry, automated manufacturing (automotive industry), mining (gravel plant), automotive (control systems for auxiliary drives).



Market Information:

- Market environment:
- KEB: 1200 employees with approx. 180 million euros turnover (Europe area).
ZVEI: The electrical drive industry represents manufacturers of electric motors and frequency converters with a turnover of more than 20 billion euros and about 130,000 employees in Europe.
- Drive technology is a system solution consisting of various components matched to the customer application. As soon as one component is affected, the rest is not competitive. Customers will produce abroad?
- Durability, low maintenance, energy efficiency, precision, dynamisation of processes, e.g. adaptation to differences in capacity utilisation, advancing industrialisation, automation, miniaturisation.
- Conflicting goals: energy efficiency, resource efficiency, rare earths, ecological footprint



Requirements Profile

- Service life time:
Motors and frequency inverters are durable products used in the B2B sector with long service lives (10 - 30 years)
- Development times
B2B products have very long development times, as the various product ranges remain unchanged for many years and are only redeveloped every few years.
- Required availability time of spare parts
They are easy to repair and require spare parts for long lifetimes
- Temperature resistance,
Drive technology in general is used in all temperature ranges, therefore temperature resistance is of elementary importance.
- Flame retardancy
Electrical safety in the area of enclosures around power electronics is ensured, among other things, by the use of flame retardants in the plastic.
- Standards, certification/approvals, market/customer requirements
CE marking, UL, CSA, ATEX, CCC, India, use in food production (compatibility with food-grade oils).



Identified PFAS Uses

In complete product

KEB develops and manufactures drive products that are assembled from many components from the various mechanical and electronic areas. These are designed for the demands of the application. Since both a long service life and high load capacity due to temperature, speed and chemical influences are required, corresponding components and materials from specialized suppliers must be used. In the course of this supply chain, there is usually no one who falls under the CLP regulation (EU, No. 1272/2008) except for the basic material manufacturer.

Therefore, it must be assumed that, despite all efforts, the following list is incomplete at this point in time.

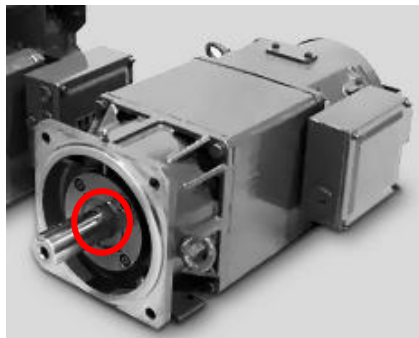
1. Name/Description of the use: Electric motor: Asynchronous motor	
PFAS substance/substance group: • Fluoropolymers	PFAS-containing material/component: • Gaskets (FKM)
Reason for PFAS Use/ Requirements Profile: • Use at higher temperatures und less abrasion	

Fig. Asynchronous motor VF , Source / rights: KEB

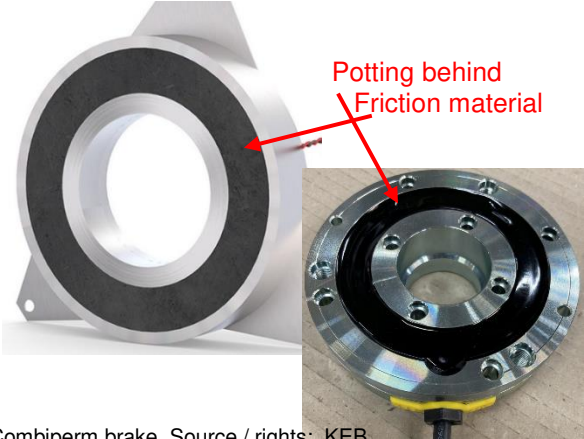
2. Name/Description of the use: Electric motor: Synchronous motor	
PFAS substance/substance group: Fluoropolymers	Fig. Synchronous motor BR , Source / rights: KEB PFAS-containing material/component: Gaskets O-Rings (FKM)
Reason for PFAS Use/ Requirements Profile: Use at higher temperatures and less abrasion	

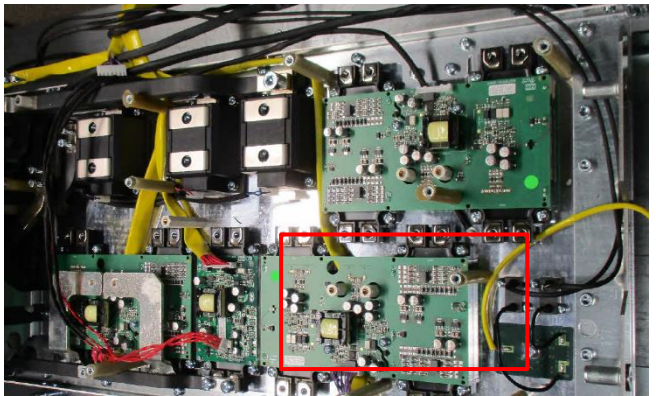
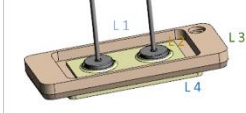
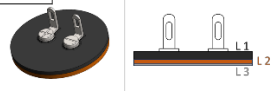
3. Name/Description of the use Power cables / wires for inverter – motor connection	
PFAS substance/substance group: Fluoropolymers	Fig. Servo power cables , Source / rights: KEB PFAS-containing material/component: Cable insulation / connector inlet
Reason for PFAS Use/ Requirements Profile: Use at higher temperatures	

4. Name/Description of the use Encoder cables / wires for inverter – motor connection	
PFAS substance/substance group: Fluoropolymers	Fig. Servo power cables , Source / rights: KEB PFAS-containing material/component: Cable insulation / connector inlet
Reason for PFAS Use/ Requirements Profile: Use at higher temperatures	

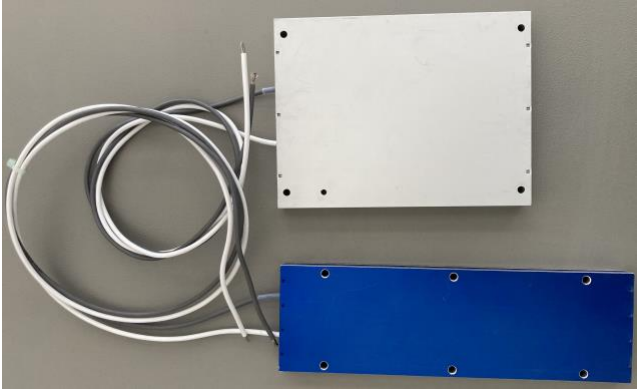
5. Name/Description of the use: Electric brakes for motors	 Fig. Combiperm brake, Source / rights: KEB
PFAS substance/substance group: Fluoropolymers	PFAS - containing material / component: Gaskets O-Rings (FKM)
Reason for PFAS Use/ Requirements Profile: Use at higher temperatures und less abrasion	

6. Name/Description of the use Electric brakes for motors	 Fig. Combiperm brake, Source / rights: KEB
PFAS substance/substance group: PTFE	PFAS - containing material / component: ETFE - Litzen
Reason for PFAS Use/ Requirements Profile: Use at higher temperatures	

7. Name/Description of the use Electric brakes for motors	 Fig. Combiperm brake, Source / rights: KEB
PFAS substance/substance group: Fluoropolymers	PFAS-containing material/component: Potting material for electric bobbin
Reason for PFAS Use/ Requirements Profile: Use at higher temperatures and high insulation resistance	

8. Name/Description of the use Electric drive inverter: internal Litz wire connections	 Fig. Litz wires, Source / rights: KEB PFAS substance/substance group: PTFE PFAS-containing material/component: Electric litz wire insulation EFTE														
Reason for PFAS Use/ Requirements Profile: Use at higher temperatures and high insulation resistance															
9. Name/Description of the use Electric drive inverter: Gaskets in power capacitors	<table border="1" data-bbox="805 853 1195 958"> <tr><td>Layer 1</td><td>Terminals copper tinned</td></tr> <tr><td>Layer 2</td><td>Polytetrafluorethylen (PTFE)</td></tr> <tr><td>Layer 3</td><td>aluminum lid (99,8%)</td></tr> <tr><td>Layer 4</td><td>Polytetrafluorethylen (PTFE)</td></tr> </table>  <table border="1" data-bbox="1118 1016 1449 1077"> <tr><td>Layer 1</td><td>Ethylene-Propylene-Diene-Rubber (EPDM)</td></tr> <tr><td>Layer 2</td><td>hard paper</td></tr> <tr><td>Layer 3</td><td>Polytetrafluorethylen (PTFE)</td></tr> </table>  Fig. PFAS sealing capacitors and isolating wires [ftcap GmbH] PFAS substance/substance group: PTFE PFAS-containing material/component: Gasket material for housing	Layer 1	Terminals copper tinned	Layer 2	Polytetrafluorethylen (PTFE)	Layer 3	aluminum lid (99,8%)	Layer 4	Polytetrafluorethylen (PTFE)	Layer 1	Ethylene-Propylene-Diene-Rubber (EPDM)	Layer 2	hard paper	Layer 3	Polytetrafluorethylen (PTFE)
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Reason for PFAS Use/ Requirements Profile: Use at higher temperatures and high insulation resistance															
10. Name/Description of the use Electric drive inverter: Encapsulation of used components from manufacturers	 Fig. Sensors using PFAS in encapsulation [TDK Electronics AG] PFAS substance/substance group: Fluoropolymer PFAS-containing material/component: Einhausungsmaterial														
Reason for PFAS Use/ Requirements Profile: - Use at higher temperatures and high insulation resistance - Chemical resistance to environment															

11. Name/Description of the use Accessories for Inverters (PDS): High temperature wires in EMC filters	 Fig. EMC filter internal, source / rights: KEB
PFAS substance/substance group: - PTFE -	PFAS-containing material/component: Wire insulation
Reason for PFAS Use/ Requirements Profile: • Use at higher temperatures >150°C • High performance insulation	

12. Name/Description of the use Accessories for Inverters (PDS): High temperature wires in brake resistors	 Fig. brake resistors, source / rights: KEB
PFAS substance/substance group: - PTFE -	PFAS-containing material/component: Wire insulation
Reason for PFAS Use/ Requirements Profile: • Use at higher temperatures >200°C • High performance insulation	

In the process of manufacturing

We are only aware of applications of PFAS in our production processes that remain in the product. These are listed in the previous section "In the finished product".

PFASs that are needed to run machinery and production equipment and cannot usually be attributed to a single concrete product type are listed in the next section "In machinery and equipment for production".

Of course, processes dependent on PFASs may take place in our upstream supply chain, e.g. semiconductor production or the use of release agents containing PFASs in the production of plastic parts. However, because we do not have any concrete information on this, we do not comment on this as the "Electric Drive Technology" sector.

In machines and systems for production

13. Name/Description of the use Oil and grease	Examples applications: - Reflow oven - Wave soldering machine
PFAS substance/substance group: - PFPE, PTFE, as spray additionally fluorinated greenhouse gas R-1234ze PFAS- containing	PFAS-containing material/component: Base oil (PFPE), thickener (PTFE), as spray: propellant gas
Reason for PFAS use/ requirements Profile: • Temperature resistance up to +280°C (no decomposition, no evaporation). • Maintenance every 2 months • The use of conventional lubricants would require much more maintenance, as they would decompose or evaporate at the high temperatures in the reflow oven and the wave soldering machine. The machine parts (e.g. chains, guides) would become encrusted and would have to be replaced annually instead of very rarely or not at all. This would not only run counter to the goal of resource efficiency, but also reduce the economic viability of production in the EU.	

↔ Substitution

- In general, the manufacturers of electric drive systems ask whether PFAS-free alternatives are available and, if possible, these are substituted
- However, from today's perspective, PFAS substitution is not possible for the applications shown. The manufacturers of drives downstream in the supply chain are dependent on the developments of the upstream suppliers for the use of PFAS-free substitutes. In other words, the manufacturers of drive system components themselves do not have the necessary knowledge, skills and equipment to conduct materials research. The search for equivalent alternatives among the suppliers of the preliminary products has unfortunately not been successful so far.

Safe Use: Prevention and Reduction of Emissions and Exposure

- There is no direct emission of the PFAS materials as they are bound in the precursor materials / components.
- Through the orderly disposal or recycling in the B2B area, the bound substances are fed into a secure final processing.

(((o))) Socio-economic Impact

Consequences of the Proposed Restriction

- Due to the wide range of end-uses and industries in which the products are used, we can only estimate the socio-economic impact of the proposed PFAS restriction only qualitatively.
- A blanket ban on PFASs would make it impossible for manufacturers to produce products of the same quality, durability and performance and to cover certain areas of application (e.g. corrosive industrial environments).

Contradicts the goal of a circular economy

- Constantly increasing energy efficiency requirements (among others due to the Eco-Design Directive 2009/125/EC), the ongoing trend towards miniaturisation - not least to avoid wasting resources - have led to electric drive systems becoming smaller and more compact over the years. The more compact an electric motor is built with the same power, the higher temperatures arise inside. In order to be able to do without high-temperature PFAS, electric motors should no longer become so hot. To do so, electric motors would have to be oversized and/or additionally cooled - both of which would be a waste of energy and resources and would contradict the idea of the Green Deal.

Productivity of the economy declines

- If PFASs are banned, the productivity of the economy would decrease, as machinery and equipment will experience more frequent maintenance and unplanned breakdowns (such as excessive wear of shaft seals).

Burden of Proof and Analytical Aspects

- No analytical tests will be carried out. These would not be necessary at this stage of processing, as information can be provided by the supplier



Required Transition Period and/or Derogations

- We therefore plead for the indefinite exemption of fluoropolymers and perfluoropolyethers from the scope of the restriction for use in propulsion systems and their components as well as in production machinery and equipment
- Since it is uncertain whether drop-in alternatives for existing HVACR equipment will exist 13.5 years after entry into force, the exemption for maintenance and refilling of such equipment should not be time-limited. Instead, we propose that the Commission review this exemption by that time in light of new scientific evidence and amend the exemption accordingly, if necessary
- Further need for change?



Our sector offers:

- In the light of the restriction proposal and the scientific evidence on the effects of various PFAS(-groups) on human health and the environment, we question the need for PFASs. Our development departments are working closely with suppliers to find alternatives. When developing new technologies and products technologies and products, we are already switching to technically and economically suitable PFAS-independent technologies
- For reasons of environmental protection and scarcity of resources, we strive to reduce thermal recycling and expand material recycling. For example, wear parts such as sealing rings, which are replaced by our skilled personnel during repairs and maintenance work, could be collected separately and fed into a single-variety recycling process. However, it is crucial for the establishment of such processes that the recyclates are competitive with conventional materials in terms of quality and price.

Contact

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