

Substance: Per- and polyfluoroalkyl substances (PFAS)
EC number: -
CAS number: -

Annex XV report Third Party Consultation
From 22/03/2023 to 25/09/2023

22.09.2023 Note to ASD

This is the final version. The text will be copy/pasted to the webform.

2 attachments will be submitted (1) the public reply to Q6 and (2) confidential annex (Annex 2 with the case studies).

General comments and answers to specific information requests

ASD (Aerospace, Security and Defence Industries Association of Europe) represents European Aerospace, Security and Defence Industries, representing directly or indirectly (through our national association members) over 3,000 companies of all sizes from 18 countries.

We note that uses by the aeronautic, space, security and defence (A&D from here on) sector have not been considered by the dossier submitters. The proposed restriction (restriction option 2 (RO2)) was developed without taking the specificities of our sector into account. The restriction as currently proposed would have a catastrophic impact as it would bring aviation, space and defence to a standstill (no production, no imports, no maintenance) already 18 months after the entry into force.

In our comments, we explain that the specificities of our sector need to be considered in the restriction options proposed by the dossier submitters.

A&D products include civilian and military aeronautics (aircraft of all types including all technologies for propulsion, hydraulics, flight control, etc. and associated ground equipment e.g. air traffic control, ground support equipment and maintenance/inspection equipment. They also include a diversity of security and defence products ranging from naval vessels, armoured vehicles to weapon systems and munitions and all associated ground platforms for example involved in surveillance, communication, critical infrastructure protection and ground support equipment and maintenance /inspection equipment. Space equipment includes satellites, launchers and communication systems. All these diverse products have the commonality that they operate under extreme conditions and must comply with very strict safety and reliability requirements over their service lives. These requirements mean that there are stringent performance requirements for the chemicals/formulations/materials that are used in the manufacture of the parts, components, systems, etc. that make up A&D products. There are formal quality management systems in place for the manufacture, operation and maintenance (so called maintenance, repair and overhaul (MRO)) to ensure compliance with these safety and reliability requirements (e.g. AS9100). The qualification and certification processes in place mean that once a product design is approved, there are formal change management processes that need to be followed to make changes to any part. MRO of products can only be done with the parts/components/system manufactured as per the approved design.

In our reply to Q6, we give an overview of the where and why PFAS chemicals are used in A&D products. We explain that PFAS chemicals are integral to their production, operation and MRO. We give examples of the most common uses and include 20 illustrative case studies. Each case study includes an overview of the application, the role of the PFAS chemicals in performance, the availability of alternatives and the impact of the proposed restriction on the application. We explain that fluoropolymers are in particular ubiquitous as seals, sealants, gaskets, lubricants, bearings, bushings, etc. across all the parts, components, systems that make up A&D products. Due to the formal quality management systems in place, change management is in general a lengthy process due to the qualification and certification requirements and likely redesign requirement for MRO. However in this case, there are no alternatives available that can fulfil the performance requirements that underpin the safety and reliability of A&D products. This means that the timeline for substitution depends on the availability of alternatives not yet identified, commercialised or industrialised. For example, it is unlikely that 1 to 1 alternatives to PTFE for all current uses will be identified meaning that multiple new materials will need to be innovated.

We highlight that the scale of the substitution requirement that would be triggered by this proposal has no precedent. It impacts the availability of 1000's of parts, components, systems etc. across all A&D products needed for their production, operation and MRO. We cannot overstate the impact. The dossier submitters' assessment is incomplete as it did not consider the impact on aviation, space, defence and security. RO2 would have wider economic impacts that go beyond lost jobs in manufacturing – it would stop all EEA production of civilian aircraft, require scheduled maintenance for in-service aircraft to be done outside the EEA and make the EEA dependent on an aging and depleting fleet that could not be replenished. Defence forces would be crippled as they would not be able to maintain existing products, could not procure new products from either EEA or non-EEA providers and

could not replenish depleted stocks of weapons and munitions. This does not describe a plausible scenario as it would be a loss of sovereignty for Europe.

For the above reasons, we ask the dossier submitters to amend their restriction proposal to explicitly include our sector and its specificities in their assessment.

We ask them to consider the following

- The formal quality management systems and in particular the strict certification process that are in place to ensure safety and reliability of A&D products (e.g. AS9100, NATO standards)
- The absence of alternatives that can fulfil the performance requirements that underpin the safety and reliability of A&D products
- The formal change management process in place to ensure safety and reliability of A&D products mean that substitution is in general lengthy. It could take decades for a full phase out if suitable alternatives could even be developed (see detailed response to Q6)
- The scale of the R&D activities as a result of substitution needs that would be triggered by a restriction with the current broad scope
- The complexity of A&D products that are assembled from 10000's of parts, components, systems etc. provided via multi-tiered global supply chains
- The interdependencies of parts, components, systems, etc. across diverse products mean that the lack of a qualified part can impact products that operate in different market segments (e.g. seals in gas turbine engines where the engines are used in civilian and non-civilian applications)
- A shortage of even a limited number of parts/components will mean the product cannot be produced/operated/serviced meaning that derogation coverage must ensure availability of all parts/components over the entire service life of the product
- A 12 year derogation period is not adequate due to the absence of alternatives, the need to develop new chemicals/materials/formulations and the lengthy substitution process to take suitable alternatives into use for both new and existing products
- A review clause through innovation would always be necessary for derogations as there are no alternatives and the timelines needed for the identification, commercialisation and industrialisation of new chemicals/materials/parts/formulations is unknown
- The ubiquity of fluoropolymers in the seals, sealants, cabling, coatings, hosing, etc. across all the parts, components, systems that make up A&D products and lack of foreseen alternatives to these materials, that do not also possess 'persistent' properties (fluoropolymers are often used for their durability/resilience)
- Any reporting requirement of uses relying on derogations would need to consider the administrative burden and allow adequate time to collect the enormous volume of information on all PFAS chemicals in complex A&D products (e.g. naval vessels, aircraft, armoured vehicles)

Specifically we ask them to

- Exclude fluoropolymers (and the precursor PFAS chemicals necessary for their manufacture) from the scope of the restriction given their ubiquity in A&D products and the absence of alternatives that fulfil the performance requirements for reliability and safety
- Include a sector derogation for the use of non-polymeric PFAS chemicals necessary for the production and operation of A&D products with a review clause to allow for an extension/renewal of the derogation if needed due to the non-availability of suitable alternatives
- Exclude the use of PFAS chemicals on their own, in formulations and in articles that are necessary for the MRO of existing products
- Include a time-unlimited derogation for specific PFAS chemicals used fire suppression systems (see case study 5 in Annex 2 of the ASD response)

We highlight that due to our sectors reliance on products from a wide range of industries (electronics, semiconductors, batteries etc.), A&D sector derogations for fluoropolymers would not be sufficient to protect our industry from widespread obsolescence of materials and processes and unpredictable side effects within the related industrial supply chains.

We highlight that a blanket ban on fluoropolymers is a disproportionate risk management option given that the dossier submitters concern is on the conditions of use and risk management measures in place at their sites of manufacture and end-of-life, and not as such from their use. We note that although the dossier submitters group all PFAS chemicals into (1) PFAAs and PFAA precursors (2) Fluorinated gases and (3) Polymeric PFASs, the use tonnages for polymeric PFAS were ascribed to group 1 (see chapter 1.3.1 of the restriction report). In addition, we note that related to PFAS properties of concern given in Figure 4 of the restriction report, the only property relevant for fluoropolymers is “persistence”. There are more proportionate risk management options that would address the concern e.g. specific obligations under the Industrial Emissions Directive. Their potential for emissions at end-of life requires different considerations from non-polymeric PFAS as while they are “persistent” due to their extreme inertness; we understand that they are non-mobile, non-bioaccumulative and non-toxic*. The potential for risk has not been demonstrated from this class of materials.

Fluoropolymers have a unique combination of properties that make them ideally suited to applications with high performance requirements for safety and reliability for extended periods in harsh and extreme conditions of use. They are durable, stable and mechanically strong in harsh conditions, stable in air, water, sunlight, chemicals and microbes, chemically inert, non-wetting, non-stick, and highly resistant to temperature, fire and weather. There are no materials currently available that have this range of properties. A ban on their use will compromise existing safety standards in the A&D sector and in other sectors (e.g. manufacturing, transport and storage of chemicals).

With regards to fire suppression, we would like to point out that, as shown in case study 5 in Annex 2 and summarised in Table 11 in our reply to Q6, years of research to replace Halon to comply with the EU Ozone regulation deadline have demonstrated that PFAS are the only suitable Halon alternative, already implemented in some applications (cabin & cockpit portable and lavatory fire extinguisher systems) and in final stages of development for other (Cargo). The EU PFAS restriction as proposed would have devastating economic and operational consequences for aircraft OEMs and their customers associated with the regrettable substitution scenario. Considering the very high risk of not finding any other better alternatives to Halon 1211 & 1301 in due time, a time unlimited derogation is requested to allow current implemented halon replacement to be maintained and ongoing activities to continue with no disruption and uncertainties that the current proposal would generate.

We also note that the reporting requirements on manufacturers and importers of PFAS or PFAS containing articles as well as formulators of PFAS containing mixtures relying on derogations (paragraphs 7 & 8) did not consider the specificities of our sector. Due to both the complexity of our products and our global supply chains (see chapter 2.2 in our reply to Q6), it is not possible to collect, compile and report the information required under paragraph 7 within 18 months of the entry into force. The site specific management plans requirements given in paragraph 8 also cannot be implemented within 18 months of entry into force as the users will be need to collect information from all tiers of their supply chain and map PFAS in the 1000's of parts, components, systems etc. that make up A&D products. At least 5 to 10 years would be needed to be compliant with such requirements.

In addition, we highlight that the restriction refers to ppb levels in articles (paragraph 2) – the challenges associated with complying with the requirement were not considered by the dossier submitters as apriori to verify this, we would need to test all articles. This is not feasible for A&D products as 1000's of parts/components would need to be tested. In addition, standard test methods are not available for the range of articles that would need testing with this level of detection.

This response is also supported by the Space Restrictions Task Force (RTF), an initiative of the Materials and Processes Technology Board of the European Space Components Coordination (ESCC MPTB), which is a partnership of the European Space Agency (ESA), national space agencies, and space industry represented by ASD-Eurospace. In addition, ASD-Eurospace with the support of the RTF has prepared a complementary response to the present contribution focusing on equipment designed to be sent into space (ref. MPTB-ES-PO-0131), as they have not been considered as such in the current restriction proposal ("missing uses").

*see position paper from Fluoropolymers Product Group (FPG) available at https://fluoropolymers.plasticseurope.org/application/files/8716/7991/0281/21_March_FPG_Statement_on_the_PFAS_REACH_restriction_report.pdf and submission #6148 in the public consultation

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.

A&D sector uses were not included in Table 9 of the dossier and the list of uses given do not adequately include A&D uses and their specificities in terms of safety and reliability requirements. ASD ask that A&D be included as a sector in its own right and its specific uses of PFAS chemicals be considered in the restriction dossier.

A&D end-products include

Commercial aircraft for transportation of passengers and cargo - both fixed wing aircraft and helicopters

Military aircraft, including fast jets, training aircraft, large transports and helicopters

Naval vessels: surface ships - including aircraft carriers - and submarines

- Land vehicles, such as tanks, armoured vehicles, communications vehicles, weapons launchers and transportation vehicles for military personnel and munitions
- Weapons, munitions and ammunition
- Space launchers, satellites and associated ground-based support equipment
- Other defence and security systems such as radars, communication systems, cameras, Command & Control systems, protection and surveillance systems.

Details on aeronautics, defence and space sub-sectors are given below.

Aeronautics: Aeronautics products include fixed wing and helicopter aircraft that in turn include technologies for wing controls, propulsion, communications, flight controls, cabin equipment, fuel systems, hydraulics, oil systems and electrical systems. It also includes ground equipment for example involved in air traffic control, ground support equipment and maintenance/inspection equipment. Safety and reliability requirements mean that production, operation and MRO of products is subject to controls set by regulations and/or industry standards

Defence & security: These include military aeronautics and many other capabilities critical for national and European defence and security, for example ships, submarines, munitions, land vehicles such as tanks, artillery and armoured personnel carriers, air defence systems as well as military aircraft. It also includes ground platforms for example involved in surveillance, communication, critical infrastructure protection and ground support equipment and maintenance /inspection equipment. Due to the sensitive nature of this sector, there are strict controls on data security especially around technology and material. This sensitivity is formalized through a system of technology export controls and security classification that prevents disclosure of information except under highly controlled conditions. As a result, this consultation response cannot include sensitive details of any uses of PFAS in military products, or their operation, nor disclose applications or availability of alternatives, except where these technologies are the same as non-military applications. ASD highlight that the case-by-case defence exemption mechanism in REACH Article 2(3) for each Member State would not be workable for a restriction with this scope as 1000's of exemptions would be needed in each member state. Defence exemptions also have limitations for applications with dual uses (for example the shared supply chains with non-defence related aeronautics) and cross-border supply.

Space: The EEA has a robust space industry with companies involved in satellite manufacturing, launch services, and the development of space technologies. The space sector is strategic for the EEA in terms of technological independence. It is essential for the implementation of many public policies and supporting all economic sectors and for Europe's independent access to space. See the response specifically for space uses submitted by ASD-Eurospace with the support of its Space Restrictions Task Force.

PFAS chemicals are integral to the manufacture, operation, and maintenance of A&D products and/or in the manufacture of component parts (articles), sub-assemblies and formulations (mixtures) in A&D supply chains. Their unique combination of properties makes them ideally suited to applications in harsh or extreme operating conditions and that have high reliability requirements in terms of performance and safety over long service lives.

We have included details of A&D sector wide uses in our reply to Q6.

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:
- 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.
 - 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.

See our reply to Q6 in the attachment.

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.

See our reply to Q6 in the attachment.

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:
- 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).
 - The measures that recyclers would need to take to achieve the proposed concentration limits.
 - The costs associated with these measures.

ASD have no specific information on this at this time.

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.

See our reply to Q6.

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:

The dossier submitters did not consider the A&D sector and the restriction proposal does not adequately address uses by this sector. Some A&D uses would be covered under proposed/potential derogations. However, the scope and durations are inadequate. Many A&D uses are not covered by a proposed or potential derogation. For this reason, we provide input of our sector wide uses together with information on the availability of alternatives and socio-economic impacts in the attachment. A summary of the content is given below.

PFAS chemicals are ubiquitous in the production, operation and MRO of A&D products (Table 1). Fluoropolymers are the most widely reported PFAS type e.g. as parts (seals, cables, hoses, etc.), as surface treatments (paints, coatings, sealants, etc.) as components of mixtures (e.g. lubricants) (Table 1 and Annex 1 of the ASD response). Our derogation assessment shows that there is limited coverage for the vast majority of A&D application areas (Table 15-19 of the ASD response). Table 18 and Table 19 of the ASD response show that there are application areas that were in principle assessed but are not covered by any derogation and there are also a significant number that were not assessed and unsurprisingly not covered by any derogation. From the use and derogation mapping, it is evident that non-use scenario impacts of the restriction as currently drafted

would be already apparent 18 months after the entry into force as ca. half of our reported application areas are not covered by either a proposed or potential derogation.

We explain that the A&D sector has specificities that need to be considered by the dossier submitters in their assessment. These include the strict safety and reliability requirements A&D products must fulfil, the very high performance requirements on the parts, components, systems, etc. that make up A&D products due to the harsh and extreme operating conditions they operate in and the qualification and certification requirements that are in place to ensure safety and performance requirements are fulfilled over the service life of the products. A&D products are also highly complex in terms of the number of parts, components, sub-systems, systems. A single major platform such as a ship or aircraft can have millions of parts, many of which are complex assemblies (e.g. engines, landing gear, brake systems, fuel systems). They have very long service lives meaning that spare parts must be available as per the original design for decades. These specificities mean that a regulatory requirement to substitute chemicals currently in use is extremely challenging. In this case, the requirement would impact 1000's of parts/components/formulations in use across a diversity of A&D products. There are no alternatives currently available that fulfil the stringent performance requirements of A&D products. The list of possible alternatives given in the restriction report (Annex E) are not suitable for our uses as the specificities of our sector were not considered by the dossier submitters in their alternatives assessment. For example, section E2.2.10 for "transport" as defined by the dossier submitters lists alternatives for transportation sector uses does not differentiate between the differing performance requirements. New chemicals, formulations and materials would need to be innovated and then taken through the lengthy qualification and certification processes that are in place to ensure safety and reliability of A&D products. For existing products, introduction of new materials means that the product will need to be redesigned and recertified. Taking the example of a gas turbine engine, hundreds of PFAS containing components would have to be replaced. It would be necessary to have an alternative for each component before launching the re-certification process for the redesigned whole engine. An additional challenge is that it is uncertain if R&D programs will identify alternatives in particular to fluoropolymers for these uses. They are currently the only class of materials that have the range of properties needed for A&D applications. It is unlikely that a 1:1 alternative can be identified for all current uses of PTFE, for example. Considering the range and diversity of A&D products, we highlight that the scale of the substitution requirement has no precedent for our sector. It has been estimated that around 400,000 - 500,000 PFAS-containing components (mostly fluoropolymers) are likely to be present in a smaller short-haul commercial aircraft, whilst in larger aircraft the number of PFAS-containing components will likely be in excess of 1 million.

We explain where PFAS chemicals are generally used in the production, operation and MRO of A&D products and the driver for these uses. We include examples of uses in specific products, systems, components, parts and formulations in Tables 3-5 of the ASD response. We give examples of key functionalities of different types of PFAS (polymeric, non-polymeric) and examples of their specific uses in the A&D sector in Tables 6-8 of the ASD response together with information on the availability of alternatives. We also included detailed case studies as illustrative (but non-exhaustive) examples (see Table 11 and Annex 2 of the ASD response). These include examples from aeronautic, security and defence. The 20 case studies give descriptions of the PFAS use (which PFAS and the role they play in the performance of the part, component, and product as relevant), the availability of alternatives and the impact of the restriction as currently drafted. The case studies illustrate that there are currently no alternatives available and that the entry into force of the restriction as drafted would have a catastrophic impact due to incomplete/no coverage of proposed/potential derogations and/or derogations periods expiring irrespective of the availability of alternative and/or MRO requirements for existing products.

We also considered the socio-economic impacts of the non-use scenario of the Risk Options 1 & 2 (RO1 & RO2) specifically for our sector (see Table 12). Our sector was not considered by the dossier submitters and the consequences of the restriction are not included in their assessment. We

considered the impact to the options proposed on A&D companies, their supply chains, third-party MRO facilities, customers (including airlines and defence agencies) and those who rely on the products and services provided by the A&D industry.

With RO1 where all PFAS chemicals are banned with no derogations, the economic impacts would be catastrophic and detrimental to the functioning of the EEA both in terms aviation (passenger, cargo, military) and national security. This option is discarded by the dossier submitters.

With RO2 (all PFAS chemicals are banned with time limited derogations for uses by specific sectors/applications), the impact depends on the coverage of the derogations for uses of PFAS chemicals needed for the production, operation and MRO of A&D products. If the derogation coverage is not complete and/or the expiry periods are not aligned, the impact can be as severe as RO1. From our use and derogation mapping, we have demonstrated that the coverage is incomplete and the derogation periods when given are inadequate for this sector.

We referred to recent authorisation applications submitted for continued use of a limited number of hexavalent chromium compounds for a limited number of surface treatments of parts/components/systems/products by the A&D sector to get an illustrative understanding of the wider economic consequences of non-use scenarios (see Table 13 of the ASD response). From that socio-economic assessment, we can see that the economic impact of the non-use scenario is exceptionally severe. In this case, due to the number of chemicals within scope and the ubiquity of their use in the production, operation and MRO of A&D products, the impact of RO2 would be catastrophic. RO2 would shut down production of new products, stop MRO of existing products, stop the import of products, components, parts etc. The wider economic consequences go beyond lost jobs but would in effect stop all EEA based production of A&D products, stop their imports, stop MRO of existing products, stop import of components, parts etc. Taking civilian aviation as an example, this would mean that aircraft could fly in the EEA but could not be produced, serviced or imported in the EEA. Taking national security as an example, existing defence products (aircraft, naval vessels, land vehicles, munitions, weapons) could be operated but not serviced due to lack of spare parts. Existing stocks once depleted could not be replenished. New products/parts could neither be produced nor imported in the EEA. Defence forces would be unable to respond to security threats. For these non-use scenarios to come into effect is not credible.

Based on our assessment, we can see that the scale of the substitution requirement that would be imposed by the entry into force of this restriction, together with the specificities of our sector have not been considered by the dossier submitters. Their proposed RO2 does not include our sector and is therefore incomplete.

We ask the dossier submitters to amend their proposal to include our sector and to take into account our considerations and requests as given in our general comments.

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.

See our reply to Q6.

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.

See our reply to Q6.

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.

ASD has no specific information for this request.

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.

ASD has no specific information for this request.