Comments for Annex XV restriction report

Where to specify the comments
https://echa.europa.eu/restrictions-under-consideration/-/substance-rev/72301/term

Substance name
Per- and polyfluoroalkyl substances (PFAS)
EC Number
-
CAS Number
-
Scope
Restriction on the manufacture, placing on the market and use of PFASs.
Before you fill in the form, read the **Consultation Guidance** and the specific **Information Note** as they explain both the process and the proposal itself.
Link to the Consultation Guidance
Link to the Information Note

Compulsory fields/tick boxes are marked with an asterisk (*)
* ✓ I have read the Consultation Guidance and Information Note
All non-confidential comments will be made publicly available once a month during the duration of the consultation.
The Consultation is intended to provide ECHA's Committees with scientific and technical information to assist them in the development of their opinions. Although other information can be submitted, any abusive comments will not be published monthly and only published at the end of the process without any response from the Dossier Submitter or the Rapporteurs.

Where did you learn about this consultation? (please select all that apply):*
✓ Industry organisation

SECTION I. Personal information

We may contact you about your comment and to request additional information.
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SECTION II. Organisation

I am submitting information: *
✓ On behalf of an organisation or institution
Type of organisation/institution: **Other contributor**
Other contributor type: * **International Non-Profit Association**
Country where the organisation or institution is legally established: * **Belgium**
Name of organisation / institution: * **TensiNet Association**
Select one of the following options: *
✓ I agree to the disclosure of the name of my organisation/institution to the public
Note: the type and country of your organisation/institution will always be disclosed.

SECTION III. Non-confidential comments

It is possible to provide both general comments on the Annex XV restriction report subject to this Consultation and answers to the specific questions posed. In both cases, it is necessary to provide supporting evidence to allow ECHA's Committees to take your comments into account. It is important not to leave the submission of any socio-economic information until the consultation on SEACs opinion but already submit relevant comments at this stage.

General Comments

Select the relevant boxes that cover the content of your comments and provide your non-confidential comments below

- ☐ Scope or restriction option analysis
- ☐ Hazard or exposure
- ☐ Environmental emissions
- ☐ Baseline
- ☐ Description of analytical methods
- ☑ Information on alternatives
- ☐ Information on benefits
- ☑ Other socio economic analysis (SEA) issues
- ☐ Transitional period
- ☑ Request for exemption

* ☑ I understand that it is my responsibility not to include confidential information in responses to general comments and in any responses to requests for specific information (e.g. company name, email addresses, phone numbers, signatures etc.). ECHA will not be held liable for any damages caused by making non confidential responses publicly available.

Please provide your general comments in the box below

Bold not possible, no indents

The response is a reply provided by the members of the TensiNet Association. The content has been discussed during several online meetings of the Working Group Sustainability & Comfort.

The TensiNet Association stands as a prominent force within the realm of membrane structures, bringing together professionals from various fields such as design, architecture, engineering, manufacturing, supply, and installation. This esteemed association operates primarily on a European scale, while also functioning worldwide, fostering collaboration, knowledge exchange, and innovation in the domain of tensioned membrane constructions. Through its diverse membership base and extensive expertise, TensiNet plays a pivotal role in advancing the development, understanding, and implementation of these unique architectural marvels.

Background:

The initial TensiNet project (2001-04) has been funded by the European Commission for three years. The consortium of TensiNet consisted of 22 participating organisations with representatives from 9 EU member states. The membership formed a complementary group representing multi-disciplinary industries (coater and weaver, manufacturer, producer, engineering and architecture offices), universities and other associations.
Within the thematic programme GROWTH (Promoting Competitive and Sustainable Growth) the partners made the knowledge of their specific domain available and exchanged know-how between different disciplines.
The publication of the first "European Design Guide for Tensile Surface Structures" (B. Forster, M. Mollaert (Eds.), *European design guide for tensile surface structures*, TensiNet Association, Brussel, 2004) was the result of these three years of assembling, structuring and analysing existing knowledge and data.

Mission/Aim:

The TensiNet Association is driven by the mission to empower its members to make meaningful contributions within their respective activities in the field of tensile membrane buildings. The association focuses on several key objectives to achieve this aim:

1. Providing Information and Advice in the field of tensile membrane buildings
2. Supporting Research and Technical Studies
3. Bridging the Gap between Research and Practice
4. Enhancing the Quality of Tensile Membrane Buildings
5. Expanding Architectural Applications
6. Facilitating the Translation of Scientific Results into Practice
7. Stimulating Research Initiatives

The association facilitates the exchange of information and encourages joint working among its members, creating a supportive network that enhances the overall quality of tensile architecture.

Objectives:

The TensiNet Association creates a platform for all parties interested in tensioned membrane structures.
TensiNet supports teaching, workshops and training activities in the field of tensioned membrane construction and provides information about these events.
TensiNet publishes the TensiNews newsletter twice a year. TensiNet organises every three year the TensiNet Symposium.
TensiNet continues to publish reference documents, Working Group publications and the proceedings of the TensiNet symposium.
TensiNet has launched several Working Groups (WG Sustainability and Comfort, WG Pneumatic structures, WG Specifications and EUROCODE, WG Specifications GOOD PRACTICE etc.). Each Working Group focuses on a specific topic and is responsible for its operation.
TensiNet maintains the website www.tensinet.com, containing a projects database, reference documents, research reports etc.

With respect to the PFAS Restriction Proposal, the TensiNet Association supports the statements and replies made by

- its members:
- Membrane and foil producers, coating and weaving companies: Sioen, AGC and Chukoh Chemical Industries
- Tensile architecture manufacturers and fabricators: Taiyo Europe GmbH and Vector Foiltec

- the Industrieverband Kunststoffbahnen e.V. (IVK Europe, answer uploaded 7/9, reference e6fabaeb-86f0-4292-aa5f-dc946e348491) representing Sioen, Mehler Texnologies, Sattler, Serge Ferrari and Verseidag,
- the FluoroPolymer Product Group (FPG, see https://fluoropolymers.eu/wp-content/uploads/2023/08/FPG-DRAFT-REACH-Restriction-Consultation-Response_FINAL.pdf) with member AGC.

For detailed information the TensiNet Association refers to their replies.

The TensiNet Association requests an exemption of all fluoropolymers from the PFAS Restriction Proposal under the REACH regulation.
By grouping all various PFAS substances together and restricting them as a single class, the PFAS Restriction Proposal would restrict numerous PFAS substances that have not been risk-assessed and for which no unacceptable risk has been demonstrated.

For now, there are no alternatives at hand and the restriction would mean the end of lightweight tensile structures in Europe.

Specific Information Requests

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.

* Compulsory Fields

☑ I have information on this topic

Construction products / Architectural membranes and ETFE foils
Membrane structures, also known as tensile surface structures or fabric structures, are architectural constructions that utilize flexible membranes ((un-)coated fabrics or foils) to create self-supporting roofs, canopies, and other types of enclosures (Ignasi de Llorens J. (Ed.), 2015, *Fabric Structures in Architecture*, Woodhead Publishing, Cambridge). These structures derive their strength and stability from the tension forces exerted in the surface (Stranghöner, N., Uhlemann, J., Bilginoglu, F., Bletzinger, K.-U., Bögner-Balz, H., Corne, E., Gibson, N., Gosling, P., Houtman, R., Llorens, J., Malinowsky, M., Marion, J.-M., Mollaert, M., Nieger, M., Novati, G., Sahnoune, F., Siemens, P., Stimpfle, B., Tanev, V., Thomas, J.-Ch., *Prospect for European guidance for the Structural Design of Tensile Membrane Structures: Support to the implementation, harmonization and further development of the Eurocodes*, JRC Science and Policy Report, European Commission, Joint Research Centre, Editors: M. Mollaert, S. Dimova, A. Pinto, St. Denton, EUR 31430 EN, European Union, 2023), which is typically made of materials like:
(1) PVC-coated polyester,
(2) PTFE-coated fiberglass, or
(3) ETFE and other films (more than 1500 buildings erected worldwide).

(Gabler M., Cremers J., Knippers J., Lienhard J., 2010, *Atlas Kunststoffe + Membranen: Werkstoffe und Halbzeuge, Formfindung und Konstruktion*, De Gruyter; Detail, Berlin, München. Gabler M., Cremers J., Knippers J., Lienhard J., 2011, *Construction Manual for Polymers + Membranes*, Birkhäuser GmbH, Basel, ISBN: 3034607261)

Advantages of membranes structures include:
- Lightweight: Membranes are significantly lighter than traditional building materials such as steel or concrete. This property allows for easier transportation, reduced foundation requirements, and overall cost savings (Monticelli C., Zanelli A., 2021, *Material saving and building component*

efficiency as main eco-design principles for membrane architecture: case-studies of ETFE enclosures, Architectural Engineering and Design Management 17 (3-4), 264-280).

- Versatility of design: The flexible nature of membrane materials enables architects and designers to create unique and innovative shapes and forms that are challenging to achieve with conventional construction methods. Membrane structures offer great design freedom and aesthetic appeal (Xu J., Zhang Y., Yu Q., Zhang L., *Analysis and design of fabric membrane structures: A systematic review on material and structural performance*, Thin-Walled Structures 170 (2022) 108619; Zanelli A., Monticelli C., Mollaert M., 2021, *Sustainable innovation in minimal mass structures and lightweight architectures,* Architectural Engineering and Design Management 17 (3-4), 167-168; Forster B., Mollaert M. (Eds.), *European design guide for tensile surface structures*, TensiNet Association, Brussel, 2004).
- Natural lighting: Membrane materials can be translucent or transparent, allowing natural light to penetrate the building. This feature reduces the need for artificial lighting during the day, resulting in energy savings and a more pleasant indoor environment (Forster B., Mollaert M. (Eds.), *European design guide for tensile surface structures*, TensiNet Association, Brussel, 2004).
- Cost-effective: Compared to traditional construction, membrane structures can be more cost-effective due to reduced material requirements, shorter construction times, and simplified foundations. They can provide an economical solution for various applications.
- Quick construction: Membrane structures are often prefabricated off-site, allowing for rapid installation and construction. This aspect makes them ideal for temporary or semi-permanent structures, public space canopies, event venues, and disaster relief shelters (Ignasi de Llorens J. (Ed.), 2015, *Fabric Structures in Architecture*, Woodhead Publishing, Cambridge).
- Durability and weather resistance: High-quality membrane materials are designed to withstand challenging weather conditions such as wind, rain, and snow. They are often treated to be fire-resistant and UV-stable, ensuring long-term performance and reduced maintenance requirements (Beck P., 2021, *Zum zeit- und temperaturabhängigen Werkstoffverhalten von Ethylen/Tetrafluorethylen—Folien im Hochbau - On time- and temperature-dependent material behaviour of ethylene—tetrafluoroethylene foils in building construction*, Darmstadt, PhD-dissertation, Technische Universität Darmstadt, https://tuprints.ulb.tu-darmstadt,de/id/eprint/18560; Philip M., Al-Azzawi F., *Effects of Natural and Artificial Weathering on the Physical Properties of Recycled Poly(ethylene terephthalate),* J Polym Environ 26 (2018) 3139–3148; Mailler P., Nemoz G., Hamelin P., *Long Term Behavior Characterization of Coated Fabrics for Architecture Membrane under Biaxial Loading*, Journal of Coated Fabrics 26 (2016) 323–333, João L.S., Carvalho R., Fangueiro R., *A Study on the Durability Properties of Textile Membranes for Architectural Purposes*, Procedia Engineering 155 (2016) 230–237; Dezső Hegyi K.H., *Long-term analysis of prestressed membrane structures*, Journal of Computational and Applied Mechanics, 6 (2005) 219–235).
- Sustainability: Membrane structures have the potential to be environmentally friendly. They require fewer materials, generate less waste during construction, and can be dismantled and reused in other projects. Coated fabrics or printed foils provide shade. The translucent membranes contribute to energy efficiency by reducing the need for artificial lighting (Monticelli C. et al., *Life cycle assessment of textile façades, beyond the current cladding systems*, Tensinet Symposium 2013 [Re]thinking lightweight structures, Proceedings, Mimar Sinan Fine-Art University, Istanbul, May 2013, 467-476; Monticelli C., *Environmental assessment of ultralight roof structures built with new materials: the case of the ETFE cushions*, Proceedings of IASS WG18 Colloquium, 2010; Tim C. R. Finlay, 2021, *The Carbon Footprint of Long Span Structures: Review of the Millennium Dome and Subsequent Tensile Systems*, Proceedings of the IASS Annual Symposium 2020/21 and the 7th International Conference on Spatial Structures, Inspiring the Next Generation, 23 – 27 August 2021, Guilford, UK, S.A. Behnejad, G.A.R. Parke and O.A. Samavati

(eds.); Eryuruk, Z., & Mollaert, M. (2023, Apr), *Canopy Wolke Marienfeld: Comparing the environmental performance of a short use, a reusable and a permanent membrane structure*, (Newsletter Nr. 44 ed.) TensiNet Association; Eryuruk, Z., Mollaert, M., Van Hemelrijck, D., & De Laet, L. (2023, June), *The environmental performance of membrane structure: OCMW Zoutleeuw case study*, In Proceedings of the TensiNet Symposium 2023 TENSINANTES2023 (pp. 367-379); Cremers J., *Environmental Impact of Membrane Materials and Structures – Status Quo.*, Tensinet Symposium 2013 [Re]thinking lightweight structures, Proceedings, Mimar Sinan Fine-Art University, Istanbul, May 2013, 447-456; Chilton J., Pezeshzadeh S., Afrin S., *Embodied energy in ETFE foil construction*, Tensinet Symposium 2013 [Re]thinking lightweight structures, Proceedings, Mimar Sinan Fine-Art University, Istanbul, May 2013, 457-466).

Membrane structures find applications in a wide range of industries and sectors due to their versatility, lightweight nature, and aesthetic appeal. Some common applications include (see also Rene Motro (Ed.), *Flexible Composite Materials in Architecture, Construction and Interiors,* Birkhäuser 2011):

1. Architectural Roofs and Canopies: Membrane structures are used in stadiums, convention centres, outdoor theatres, and shopping centres. They provide weather protection while creating visually striking spaces.
2. Exhibition and Event Spaces: Membrane structures are frequently employed as temporary or semi-permanent exhibition spaces, trade show pavilions, and event venues. They offer quick installation, flexibility in design, and can be easily customized to fit specific event requirements.
3. Transportation Facilities: Membrane structures are utilized in transportation infrastructure, including airport terminals, train stations, and bus terminals.
4. Sports Facilities: Membrane structures are used for tennis courts, swimming pool covers, indoor sports arenas, and practice fields. Their lightweight construction allows for clear-span spaces without columns, providing unobstructed views for spectators.
5. Commercial and Industrial Buildings: Membrane structures are employed for warehouses, storage facilities, manufacturing units, and distribution centres.
6. Hospitals: Transparent ETFE foils cover inner areas for surgery with (better cleaning and no bacteria). Membrane structures are used as roof systems and shade nets provide sun protection.
7. Environmental Structures: Membrane structures are used in environmental applications such as greenhouse covers, botanical gardens, zoos, and aviaries. They create controlled environments, allowing for optimal growth of plants or providing appropriate habitats for various species.
8. Military and Disaster Relief Shelters: Membrane structures are utilized in military applications as temporary barracks, command centres, or hangars.
9. Cultural and Recreational Facilities: Membrane structures are utilized in cultural and recreational projects such as museums, art installations, theme parks, and amphitheatres. They provide visually appealing spaces that enhance the visitor experience.
10. Educational Facilities: Membrane structures are employed as school playground covers, outdoor classrooms, and shade structures. They create comfortable and functional spaces.
11. Residential Structure: Membrane structures are used in residential applications as patio covers, shade sails, carports, and pergolas.

These are just a few examples of the diverse applications of membrane structures. Their lightweight, durable, and customizable nature makes them suitable for a wide range of architectural, commercial, and industrial projects.

The trends in architecture are to combine the shapes of facades with thermal and acoustic properties to achieve the net zero carbon requirement by 2023/2050, and that lightweight and membrane-based building systems offer promising solutions to achieve more efficient and less impacting building structures due to their lightness.

In addition to an impact quantified at around 14-30% (Table 1 of the Use Phase of Construction Products, Table 1 of the Annex XV Restriction Report), the cessation of the production of membranes for lightweight construction - compared to its PFAS part of the impact - will have the counter effect of halting the most promising research projects aimed at developing new membrane-based products, and will consequently bring about a detriment to the technological progress of the entire construction sector, for which academics (in the fields of architecture, design and construction), public/private research institutions, companies, professional associations, architectural and engineering design societies and studios have devoted years of research, human resources and funding, and whose activities have in many cases been financed by EU and national/regional funds, with proven and recognised results.

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.

* Compulsory Fields

☑ I have information on this topic

Distinction should be made between the emissions in the different stages of the lifecycle of a product, i.e.
(I) the manufacture phase,
(II) the use phase and
(III) the end-of-life phase.

The three product families concerned by tensile architecture are:
(1) PVC-coated PVDF top-coated polyester fabric,
(2) PTFE-coated glass fabric and
(3) ETFE foil.

a: emissions attributable to the three different stages

(I) Manufacture phase: See the appropriate EPD's

- Mehler Texnologies: EPD-MTX-20130164-IBA1-EN, EPD-MTX-20130165-IBA1-EN, EPD-MTX-20130166-IBA1-EN, EPD-MTX-20130019-IBA1-EN, EPD-MTX-20130167-IBA1-EN, EPD-MTX-20130168-IBA1-EN,
- Serge Ferrari: INIES_IMEM20210507_152654, 26711, INIES_IMEM20210507_155452, 26710, INIES_IMEM20210507_160928, 26709,
- Sioen: EPD-SIO-20220324-IBJ1-EN,

- Vector Foiltec: EPD-VFA-20170121-IBE1-EN, EPD-DVN-20140043-IBE1_EN, EPD-DVN-20210122-IBJ2-EN,
- TAIYO: EPD-TAI-20190092-ICB1-EN,
- Novum: EPD-NMG-20170152-IBC1-EN,
- PFEIFER: EPD-PFE-20220207-IBC2-EN

(II) Use phase: The fluoropolymers used in membrane structures are long lasting, even longer than initially (thirty years ago) expected. These fluoropolymers are employed for their durability, and they stay on the buildings for more than 20 years. EN1990 specifies a "design service life" of 25 years for "replaceable structural parts" (L.S. João, R. Carvalho, R. Fangueiro, *A Study on the Durability Properties of Textile Membranes for Architectural Purposes,* Procedia Engineering 155 (2016) 230–237; Andrzej Ambroziak, Paweł Kłosowski, *Influence of Water-Induced Degradation of Polytetrafluoroethylene (PTFE)-Coated Woven Fabrics Mechanical Properties,* Materials 15 (2021))

- (1) For PVC-coated PVDF top-coated polyester fabric: the top coating assures the durability. The materials are generally more resistant to abrasion than without a top coating (Ansell M.P., *The Degradative Effect of Boiling Water on Polyester Fibres in a PVC-Coated Fabric*, Journal of Coated Fabrics 14 (1985) 242–255),
- (1) and (2) PTFE-coated glass fabric: According to the state-of-the-art, Fluoropolymers at the surface of a membrane are chemically bonded (Asadi H., Uhlemann J., Stranghoener N., Ulbricht M., *Artificial Weathering Mechanisms of Uncoated Structural Polyethylene Terephthalate Fabrics with Focus on Tensile Strength Degradation*, Materials (Basel, Switzerland) 14 (2021); Asadi H., Uhlemann J., Stranghoener N., Ulbricht M., *Water Influence on the Uniaxial Tensile Behavior of Polytetrafluoroethylene-Coated Glass Fiber Fabric*, Materials (Basel, Switzerland) 14 (2021)),
- (3) For ETFE films: Concerning the use of the ETFE material, up to now it is not documented if emissions occur. The Fluoropolymers' anti-adhesion property highly reduces the cleaning needed during the service life, although the aluminium frames can still require to be cleaned (Beck P., Hornig J., *Ethylen/Tetrafluorethylen-Folien unter Dauerlast*, in: N. Stranghöner, J. Uhlemann (Eds.), 5. Essener Membranenbau Symposium, 1st ed., Shaker, Aachen, 2022, pp. 57–79; Beck P., 2021, *Zum zeit- und temperaturabhängigen Werkstoffverhalten von Ethylen/Tetrafluorethylen—Folien im Hochbau - On time— and temperature—dependent material behaviour of ethylene—tetrafluoroethylene foils in building construction*, Darmstadt, dissertation for the PhD, Technische Universität Darmstadt, https://tuprints.ulb.tu-darmstadt,de/id/eprint/18560).

(III) The end-of-life phase:
(3) For ETFE films: Some companies are controlling the end-of-life stage: the contract with the client, provides the "take back" collection, ensuring the recycling chain and avoiding landfill disposal or incineration.

b: which percentage of (1), (2), (3) is incinerated, landfilled, and recycled?
The production of wastage during the manufacturing is low, due to the optimized engineered design and manufacturing.

(I) Manufacture phase:
(1) For PVC-coated PVDF top-coated polyester fabric and (2) PTFE-coated glass fabric: waste about 15% depending on the architectural shape.
(3): Production of ETFE foils: waste 2-3%; manufacturing and tailoring: waste less than 10%.

(III) The end-of-life phase:
(1) For PVC-coated PVDF top-coated polyester fabric and (2) PTFE-coated glass fabric: After the final application (reuse, recycling...), the material eventually will be burned.

(2) For PVC-coated PVDF-top-coated polyester fabric recycling is at research and exploratory level. KKF reVinyl GmbH (http://re-vinyl.de/) already does PVC/Polyester recycling. Regulations could increase the recycling rate.
(3) For ETFE foils: At end-of-life, the materials are recyclable and downcycled in tubes, valves and other products. In the EU PETERS-plastic GmbH (Kelkheim, Germany), Aturon (Widnau, Switzerland), Marubeni International (Europe) GmbH (Düsseldorf, Germany) and Nowofol Kunststoffprodukte GmbH & Co. KG (Siegsdorf, Germany) do this recycling of ETFE. Marubeni has a Recycling Scheme for the collection of transparent and printed ETFE film in individual foldable boxes. The cushion foils from the Vodafone project for instance have been taken back for downcycling (see Sonmez, Gulhan, *Permanent Membrane Structures: End of life situations*, Master Thesis Civil Engineering, VUB, 2021).

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.
* Compulsory Fields
☑ I have information on this topic

The question is about waste management options + incineration effectiveness:
(2) For PTFE-coated glass fabric: PTFE burned at temperatures typical of a municipal waste incinerator does not degrade into the identified PFAS of Environmental Concern. Under standard municipal waste incineration condition, PTFE is essentially transformed to carbon dioxide and hydrogen fluoride (see https://www.gore-tex.com/sites/default/files/docs/Chemosphere_Incineration%20Study_Executive-Summary%20(002).pdf)
The study examined what happens to a PTFE polymer at the end of its life - when it's thrown away and ends up in a municipal waste incinerator (K. Aleksandrov, H.-J. Gehrmann, M. Hauser, H. Mätzing, D. Pigeon, D. Stapf, M. Wexler, *Waste incineration of Polytetrafluoroethylene (PTFE) to evaluate potential formation of per- and Poly-Fluorinated Alkyl Substances (PFAS) in flue gas*, Chemosphere, Volume 226, 2019, Pages 898-906, ISSN 0045-6535)

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.

* Compulsory Fields

☑ I don't have information on this topic

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.
* Compulsory Fields

☑ I don't have information on this topic

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). 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:

a. The annual tonnage and emissions (at sub-sector level) and type of PFAS associated with the relevant use.
b. The key functionalities provided by PFAS for the relevant use.
c. The number of companies in the sector estimated to be affected by the restriction.
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.
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.
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);
    ii. the time required for completing the substitution process (including any relevant certification or regulatory approvals);
    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);
    iv. information on the benefits for alternative providers.
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.

* Compulsory Fields

☑ I have information on this topic

a: emissions (at sub-sector level) per type of PFAS associated with the relevant use.
No information

b: functionalities provided by PFAS for the relevant use.

(1) PVC-coated PVDF-top-coated polyester fabric: PVDF, providing protection for PVC, allows to improve the durability of the PVC-coated polyester fabric to 25 years or more (instead of 10 years).
(2) PTFE-coated glass fabric: this is considered as an indispensable material for building roofs, especially large-span stadia.
(3) ETFE foil: is employed as an alternative to glass, with a fraction of its self-weight, and hence, a fraction of weight of the supporting structure.

c: number of companies in the sector estimated to be affected by the restriction: All.
Taking the Tensinet Association as a representative group for Europe, it covers

- Membrane and foil producers, coating and weaving companies: 11
- Tensile architecture manufacturers and fabricators: 36
- Architecture and engineering offices: 40
- Software companies and products: 4
- Steelwork and ropes producers: 2
- Universities: 21
- Other: 3

To get the opinion of the TensiNet members, the following was published on www.tensinet.com: Statement PFAS restriction:

The TensiNet Association, promoting the quality of tensile surface structures since 2000, formulates the following statement with respect to the PFAS restriction proposal:

For more than half a century, structural membranes, including PTFE-coated glass fabric, PVC-coated (with PVDF-top-coat) polyester fabric, ETFE-foils, and other variants, have found widespread use. These Fluoropolymers are classified as Polymers of Low Concern (PLC) (see Barbara J Henry, Joseph P Carlin, Jon A Hammerschmidt, Robert C Buck, L William Buxton, Heidelore Fiedler, Jennifer Seed, Oscar Hernandez, *A critical review of the application of polymer of low concern and regulatory criteria to fluoropolymers,* Integrated Environmental Assessment and Management, 2018).

Unfortunately, there is currently no alternative material with comparable performance in terms of longevity, durability, strength, and fire-resistance, and the consequences of the PFAS restriction for the tensile surface structures sector (membrane structures sector) would have a non-compensatable negative impact.

Given that tensile surface structures occupy a specialised niche, it is needed to group effort to ensure an effective communication. The TensiNet Association wants also to speak for modest companies, engineers, architects, and other stakeholders.

If you share this point of view, we cordially invite you to support the petition, thereby helping to preserve the future of membrane structure.

Outcome of the petition:

- Membrane and foil producers, coating and weaving companies: 6
- Tensile architecture manufacturers and fabricators: 19
- Architecture and engineering offices: 9
- Software companies and products: 1
- Steelwork and ropes producers: 1
- Universities: 21

d: risks of alternatives for the relevant use: currently no alternatives with comparable performance exist (see above, also mentioned in the petition statement).
(1) Thanks to the PVDF-top-coating, PVC-coated polyester membranes developed long-lasting products (up to a service life of 37 years): no alternatives offer this longevity.
(2) The durability of PTFE membrane is 40 to 50 years: no alternatives offer this longevity. Stadium owners are unlikely to accept the cost of frequent replacements within a short period.
(3) There are no other transparent resins that can replace ETFE, there is currently no substitute material with equivalent properties available.

e: For cases in which alternatives are not yet available, information on the status of R&D processes for finding suitable alternatives:
No information

f: For cases in which substitution is technically and economically feasible but more time is required to substitute:
No information

g: For cases in which substitution is not technically or economically feasible, information on what the socio-economic impacts would be:
No information

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.
* Compulsory Fields

✓ I don't have information on this topic

8: **Other identified uses – Analysis of alternatives and socio-economic analysis**: Table 8 in the Annex XV restriction report 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.
* Compulsory Fields

✓ I don't have information on this topic

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.
* Compulsory Fields

✓ I don't have information on this topic

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.
* Compulsory Fields

✓ I don't have information on this topic

SECTION IV. Non-confidential attachment

If needed, attach additional non-confidential information (data available in excel format, reports, etc.) below. Do not attach the same information already provided in section III here. If part of the information is confidential, please use section V to share it
Add attachment

If you would like to submit more than one document, please create a compressed archive where you include all files and upload the compressed file as attachment. Maximum file size is 20 MB.
* ✓ ***I have removed/blanked the information I wish to keep/I have claimed confidential from all the attachments in section IV (e.g.: company name, company logo, personal names, email, signatures, other confidential business data).*** I understand that ECHA will not be held liable for any damages caused by making the attachments publicly available.

To submit

ANNEX I - bibliography
ANNEX II - petition

SECTION V. Confidential Attachment

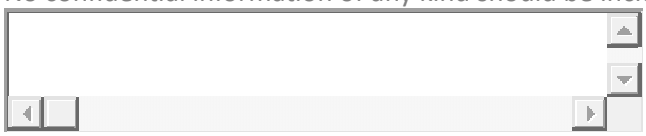
If needed, attach confidential information below (for example: studies, laboratory tests, additional contact details, business data, etc.). Do not add the same information already provided in the

previous sections here. Confidential information will only be used by ECHA, including its Committees, by the Member State competent authorities and by the European Commission.
If you upload a confidential attachment, please justify the reasons for confidentiality of the information in the field below. This will facilitate ECHA's work if it receives requests for access to documents.
Upload Confidential Attachment:
Add attachment

If you would like to submit more than one document, please create a compressed archive where you include all files and upload the compressed file as attachment. Maximum file size is 20 MB.

* ☐ I have the following reasons enumerated in Article 4(1) or 4(2) of Regulation (EC) No 1049/2001 regarding public access to documents why the information submitted as confidential cannot be disclosed to persons requesting access to documents (please explain below in the commenting field those reasons; a reason could be that the protection of your commercial interests, including intellectual property, would be undermined).

No confidential information of any kind should be included:



1. After the interested party would submit the information he/she would get an automatic reply that the information was successfully submitted.
2. If the user has not filled in the mandatory fields indicated above the IT system displays the user an error message stating 'Please fill in ALL mandatory fields in 'Identification of the party submitting information'. Your submission could not be retrieved due to data lacking from these fields'.
3. If all comment fields are empty and no file is attached, submission should not be possible and there should be an error message: "One comment or one attachment should be provided as a minimum."