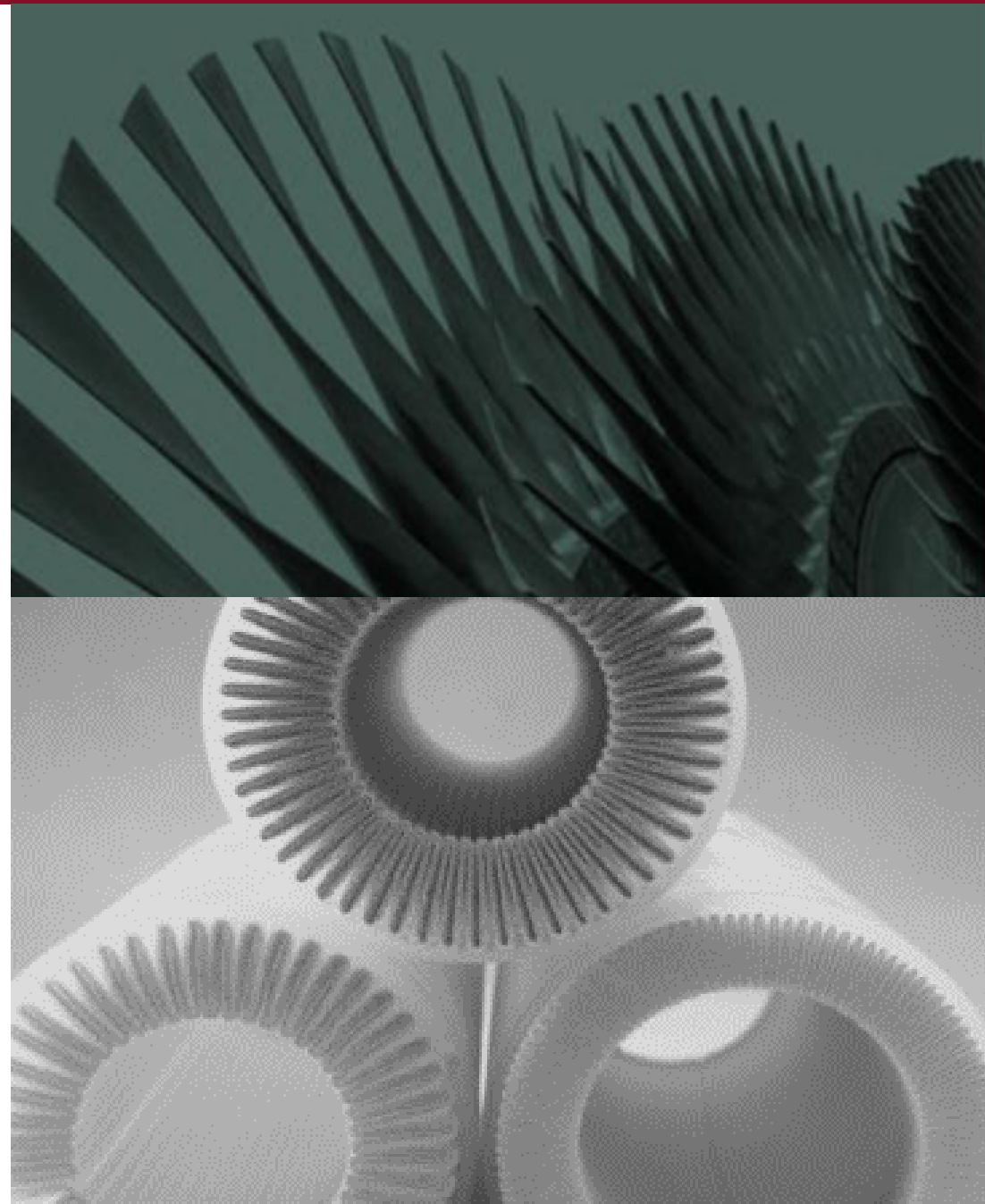


PFHxA Restriction Proposal

Filtration and Separation Coalition

Discussion with the
Belgian Committee REACH

15 June 2021



AGENDA

Discussion on the PFHxA Restriction Proposal

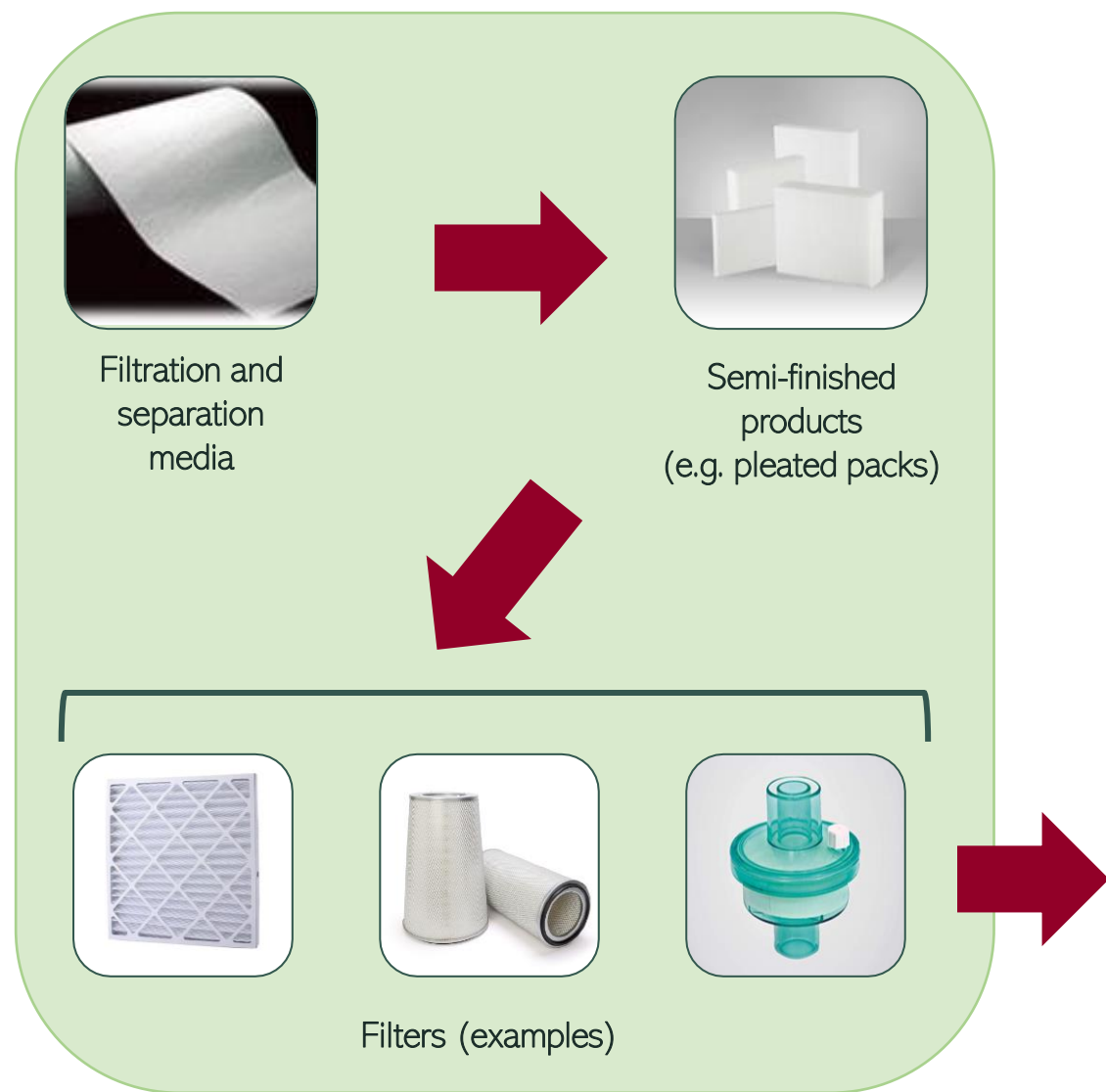
1	The Filtration and Separation Coalition
2	Filtration Value Chain
3	Key Properties of C6
4	Applications
5	Emissions
6	Alternatives to C6
7	Socio-economic implications
8	Conclusion

THE FILTRATION AND SEPARATION COALITION

The coalition includes the three leading manufacturers of filtration and separation media, with a strong presence within the European Union, including France, Finland, Germany, Italy, and the United Kingdom.



FILTRATION VALUE CHAIN



Above 1 000 ppb



Finished equipment incorporating filters
(examples)



Typical C6-content in
filtration & separation media
is below 1%.

C6-treated filtration &
separation media make up a
significant part of the semi-
finished products and filters.

Semi-finished products and
filters would also exceed
the 1 000 ppb threshold
for articles.

KEY PROPERTIES OF C6 FLUOROCHEMISTRY



Durable water and oil repellency due to unique low surface tension of fluorine;



Glue-repellency to avoid clogging of pores during pleating and assembly of filters, as well as ensure shape stability of the filter even in difficult operating conditions;



Reduced pressure drop providing high performance and energy-efficient filtration even in difficult operating conditions (high moisture content/ oily environment);



High dust holding capacity;



Resistance against microbiological contaminants;



Resistance to high temperatures, which is critical for certain applications; and



Compatibility with other chemistries, final applications and processes.



Key contribution to **life-critical** and **energy-saving** filtration applications

AIR FILTRATION APPLICATIONS

HVAC

- **Standard HVAC:** air purification and ventilation applications in hospitals, warehouses, office buildings.
- **High Purity HVAC (EPA/HEPA/ULPA):** cleanrooms in pharma, food and electronics, professional vehicles, nuclear plants, CBRN systems for military applications, official buildings.



Implications in absence of C6 include a lower barrier properties against airborne droplets carrying over microbial contaminants, increased energy consumption resulting in increased GHG emissions, premature change of filters and non-compliance with high standards of air quality required.

Gas Turbines (GT)

- GT require air intake filters to purify air entering in the combustion chamber of the turbine.
- C6 ensures good functioning of the turbines even in challenging environments, protection from corrosion and optimisation of energy production rate.



Implications in absence of C6 include a reduced lifetime of products, a reduced engine efficiency resulting in increased GHG emissions and serious risks for operating platforms and supply of energy or transport of gas.

Medical applications

- Used in respiratory applications, such as ventilators and breathing devices.
- C6 provides excellent barrier properties to airborne microbial contaminants.

Implications in absence of C6 include a lower barrier properties against airborne droplets carrying over microbial contaminants exhaled by a patient.



Personal Protective Equipment

- Used in protective equipment such as defence respirators (CBRN), which protect wearers from inhaling hazardous air. These applications follow strict industry standards.

Implications in absence of C6 include a reduced protection against CBRN threats and a non-compliance with industry standards of defence applications.



Air pollution control and dust collection

- Industrial applications: Reducing or eliminating the emission of particles into the atmosphere from stationary sources.
- Pharma, food industries: Safeguarding against fugitive dust and other potential pollutants.

Implications in absence of C6 include increased emissions of pollutants from stationary sources, increased risk of product failures and an increased risk of respiratory problems for workers.



LIQUID FILTRATION APPLICATIONS

Hydraulic filtration

- Used in heavy duty (agriculture, construction), mobile equipment, industrial (such as mining, construction), aerospace applications and manufacturing equipment.
- C6 allows to keep hydraulic filtration contaminant-free (from e.g. dust and dirt) and ensures an ultimate protection and equipment uptime in any harsh environment.



The absence of C6 would result in a lower fluid and temperature resistance, impacting the protection of the fluid power system. Additionally, it leads to a reduced lifetime of the machinery.

Fuel filtration

- Used in transport applications and mobile machinery to screen out dirt and dust particles from fuel.
- C6 allows to comply with fuel cleanliness standards, protect the engine and reduce fuel consumption.



Implications in absence of C6 include a decreased fuel-cleanliness level, leading to reduced fuel efficiency and increased fuel consumption. Additionally, it leads to a shorter lifetime of the filters.

AIR OR LIQUID SEPARATION APPLICATIONS

Air/Liquid separation

- Air/Oil Separation: Used in pharma, food and paint industries to ensure the delivery of clean process air, allowing efficient, and safe manufacturing systems.
- Petrochemical refining industries: Removing water and hydrocarbon liquids to ensure natural gas purity and to protect downstream equipment.



Implications in absence of C6 include disabling contaminants' separation for processes that rely on clean air flow.

Liquid/Liquid separation

- Chemicals' manufacturing: Dewatering of hydraulic fluids and removal of quench water.
- Fuel-water separation: Used in transport applications (cars, planes and heavy duty) to removing water droplets from fuel before it reaches the pump.



Implications in absence of C6 include disabling dewatering and removal of fluid contaminants.

EMISSIONS THROUGHOUT THE LIFE-CYCLE

From production:

- Wastewater from the process is recovered and treated in wastewater treatment plants.
- On-site measurements from wastewater have shown levels of emissions either non detectable or close to the detection limit
- Negligible air emission releases are expected from the drying process since C6 polymers are very stable chemicals and the temperature remains below degradation possibility.

During use:

- C6 is well embedded in the filter matrix and, therefore, there is no risk of C6 getting airborne downstream in the value chain.

End-of-life:

- Overwhelming majority of C6-based filters stem from professional and industrial applications and are considered as hazardous waste. Therefore, they are separately collected and incinerated at high temperatures (>850 °C) in line with waste codes 150202* and 150203.

Estimated yearly volume of C6 in C6-treated filtration media placed on the EU market:
70 tonnes/year

The quasi totality (over 99%) is separately collected and is sent into high-temperature incineration.



ALTERNATIVES TO C6

There are no alternatives available to provide filtration and separation media with the **essential** water- and oil-repellency.



Water- and oil/glue-repellent properties can normally be achieved by two approaches:	
PHYSICAL BARRIER	Where there are no pores in the media and a specific coating treatment avoids or reduces the diffusion of water or oil throw in the media
CHEMICAL BARRIER	Where the unique low surface energy tension of fluorine turns the surfaces into repellent surfaces for water and oil



Filtration and separation applications
<u>NOT SUITABLE</u> where filtration media needs to remain porous 
<u>POSSIBLE</u> with a low surface tension chemistry 

NON-FLUORINATED ALTERNATIVE CANDIDATES WHICH HAVE BEEN EVALUATED:

- Flat modified polymers;
- Hyperbranched functionalized polymers;
- **Paraffins:** No sufficient temperature resistance. It is a paint wetting impairment substance;
- **Silicones:** It is a paint wetting impairment substance. Impurities of D4, D5, D6 listed as SVHCs;
- Polymeric compounds.

→ These candidate alternatives show a **lower level of water repellency and no oil repellency**. As such, they do not meet current performance standards of industry for these parameters.

→ Potential fluorinated alternatives are not seen as suitable alternatives due to separate workstream aiming at restricting "all PFAS".

→ More detailed test data and information on standards can be found in individual and confidential contributions of coalition members.

SOCIO-ECONOMIC IMPLICATIONS

Impact along the value chain following an introduction of a change in a product

Requalification process

1. Requalification would not only apply to C6-related properties but for **all key performance requirements**.
2. The process varies depending on the end-use, but it usually involves four main steps: **converting, internal testing, third-party certification and field testing**.
3. Requalification of materials comes with its **own costs**, including resources, risks to product performance, and failures in critical product uses



Socio-economic implications

1. **Supply interruption** of filtration and separation media within the current technical specifications.
2. An absence of C6-treated media will have **implications in the functioning of downstream applications**, leading to **increasing energy consumption** and **early replacement of filters**.
3. The sector just completed its transition from C8 to C6 which already took 5 to 10 years and represented a heavy economic burden on the industry. Transitioning to non-fluorinated chemistry will take even **more time and be significantly costlier**.
4. The restriction may penalise **European filtration media** and filter producers that have already transitioned to C6 in a global competition context.

CONCLUSION

Main messages



Proposal for a derogation:

- Derogation request for high performance air and liquid filtration and separation media that require a combination of water and oil repellency.

Emissions:

- The media is used in professional and/or industrial applications for the quasi totality (over 99%) of the cases, ensuring separate collection and incineration.
- The production of the media generates non-detectable or very limited releases of PFHxA into the environment.

Alternatives and reformulation:

- There are no existing alternatives that can provide the properties on repellency required.
- It took ca. 10 years to shift from C8 to C6, whereas there are currently no alternatives available.

Importance:

- High performance air and liquid filtration and separation media are used in safety-critical applications and play a crucial role in reaching the climate objectives.



Thank you for your
attention!