Gigahertz Optik GmbH

Section III – General and specific information

Summary

Gigahertz-Optik uses PTFE for key functions of their high-end light measurement devices with ISO 17025 accredited calibration based on their own calibration laboratory.

Beside of use of PTFE for measurement devices and systems Gigahertz-Optik manufactures longtime stable und precise calibration standards for light measurements. PTFE is in this case just a small part of the whole measurement systems and only used in small amounts but cannot be replaced due its technological unique features. Several studies showed the superb UV stability, lowest aging under light conditions and mechanical stability. No material was close to these specifications.

Gigahertz-Optik also provides OEM-components made of optical PTFE for photonic and optical applications like integrating spheres (Ulbricht spheres), laser resonators and light manipulating devices and others for various industrial and scientific applications.

The use of PTFE for products and applications of Gigahertz-Optik is not related to any hazardous substance and no degradation of long time preventing environmental pollution. PTFE is a polymer of low concern (PLC) in terms of its potential environmental and human health impact. In addition, the lifetime of the mentioned products can be easily reach 25 years and is not a wear tear product. These are technically irreplaceable core elements.

Environmental emissions:
During PTFE processing, emissions of PFAS-of-concern due to heating of the PTFE in the sintering process does not occur.
More than 95% of the generated waste of the production process is reused or recycled! Just a very small portion is too much contaminated (e.g. dirt) and leaves the factory for incineration. It is shown in scientific studies that municipal incineration of fluoropolymers using best available technologies is not a significant source of PFAS and should be considered an acceptable form of waste treatment. The contribution of PTFE to microplastics is estimated very low due to persistence. PTFE has a high molecular weight, no water solubility and volatility, therefore they are not expected to degrade to lower molecular weight PFAS.
The PTFE used in photonic applications can be also refurbished by a certain amount.

Any restriction of PTFE for these applications at Gigahertz-Optik cannot be compensated with existing materials at same function and performance level. Therefore, competitors in U.S.A., India, China and other countries will take away from Europe this high-tech business in case of no exemptions of restrictions causing dramatic economic impact.

Request for exemption:

Fluoropolymers should be exempted from any regulatory action under the REACH restriction for all applications in the branch of Photonics, which is an enabling technology for new high-tech products to improve

life today and in future. Also, other exemptions in the photonics showed that it is often not possible to replace certain materials due to the very special optical needs in light transmission and aging.

Exemption for PTFE used in high tech products and production aids for scientific and industrial applications!!

Contents

1. General information

1.1. Scope or restriction option analysis

The branch Photonics at all and sub-categories are not listed in the sectors of ECHA.

1.2. Hazard or exposure

The use of optical PTFE for products and applications of Gigahertz-Optics is not related to any hazardous substance and no degradation over long time preventing environmental pollution. (Optical) PTFE is a polymer of low concern (PLC) in terms of its potential environmental and human health impact.

1.3. Environmental emissions

During PTFE processing, emissions of PFAS-of-concern due to heating of the PTFE in the sintering process does not occur. More than 95% of the generated waste of the production process is reused or recycled! Just a very small portion is too much contaminated (e.g. dirt) and leaves the factory for incineration. This is described in detail in the contribution of Berghof Fluoroplastic Technology (Contribution number: 5929; date/time: 2023/06/28 15:52; document: part 25, page 20)

It is shown in scientific studies that municipal incineration of fluoropolymers using best available technologies is not a significant source of PFAS and should be considered an acceptable form of waste treatment [Aleksandrov 2019]. The contribution of PTFE to microplastics is estimated to be very low due to persistence. PTFE has a high molecular weight, no water solubility and volatility, therefore they are not expected to degrade to lower molecular weight PFAS [Yuan 2022].

The PTFE used in photonic applications can be also refurbished by a certain amount.

The handling of optical PTFE as polymer of low concern (PLC) used in industry and research only can be safely managed [Henry 2018].

[Aleksandrov 2019] Aleksandrov et al., Waste incineration of Polytetrafluoroethylene (PTFE) to evaluate potential formation of per- and Poly-Fluorinated Alkyl Substances (PFAS) in flue gas, Chemosphere 226, 2019, 898-906 (https://doi.org/10.1016/j.chemosphere.2019.03.191)

[Yuan 2022] Yuan et al., Ranking of potential hazards from microplastics polymers in the marine environment, J. Hazard. Mater. 429, 2022, 1–19 (https://doi.org/10.1016/j.jhazmat.2022.128399)

[Henry 2018] Henry et al., a critical review of the application of polymer of low concern and regulatory criteria to fluoropolymers, Integr. Environ. Assess. Manag. 14(3), 2018, 316-334 (https://doi.org/10.1002/ieam.4035)

1.4. Baseline

Gigahertz-Optik uses optical PTFE for their own measurement devices as well as for OEM-products for photonic applications (LED, Laser, LiDAR, autonomous driving, automation, semiconductor, medical technology environmental monitoring and many other applications of Photonics).

Photonics as high-tech industrial branch, which enables a wide spread of modern technologies, which are the basis of today`s and future life.

1.5. Description of analytical methods

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1.6. Information on alternatives

There are no alternatives available with the same set of properties. But optical PTFE-components are often the core component for function and performance of the entire photonic device or complex system.

1.7. Information on benefits

There is no benefit if banned.

1.8. Other socio economic analysis (SEA) issues

In case of ban of optical PTFE without exemption or long derogation period the crash of Gigahertz-Optik is possible. This will yield to loss of jobs, taxes and technical know-how in Germany and Europe.

Gigahertz-Optic will not be able to maintain their high-end business and market position in light measurement and their calibrated DAkkS-accredited calibration laboratory according to ISO 17025.

The entire Photonic industry will suffer essentially since photonic core components would not be available any more in Europe.

Any restriction of PTFE for these applications at Gigahertz-Optik cannot be compensated with existing materials at same set of functions and performance level. Therefore, competitors in U.S.A., India, China and other countries will take away from Europe this high-tech business in case of no exemptions from restrictions causing dramatic economic and technological impact.

1.9. Transitional period

Since there is no alternative available with same or better properties and physical parameters basic research is required and a high amount of money is required to get this research financed. There is no predictable success of this basic research.
An estimated transitional period of minimum 15 years is required.

1.10. Request for exemption

Fluoropolymers including optical PTFE should be exempted from any regulatory action under the REACH restriction for all applications in the branch of Photonics, which is an enabling technology for new high-tech products to improve life today and in future.

Exemption for optical PTFE used in high-tech products and production aids is mandatory for scientific and industrial applications!

Optical PTFE should be removed from the ECHA restriction dossier.

2. Specific Information

2.1. Sectors and (sub-)uses

Please specify the sectors and (sub-)uses to which your comment applies according to the sectors and (sub-)uses identified in the Annex XV restriction report (Table 9). If your comment applies to several sectors and (sub-)uses, please make sure to specify all of them.

The branch Photonics with its sectors at all and sub-categories are not listed in sectors of ECHA.

2.2. Emissions in the end-of-life phase

The environmental impact assessment does not cover emissions resulting from the end-of-life phase. To get a better understanding of the extent of the resulting underestimation, (sub-)use-specific information is requested on emissions across the different stages of the lifecycle of products, i.e. the manufacture phase, the use phase and the end-of-life phase. Please provide justifications for the representativeness of the provided information. In particular:

a. *Please provide, at the (sub-)use level, an indication of the share of emissions (as percentages) attributable to these three different stages. An indication of annual emission volumes in the end-of-life phase at sector or sub-sector level would also be appreciated.*

b. *If possible, please provide for each (sub-)use what share of the waste (as percentages) is treated through incineration, landfilling and recycling. Please provide information to justify the estimates as well as information on the form of recycling referred to.*

More than 95% of the generated waste of the production process is reused or recycled! Just a very small portion is too much contaminated (e.g. dirt) and leaves the factory for incineration. It is shown in scientific studies that municipal incineration of fluoropolymers using best available technologies is not a significant source of PFAS and should be considered an acceptable form of waste treatment. The contribution of PTFE to microplastics is estimated very low due to persistence. PTFE has a high molecular weight, no water solubility and volatility, therefore they are not expected to degrade to lower molecular weight PFAS.
The PTFE used in photonic applications can be also refurbished by a certain amount.

2.3. Emissions in the end-of-life phase

With respect to waste management options, additional information is requested on the effectiveness of incineration under normal operational conditions (for different waste types, e.g. hazardous, municipal) with respect to the destruction of PFAS and the prevention of PFAS emissions.

The waste removal and high standard incineration will not yield to dangerous PFAS-emissions.

There is as an alternative a recycling circle possible also.

2.4. Impacts on the recycling industry

To get an understanding of the impacts of the proposed restriction on the recycling industry, information is requested on:

a. The impacts that the concentration limits proposed in paragraph 2 of the proposed restriction entry text (see table starting on page 4 of the summary of the Annex XV restriction report) have on the technical and economic feasibility of recycling processes (together with a clear indication on the waste streams to which the described impacts relate).

b. The measures that recyclers would need to take to achieve the proposed concentration limits.

c. The costs associated with these measures.

More than 95% of the generated waste of the production process is reused or recycled in the factory. Just a very small portion is too much contaminated (e.g. dirt) and leaves the factory for incineration. It is shown in scientific studies that municipal incineration of fluoropolymers using best available technologies is not a significant source of PFAS and should be considered an acceptable form of waste treatment. The contribution of PTFE to microplastics is estimated very low due to persistence. PTFE has a high molecular weight, no water solubility and volatility, therefore they are not expected to degrade to lower molecular weight PFAS.

2.5. Proposed derogations – Tonnage and emissions

Paragraphs 5 and 6 of the proposed restriction entry text (see table starting on page 4 of the summary of the Annex XV restriction report) include several proposed derogations. For these proposed derogations, information is requested on the tonnage of PFAS used per year and the resulting emissions to the environment for the relevant use. Please provide justifications for the representativeness of the provided information.

Very low tonnage and zero emissions are expected since optical PTFE is a polymer of low concern (PLC) in terms of its potential environmental and human health impact.

2.6. Missing uses – Analysis of alternatives and socio-economic analysis

Several PFAS uses have not been covered in detail in the Annex XV restriction report (see uses highlighted in blue and orange in Table A.1 of Annex A of the Annex XV restriction report (page 5)). In addition, some relevant uses may not have been identified yet. For such uses, specific information is requested on alternatives and socio-economic impacts, covering the following elements:

PTFE for optical applications and photonic industry and research:
Optical industry, light measurement technology, Laser industry, LED manufacturing, LED-lighting design, environmental measurements (UV-radiation, Ozone), spectral measurements, LiDAR, Photonics (f.i. displays, digital cameras), optical communications)

Applications: Optical properties of PTFE applied in
• Reflection standards • Interior of Ulbricht integrating spheres • Diffuse reflectors • Projection screens • Display backdrops • Reflectors for highly intensive radiation sources and lasers • Photonic devices and systems

a. The annual tonnage and emissions (at sub-sector level) and type of PFAS associated with the relevant use.

   The annual tonnage is very low and limited to industrial and scientific applications.

b. The key functionalities provided by PFAS for the relevant use.

- Optical properties (reflection and scatter) from UV to IR range of light
- Ultra stable optical properties over a very long time due to persistence of optical PTFE
- Soft optical PTFE allow very complex and advanced mechanical shapes and versatile designs.

c. The number of companies in the sector estimated to be affected by the restriction.

Approx. 1.000 companies (EU) in the field of Photonics of might be affected.

d. The availability, technical and economic feasibility, hazards and risks of alternatives for the relevant use, including information on the extent (in terms of market shares) to which alternative-based products are already offered on the EU market and whether any shortages in the supply of relevant alternatives are expected.

Recently there is no equivalent material alternative available.

e. For cases in which alternatives are not yet available, information on the status of R&D processes for finding suitable alternatives, including the extent of R&D initiatives in terms of time and/or financial investments, the likelihood of successful completion, the time expected to be required for substitution (including any relevant certification or regulatory approvals) and the major challenges encountered with alternatives which were considered but subsequently disregarded.

There has been no alternative with equivalent set of properties found so far and also no money gained to finance required basic research. The results and success of the required basic research are unpredictable.

f. For cases in which substitution is technically and economically feasible but more time is required to substitute:

i. the type and magnitude of costs (at company level and, if available, at sector level) associated with substitution (e.g. costs for new equipment or changes in operating costs);

n.a.

ii. the time required for completing the substitution process (including any relevant certification or regulatory approvals);

n.a.

iii. information on possible differences in functionality and the consequences for downstream users and consumers (e.g. estimations of expected early replacement needs or expected additional energy consumption);
n.a.

iv. information on the benefits for alternative providers.

n.a.

g. For cases in which substitution is not technically or economically feasible, information on what the socio-economic impacts would be for companies, consumers, and other affected actors. If available, please provide the annual value of EU sales and profits of the relevant sector, and employment numbers for the sector.

The total loss will be in range of 10+ Billion Euro (Europe) related to all affected applications derived from EU Photonics Market Data and Industry Report 2020 (photonics21, tematys).

Beside of lost business the knowledge and performance level in Photonics Europe will decrease against other countries outside Europe without ban of PFAS.

2.7. Potential derogations marked for reconsideration – Analysis of alternatives and socio-economic analysis

Paragraphs 5 and 6 of the proposed restriction entry text (see table starting on page 4 of the summary of the Annex XV restriction report) include several potential derogations for reconsideration after the consultation (in [square brackets]). These are uses of PFAS where the evidence underlying the assessment of the substitution potential was weak. The substitution potential is determined on the basis of i) whether technically and economically feasible alternatives have already been identified or alternative-based products are available on the market at the assumed entry into force of the proposed restriction, ii) whether known alternatives can be implemented before the transition period ends (taking into account time requirements for substitution and certification or regulatory approval), and iii) whether known alternatives are available in sufficient quantities on the market at the assumed entry into force to allow affected companies to substitute.

A summary of the available evidence as well as the key aspects based on which a derogation is potentially warranted are presented in Table 8 in the Annex XV restriction report, with further details being provided in the respective sections in Annex E.

To strengthen the justifications for a derogation for these uses, additional specific information is requested on alternatives and socio-economic impacts covering the elements described in points a) to g) in question 6 above.

Beside of loss of business, jobs, taxes and know-how in case of ban of optical PTFE the high-tech industry Photonics as an enabling technology (i.e. Photonics) impacts on a broad range of applications.

This branch and other related sectors will be tremendously weakened.

2.8. Other identified uses – Analysis of alternatives and socio-economic analysis

Table 8 in the Annex XV restriction report (starts on page 80) provides a summary of the identified sectors and (sub-)uses of PFAS, their alternatives and the costs expected from a ban of PFAS. More details on the available evidence are provided in the respective sections in Annex E.

For many of the (sub-)uses, the information on alternatives and socio-economic impacts was generic and mainly qualitative. In particular, evidence on alternatives was inconclusive for some applications falling under the following (sub-)uses: technical textiles, electronics, the energy sector, PTFE thread sealing tape, non-polymeric PFAS processing aids for production of acrylic foam tape, window film manufacturing, and lubricants not used under harsh conditions.

More information is needed on alternatives and socio-economic impacts to conclude on substitution potential, proportionality, and the need for specific time-limited derogations. Therefore, specific information (if not already included in the Annex XV restriction report or covered in the questions above) is requested on alternatives and socio-economic impacts covering the elements listed in points a) to g) in question 6 above.

The global annual revenues for photonics-enabled products exceeded $2.1 trillion in 2021 (SPIE Industry Report 2022). Therefore, the impact of ban of optical PTFE is difficult to determine but definitely huge.

2.9. Degradation potential of specific PFAS sub-groups

A few specific PFAS sub-groups are excluded from the scope of the restriction proposal because of a combination of key structural elements for which it can be expected that they will ultimately mineralize in the environment. RAC would appreciate to receive any further information that may be available regarding the potential degradation pathways, kinetics or produced metabolites in relevant environmental conditions and compartments for trifluoromethoxy, trifluoromethylamino- and difluoromethanedioxy-derivatives.

n.a.

2.10. Analytical methods

Annex E of the Annex XV restriction report contains an assessment of the availability of analytical methods for PFAS. Analytical methods are rapidly evolving. Please provide any new or additional information on new developments in analytics not yet considered in the Annex XV restriction report.

n.a.