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CEIR Answer to Echa consultation on PFAS restriction: Annex Question 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.

Application (no finished list)	Use	Property	PFAS	Annual tonnage	Emissions
Valves in Oil and Gas Industry	Gaskets, seals, wear parts in hydrocarbon upstream, midstream and downstream. Fastener coatings in offshore applications	Resistance against hydrocarbons Temperature resistance Low coefficient of friction Corrosion resistance and anti-galling properties	FKM, FFKM PTFE, ETFE	Not known yet	Chemical Industry data
Valves in chemical process industry	Gaskets, seals, wear parts, diaphragm, inserts	Resistance against aggressive chemicals Temperature resistance Low coefficient of friction	FKM, FFKM, PTFE, PVDF, PFA	Not known yet	Chemical Industry data
Valves in food industry	Coatings, seals,	Non-sticking properties Resistance against aggressive cleaning chemicals	PTFE, PFA, FKM	Not known yet	Chemical Industry data
Valves in energy generation (power generation)	Gaskets, seals	High temperature resistance even in the presence of air borne oxygen	FKM, FFKM, PTFE, PFA	Not known yet	Chemical Industry data

Valves in the pharmaceutical and biotechnological industry	Coatings, seals, gaskets, diaphragm	Resistance to high temperatures and aggressive chemicals being used in CIP and SIP	PTFE, PVDF, FKM, FFKM, PFA	Not known yet	Chemical Industry data
Valves in other industries - Wastewater treatment - Dosing - Mining industry - HVAC - Drinking water - Cryogenic applications - H2 production - Environmental mitigations - other	Seals, gaskets, diaphragms, cables, coatings, wear parts, bearings, …	Resistance against chemicals, temperature, weather, or a combination thereof → Safety Use due to tribologic functionality → energy efficiency, duration, safety Use due to hygienic aspects → health	List to confirm PTFE FKM FFKM FPE (PFPE) ETFE ECTFE PVDF PFA PCTFE	Not known yet	Chemical Industry data
Spare parts for valves	Seals, gaskets, diaphragms, cables, coatings, wear parts, bearings, …	Resistance against chemicals, temperature, weather, or a combination thereof → Safety. Use due to tribologic functionality → energy efficiency, duration, safety Use due to hygienic aspects → health	List to confirm PTFE FKM FFKM FPE (PFPE) ETFE ECTFE PVDF PFA PCTFE	Not known yet	Chemical Industry data
Sanitary faucets in private and public use	O-rings / seals	Use due to tribologic functionality → energy efficiency, longevity, duration, sustainability	PTFE		Waste water stream / incineration / landfill
Sanitary faucets in private and public use	High performance lubrication grease	Longevity of products, reduction of maintenance and	PTFE - as part of the lubrication grease	100 -1.000 t / a in the EU	<u>Manufacturing:</u> Waste water / incineration / landfill

		repair (exchange of parts), sustainability of products			Use phase: Waste water End-of-life: Incineration / landfill

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

Affected at a large scale (from 30% to 95% of turnover)

- Many sanitary faucets and valves will still be sold because essential for managing fluids everywhere but:
  - they will not fulfil the function as before,
  - earlier failures shall be expected,
  - more maintenance operations mean more risks for technicians and environment,
  - changed processes are required,
  - some customers will not be able to sell products (e.g. in chemical industry), where valves with advantageous properties of fluorinated polymers are required
- For those sectors where less efficient alternatives would be an option, higher total consumer prices must be expected (> Total Cost of Ownership), as long and often stand-still times for maintenance would come up and lead to reduced "production capacity"

  (→ e.g. sanitary areas in public (airports, train stations, hotels, etc. and all processes with fluidic installations in all building and industrial sectors)

- Safety aspect: less performant alternatives lead to higher risk for workers, users and environment: o e.g. in case of leakage (in plants where aggressive, toxic, volatile substances are used),
- If alternative materials composed products start burning in specific used (which is impossible with respective fluorinated polymers), accidents will occur especially where insulation materials cannot be further used and no equivalent alternatives are available
- Fulfilment of other regulations might be difficult, if not impossible: change of materials or design could lead to incompliance with other regulations such as:
  - energy efficiency regulations (Ecodesign, ESPR),
  - reduced carbon footprint targets,
  - renewable energy targets,
  - Food contact,
  - Drinking water contact,
- Main problem to define clear numbers is that the valve industry is less describing the own business, but more the other businesses.

➔ A dedicated survey on valve industry is bringing less important information than the information which is coming from the users of valves and other fluidic equipment,

- Regarding the influence in the upstream supply-chain, it is also difficult to express good values, as the processes of (pre-)suppliers are usually not exactly clear. PFAS play an important role:
  - for actuators,
  - in electronics,
  - in production of materials and components,
  - in other manufacturing processes.

All these directly affecting the valves business and performance.

Sector / Application / Use	**Faucet and valves manufacturers either as producer or user**	**Industrial users/ customers**	**consumers**
	(CEIR: 300 companies, 11 bio € turnover, 50.000 employees)		
Building and Industrial valves / Sealing and friction function with high performance in presence of temperature and/or aggressive fluids	Quite all companies are affected (even till 95% of their turnover) → if suppliers cannot deliver (also NON-PFAS products) valve manufacturers will not produce anything or, in few cases, may produce in very degraded and dangerous conditions.	The impact on the user of the valve in many applications will be with high consequences in terms of process safety, continuous running of the process, maintenance obligations, safety for the workers (including in the more frequent maintenance phase) and for the environment (if a valve fails and has a leakage, the dangerous fluid can move into the environment).	Even if valves are not in front place in the eyes of the citizens (especially building and industrial valves), they are essential goods everywhere; a lot of activities would be affected in case of fundamental changes in the supply chain.

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.

- Providing a concrete example:

On the product side, PFAS only plays a role as a component (PTFE = Teflon®) of the high-performance / special lubricants in sanitary fitting cartridges, which is a component of all delivered sanitary fittings.

However, the extremely low proportion of PTFE = Teflon® by weight in the high-performance / special lubricants is an essential aspect of the long-term serviceability, durability and thus also the sustainability of sanitary fittings.

Assuming that no equivalent alternatives would be available (Current status: There are no equivalent alternatives without using PTFE = Teflon®!), i.e. if European sanitary companies would be forced to use "inferior" lubricants and the (international resp. non-EU) competition could still use high performance / special lubricants with PTFE - Teflon®, European sanitary leading market position in all markets (Europe, USA, Asia) would be absolutely endangered! And do not argue with the market surveillance … such controls are not easy to make, costly … and market surveillance is not actual and efficient in many European countries except perhaps for toys and luxury goods.

For industrial valves, a concrete example is the difference we can state between soft seals (fluoropolymers) and metallic seals. Metallic seals may be a substitution for fluoropolymer seals but when you obtain a tightness level class A (zero leakage) with a PTFE seal, the class is B, C and even D for a metallic one (ref. EN 12266 or ISO 5208). (leakage with different rates).

You must also take into account a very important point: thanks to fluoropolymers behaviour, the industrial valves manufacturers have been able to standardize the design of their products. Different new solutions do not permit the same performances and will conduct to de-standardization and more product ranges complexity; meaning additional costs, loss of competitiveness face to foreign valves that will not be controlled with PFAS content (see above).

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.

Current status:

There are no equivalent alternatives without using PTFE = Teflon®

A forecast is entirely unfeasible. A major factor hinges on the chemical industry's involvement, assuming an alternative is even identified. Our capability lies in outlining a timeline for R&D related to incorporating alternatives into taps & valves, contingent upon their development and availability from the chemical sector. Thus far, the pursuit of a replacement has not been the primary focus.

If a design change is even feasible, it entails significant challenges. Firstly, the process of identifying a new, suitable design that fulfils the intended functions is time-intensive. Secondly, an extended testing phase is required, especially when various properties need to be assessed for qualification. In most trial scenarios, a reduction in performance is anticipated, necessitating an evaluation of diverse approaches. This could potentially result in a more complex pump range due to the introduction of numerous new designs, as opposed to a single replacement.

For instance, if metals were employed in lieu of fluorinated polymers for sealing purposes, a comprehensive redesign becomes necessary. This entails the application of greater forces to attain equivalent levels of tightness, a demand for heightened machining precision in tolerances, and an elevated likelihood of premature loosening. Additionally, the feasibility of reusing metallic seals following disassembly is rendered impossible.

If polymer alternatives are identified, adjustments to the production process become necessary. Novel molding techniques must be introduced, necessitating the creation of new tools (potentially involving PFAS in the absence of alternative processes). When the replacement of a fluoropolymer entails the use of multiple polymers, both the time required for qualification and the associated investments experience a substantial increase.

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.

- Where a substitute is available, it is used already, as PFAS containing material use leads to higher (initial) material costs, which most customers do not accept.
- Where fluorinated polymers are used it is the only solution, as the life-time, functionality (including energy efficiency), and safety (work safety, safe use, tightness, …) are substantially better than other material solutions.
- The use of fluoropolymers has led to valves performance improvements (tightness, durability, energy consuming, temperature range, …) since decades; the ban of PFAS containing materials used in the fluidic equipment will led to technical and safety regression for the users
- Let do a realistic impact analysis in order to ban what really needs to be banned and let time to improve the current processes along the supply chain (including end of life and actual research of potential alternatives).

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.

Providing a concrete example on taps, PFAS only plays a role as a component (PTFE = Teflon®) of the high-performance / special lubricants in sanitary fitting cartridges, which is a component of all delivered sanitary fittings.

However, the extremely low proportion of PTFE = Teflon® by weight in the high-performance / special lubricants is an essential aspect of the long-term serviceability, durability and thus also the sustainability of sanitary fittings.

Assuming that no equivalent alternatives would be available (Current status: There are no equivalent alternatives without using PTFE = Teflon®!), i.e. if European sanitary companies would be forced to use "inferior" lubricants and the (international resp. non-EU) competition could still use high performance / special lubricants with PTFE - Teflon®, European sanitary leading market position in all markets (Europe, USA, Asia) would be absolutely endangered!

Providing a concrete example for industrial valves: metallic seals may be a substitution for fluoropolymer seals but when you obtain a tightness level class A (zero leakage) with a PTFE seal, the class is B, C and even D for a metallic one (ref. EN 12266 or ISO 5208). (leakage with different rates).

The impact on the valves and taps industry encompasses both upstream and downstream considerations. Due to the intricate nature of the supply chain within this industry, it is unfeasible to numerically assess the socio-economic repercussions related to valve and tap production. The entire sector is influenced, and any breakdown within segments of the supply chain could lead to a collapse of the broader valves and taps ecosystem. Manufacturers within this industry would encounter difficulties in sourcing materials from their supply chains, encompassing both PFAS-containing and non-PFAS-containing materials. Consequently, the production of valves and taps would be hampered.

In the downstream perspective, valves and taps play an integral role throughout the entire supply chain by being essential components of the manufacturing process. Simultaneously, they acquire parts, materials, and energy from various stakeholders within the supply chain, who in turn utilize valves and taps themselves. As a result, attempting to quantify costs becomes an intricate endeavour due to the intricate interplay between upstream and downstream aspects of the valves and taps industry. The intricate interactions within this network make it an exceedingly complex undertaking to estimate the financial implications accurately.

Valves & taps used within and/or valves & taps production is dependent on:

- Manufacture of (assembled) products
- Manufacture of basic chemicals
- Manufacture of materials (PFAS containing and NON-PFAS containing)

- Manufacture of components (including multi-material components like electronics)
- Manufacture of machines for the different production steps
- Water treatment (including industrial wastewater treatment)
- Energy production and transport (esp. renewable energy)
- Recycling and disposal
- Other industry sectors (food and feed production where disinfection is required, pharmaceutical industry, …)

It is evident that the consequences of implementing a ban or rigorous restrictions on PFAS usage extend well beyond any single industry or market sector. Such measures would essentially regress numerous technologies related to sealing, chemical resistance, heat resistance, environmental impact, product purity, process integrity, and friction reduction back to a level reminiscent of the 1950s. With over 10,000 compounds affected, and potentially even more processes and applications impacted, the practical implementation of a "by exception" regulation becomes unfeasible. The outcomes of such a ban or restriction on PFAS compounds would be profound, rendering significant portions of European industries—including chemicals, pharmaceuticals, aerospace, automotive, and more—noncompetitive in many global markets. The resulting social and economic implications in Europe would be exceptionally severe and must be actively avoided.