September 2023

RESPONSE TO ECHA'S CONSULTATION ON THE RESTRICTION PROPOSAL ON ALL PER- AND POLYFLUOROALKYL SUBSTANCES

NON-CONFIDENTIAL

Introduction

The Company values the opportunity to provide comments to the ECHA consultation on the restriction proposal on all per- and polyfluoroalkyl substances (hereafter "all PFAS" restriction proposal).

The Company is a producer of fluorochemicals in the sectors of textile, paper and emulsions. We only sell B2B and do not sell directly to consumers.

In this submission, the Company answers ECHA's Specific Information Requests for the TULAC and Semiconductor/Electronics sector while complementing its previous contributions to the calls for evidence on the all PFAS restriction proposal.

Specific Information Requests

Question 1. Sectors and (sub-)uses:

The Company provides information for the TULAC and Semiconductors/Electronics sectors. It supports proposed derogation and has additional derogations needs for several main categories of products relying on the use of C6 fluorotelomers, including textiles, technical textile applications and surfactants in electronics as outlined in the table below.

Summary of derogation requests:

Sector	Use	Sub-use	Derogation Status
TULAC	Professional apparel (incl. PPE)	Police, military, emergency response workers	Proposed derogation 5b. textiles used in personal protective equipment (PPE) intended to protect users against risks as specified in Regulation (EU) 2016/425, Annex I, Risk Category III (a) and (c), until 13.5 years after EiF
	Other: textiles used in engine bays	Textiles used in engine bays for noise and vibration insulation used in the automotive industry	For reconsideration 5u. textiles for the use in engine bays for noise and vibration insulation used in the automotive industry until 13.5 years after EiF
	Filtration media		Proposed derogation 5e. textiles for the use in filtration and separation media used in high performance air and liquid applications in industrial or professional settings that require a combination of water and oil repellence until 6.5 years after EiF

	Technical apparel[1]	Sportswear requiring technical requirements[2]	No derogation
	Solar protection, marine protection, marine furniture, awnings, outdoor furniture		No derogation
Electronics	Semiconductors		For reconsideration 5ee. the semiconductor manufacturing process until 13.5 year after EiF
	Coating for electronic circuits		Missing use
	Additives for LCD panels		No derogation

[1] Possible derogation based on definition similar to the one in Assembly Bill A7063A "apparel" shall not include professional uniforms or outerwear intended for extreme conditions, the Assembly Bill A7063A of the state of New York; https://www.nysenate.gov//bills/2021/A7063#:~:text=2021%2DA7063%20%2D%20Summary,as%20an%20intentionally%20added%20chemical.
.

I/ TULAC

1. Professional apparel (including PPE)

Professional protective equipment (police, military, response workers) have to meet water and oil repellency requirements, which are related to the very low C6 surface tension. Oil repellency implies solvent repellency, chemical resistance, and stain repellency.

For applications such as military or police uniforms, these properties are essential to reduce the risk of injury to the user, and threats such as certain dangerous liquids and heat and flame resistance (British Standard). Chemical protection, together with durable acid and alkaline resistance, and solvent resistance, are also required for these applications. In addition, ballistic vests requiring low surface tension with ultralow moisture absorption to ensure reliable bullet resistance, can only be provided by C6.

Welding suits require durable resistance against molten metal splashes, especially for protection against molten alumina. Finally, professional apparel used in oil exploration requires highly durable oil and stain protection to enhance lifecycles.

Textiles for backpack, sailor, equipment, must meet properties in terms of abrasion resistance, air permeability, spray test, oil repellence, and water column (Norwegian Defence Materiel Agency). An additional benefit is wash durability.

Note that C6 is also used for the following professional equipment applications:

- Apparel PPE for workers in production of liquid acids including reimpregnation
- Apparel PPE for production of dust forming pesticides, allergenic products including impregnation
- Apparel PPE for protective suits in agriculture application of pesticides including impregnation
- Apparel PPE for gas-tight chemical protective suit, survival suits for passengers on ships etc.
- Apparel PPE for worker suits flammable fuel transportation

- Apparel PPE for production of dust forming pesticides, allergenic products including impregnation
- Apparel PPE for waste water worker
- Apparel PPE (medical: long operations) including necessary reimpregnations
- Apparel PPE (medical: short operations, everyday) including necessary reimpregnations
- Apparel PPE (protective clothing oil and gas industry) including necessary reimpregnations
- Apparel PPE (military: occupational protection) including necessary reimpregnations
- Apparel PPE for decontamination workers
- Apparel PPE for high voltage electricity worker suits, suits for fuel tanker driver
- Apparel PPE (protective clothing welding industry)

2. **High performance technical textiles used for NVH (noise, vibration, harshness) insulation and engine ignition protection in means of transport.**

Passenger cars, trucks, buses, emergency vehicles and all other cars with combustion engine require the use of textiles with a combination of repellent effect against oil, diesel and petrol.

C6 SFPs are used as a component in engine bay materials to provide sound and heat isolation in automotive. This includes, but is not exclusive to, the engine bay, firewall, wheel house and water shields. Other applications that require fluorocarbon-treated nonwoven materials are tunnels, hoods, dash, duct and rear insulator, cowl top insulator, apron and fender apron. An important requirement for these materials is to provide repellence against oil, petrol, diesel and water to avoid stains when the motor is working.

Fluorocarbon is used as part of the flame-retardant system and acts, through repellence, to prevent the build-up of flammable deposits / liquids in the substrate's lattice.

The Company proposes to rephrase the derogation wording under Paragraph 5u:

> *"By way of derogation, paragraphs 1 and 2 shall not apply to:*
>
> *High performance technical textiles used for NVH (noise, vibration, harshness) insulation and engine ignition protection in means of transport".*

The term **high-performance** has been used in the *Report on the use of PFAS in TULAC (Textiles, Upholstery, Leather, Apparel and Carpets)* in the context of the upcoming restriction on all PFAS substances. High-performance is defined as multiple technical functions, including:

- Water repellence;
- Oil repellence;
- Stain-resistance/soil protection; and
- Flame retardancy[3].

Based on our knowledge, these properties can be measured according to the following list of standards:

Property	Standard
Water-repellency[4]	ISO 4920 / AATCC 22
Oil-repellency	AATCC 118 / ISO 14419
Stain resistance/ soil protection	AATCC 130

Regarding **technical textiles**, the European Economic and Social Committee on Growth Driver Technical Textiles included the following definition in its Opinion on Growth Driver Technical Textiles:

> *Textile fibres, materials and support materials meeting technical rather than aesthetic criteria, even if, for certain markets, both types of criteria are met. Technical textiles bring a functional answer to a wide range of specific requirements: lightness, resistance, reinforcement, filtration, fire-retardancy, conductivity, insulation, flexibility, absorption and so on.*[5]

Additionally, we propose to extend the proposed derogation to **all means of transport**, in line with the definitions provided in the Directive 2011/65/EU. This would therefore allow to cover not only

[3] We would like to stress that C6 does not provide flame retardancy but, unlike other chemicals, it is compatible with flame retardant products.

[4] Although there may be alternatives available to provide water-repellency and comply with these standards, they are not able to provide it in combination of the properties listed hereinbelow.

[5] Opinion (CCMI/105-EESC-2012-1966) of the European Economic and Social Committee on Growth Driver Technical Textiles, https://www.eesc.europa.eu/en/our-work/opinions-information-reports/opinions/technical-textiles.

cars, commercial vehicles or aircrafts, but also hydraulic excavators, fork-lifts, road maintenance equipment and harvesters, as well as compressors for industrial machinery applications.[6]

3. Filtration media

C6 SFPs are used for their durable, efficient, water and oil repellency properties in filtration media, e.g. nonwovens. Notably, they are used in cabin air conditioning filters in transport means to provide improved particle filtration, which requires high static resistivity to enable fast electric charging and avoid clogging. C6 protects filter against humidity, water droplets, oil, dust, contaminants. It also ensures longer life by preventing premature leakages or clogging and allows effective filtration through low pressure drop.

The Company would like to ask for the following derogation:

> *" By way of derogation, paragraphs 1 and 2 shall not apply to:*
>
> *Air and liquid filtration and separation media that require a combination of water and oil repellency for filters used in industrial settings or by professionals".*

Question 6. Missing uses

Several PFAS uses have not been covered in detail in 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****.*

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

I/ TULAC

1. Solar protection, marine protection, marine furniture, outdoor furniture

C6 use in solar protection, marine protection, marine furniture, and outdoor furniture, brings the following properties:

[6] European Commission, (12 of December 2012), Frequently Asked Questions – RoHS 2, https://ec.europa.eu/environment/system/files/2021-01/FAQ%20key%20guidance%20document%20-%20RoHS.pdf, p. 17.

- Performs durable and high-water protection: protection against water and rain
- Weathering resistance combining high resistance to pollutions (oil protection) and high waterproofness (hydro protection)
- Protection for long outdoor uses (5 to 10 years warranty for outdoor use) as the final product is not meant to be washed

Outdoor fabrics must resist UV irradiation (indoor light has a short range of spectral rays), temperature variations (hot 70°C- cold -30°C) and water aspersion (hydrolysis of the materials). In addition, urban pollutants, acid or salty rains can accelerate the fabrics degradation. The downstream user mainly uses C6 for solar protection (60%) and outdoor furniture (30%):

- Solar protection includes retractable awning, fixed awning, vertical roll-down awning, window and veranda awning, folding arm awning, pergola velum, pergola rolling-up cover, Dutch canopy, shade sail and tensile structure, and klosk, pergola velum, roll-up valance, separation panels
- Marine protection includes spray hood, console cover, UV sail trip, pergola side awnings, dodgers, mainsail cover or winter cover for sailboats and recreational motorboats
- Marine furniture includes bimini, external windshield cover, fender covers, winch cover, blinds and curtains, or seating
- Outdoor furniture covers seating, cushions, curtains, roman blinds, umbrella, or pergola curtains

These applications are for professional - cafes, hotels, restaurants- and consumer uses.

2. <u>Technical apparel – sportswear for which specific requirements are necessary</u>

C6 provides water repellency, durability, oil resistance and UV resistance to sportswear for which specific requirements must be met. This includes products for trainers, competitive and professional athletes, protective offshore jackets and trousers on boats and ships, and protective motorcycle wear.

These uses require maximum water repellency for high dynamic energy at 150-200 Km speed of water droplets. For outer garments, socks, shoes, and balaclava hoods and gloves, C6 brings maximum protection against fuel, and as such heat and flame.

3. Technical textiles for gas and oil filtration

Technical textiles for gas and oil filtration C6 is used in technical textiles for oil and gas filtration, e.g. filters for wasted air/incineration plants, due to its oil repellency which is crucial to comply with sectoral testing standards.

IV/ Electronics

1. Coating for electronic circuits

Electronic protectors supply a durable and transparent surface treatment to electronic circuits against moisture, dust and chemicals. It also provides excellent water and oil repellence.

2. Additives for LCD panels

C6 telomers are used as fluorine-based surfactants in the market of 'LCD Material', such as posi-/ nega type of photoresists and coating solution for polarization films. The only production site of C6 fluorosurfactants is located in Japan. Approximately 2 metric tons of LCD material are imported to the EU each year to manufacture Flat Panel Displays (FPD). For this application, The Company's downstream users are not located in Europe.

Absence of suitable non-fluorinated alternatives available

C6

It is important to note that there are no fluorine-free alternatives able to meet the same level of performance as C6 in terms of oil/solvent repellence required by both ISO norms and customers. EU funded projects (MIDWOR LIFE, DURATEX) assessed alternatives for textile applications and concluded that the replacement of fluorotelomer chemistry by fluorine-free alternatives is not possible in areas where more than only basic water repellency is needed. C6 is the only substance being able to provide the following **combined properties: protective, durable water, oil, stain and soil protection** and unparalleled durability allowing for a high functionality over time and a much higher service life of the treated articles.

Numerous additional studies have been carried out by industry and the authorities around the world to identify suitable alternatives for oil/solvent repellency. A very comprehensive overview can be found e.g. in the report "Royal Military College of Canada Contract Report CPT-1802" published by the DRDC[7]. Whilst repellent products based on silicone polymers, hydrocarbons or polyurethanes may provide some oil repellency on hard surfaces, none of the current known chemistries can provide oil repellency on highly structured and irregular surfaces like textiles.

Adequate alternative products will require time to be developed as no suitable chemistry is known as of now. Alternatives such as silicone, that is available for many applications, should not be promoted. Silicone contains three substances (D4, D5, D6) classified as PBT and would encourage regrettable substitution. The Company is investing in research to find suitable fluorine-free alternatives. Typical applications are medium-quality outdoor articles with medium-wash durability and low performance, where only water repellency is required.

However, the switch is not possible for high technical and performance applications requiring repellency against oil, solvents and chemicals, such as the ones that are presented in this contribution. This is explained by the physical principle of surface tension. A liquid can only wet a surface if its surface tension is lower than the surface tension of the surface. Only C6 side-chain fluorinated polymers can provide an appropriate surface tension to textiles and therefore properly repel both water and oil.

We would also like to stress that requalification of different chemistries is a lengthy and expensive process that usually lasts between 3 and 8 years and requires a high level of investment, provided that suitable non-fluorinated alternatives exist. In addition, any switch to alternative chemistry would require both lower ISO standards and lower customers' requirements. At present, C6 chemistry can therefore not be technically replaced in applications requiring repellency against oil, solvents and chemicals.

I/ TULAC

1. Professional apparel (including PPE)

In the case of military / police fabrics, the following international norms must be met: Oleo test (NF EN ISO 14419), Water column (ISO 811), Spray test (NF EN 24920), and the Gutter test (ISO 368). The

[7] Available at : https://cradpdf.drdc-rddc.gc.ca/PDFS/unc331/p808749_A1b.pdf

use of C6 is specifically required for military applications. The key properties mentioned above cannot be met without C6 or other short-chain fluorinated polymers. In particular, the production of C6 protective textiles such as bullet-proof waistcoats for EU law enforcement and army are meant to protect lives by providing bulletproof vests from getting wet. Fluorine-free alternatives fail to provide these features and would therefore put human lives at high risk.

2. <u>Solar protection, marine protection, marine furniture, outdoor furniture</u>

Solar protection, marine protection, marine furniture, and outdoor furniture must meet the following norms:

- AATCC TM 22-water repellency: spray test
- AATCC TM 35- water resistance: rain test
- AATCC TM 42-water resistance: impact penetration test
- AATCC TM 127-water resistance: hydrostatic pressure test
- ISO 9865-water repellency: Bundesmann rain shower test AATCC TM 118-oil repellency: hydrocarbon resistance test
- AATCC TM 130-soil release: oily stain release method
- EN 20811 Textiles. Determination of resistance to water penetration
- Hydrostatic pressure test
- DIN EN ISO 4920 Textile fabrics - Determination of resistance to surface wetting (spray test)
- DIN EN 29 865 Textiles; determination of water-repellency of fabrics by the Bundesmann rainshower Test
- DIN EN ISO105-B04 Textiles - Tests for colour fastness – Part B04: Colour fastness to artificial weathering: Xenon arc fading lamp
- DIN 53931 Testing of Textiles

- Determination of The Resistance of Textiles To Mildew; Growth Test
- DIN EN ISO 12947 (1-4)
- Textiles – Determination of the abrasion resistance of fabrics by the Martindale method ASTM D4032
- Test Method for stiffness of fabric by circular bend procedure

C6 chemistry is currently the most durable chemistry to protect the fabric performances. Despite different trials on fluorine-free alternatives, there is currently no technical solution available for long-lasting water and oil protection, leading the fabric to get dirty after a few months and therefore less sustainable (compared to C6 finished fabrics or PVC fabric). Only the oil protection from C6 is able to protect outdoor fabrics from pollution.

With fluorine-free alternatives, the service-life of the fabrics lasts months instead of decades. Replacing C6 by fluorine free alternatives would drastically reduce the service life of the fabrics and contribute to an increased plastic waste problem. The first results of the lab testing appearing in the table below show that even in cases wherever fluorine-free alternatives present good initial performances – except in terms of oil repellency -, the performances after weathering are decreasing too rapidly. In other words, fluorine-free alternatives fail to provide product durability, which implies premature disposal and replacement - shorter product life and increased amount of waste -, as well as a higher carbon footprint, in contradiction with the EU Climate Law's ambition. In addition, this is important to bear in mind that once an alternative is validated in lab, work has to be done on industrialisation and repeatability.

Série 2	Chemical		Hydrostatic	Spray test	Oléo	stiffness		1st marquing observatio
						CH	TR	
Formulation 2-2	Mélange co-polymère	Fabric1	374	5	0	1539	1058	+++
		Fabric2	413	5	0	1757	1217	++
Formulation 5-2	Paraffine / cire	Fabric1	393	5	0	1148	744	+++
		Fabric2	405	5	0	1458	788	++
Formulation 7-2	Paraffine / cire	Fabric1	358	5	0	957	713	+++
		Fabric2	392	5	0	1224	719	+++
Formulation 9-2	Mélange co-polymère	Fabric1	399	5	0	980	681	++
		Fabric2	472	5	0	1215	736	+
Formulation 10-2	Mélange co-polymère	Fabric1	416	5	0	1055	780	+++
		Fabric2	475	5	0	1236	759	++
Formulation 11-2	Mélange co-polymère	Fabric1	371	5	0	860	566	++
		Fabric2	408	5	0	1149	708	+
Formulation 12-2	Paraffine / cire	Fabric1	367	4	0	558	457	+++
		Fabric2	365	4	0	701	563	++
Formulation 13-2	Polyuréthane	Fabric1	340	5	0	1017	712	++
		Fabric2	369	5	0	1294	800	+
Formulation 18-2	Polyuréthane	Fabric1	394	5	0	1128	816	++
		Fabric2	403	5	0	1544	897	+
Formulation 20-2	Silicone	Fabric1	406	5	0	1271	873	++
		Fabric2	430	5	0	1401	863	+
	Fluorcarbone reference		500	5	6	1250	885	+

Table 5. Test results for fluorine-free substances

Weathering results after 3 months exposure are as follows:

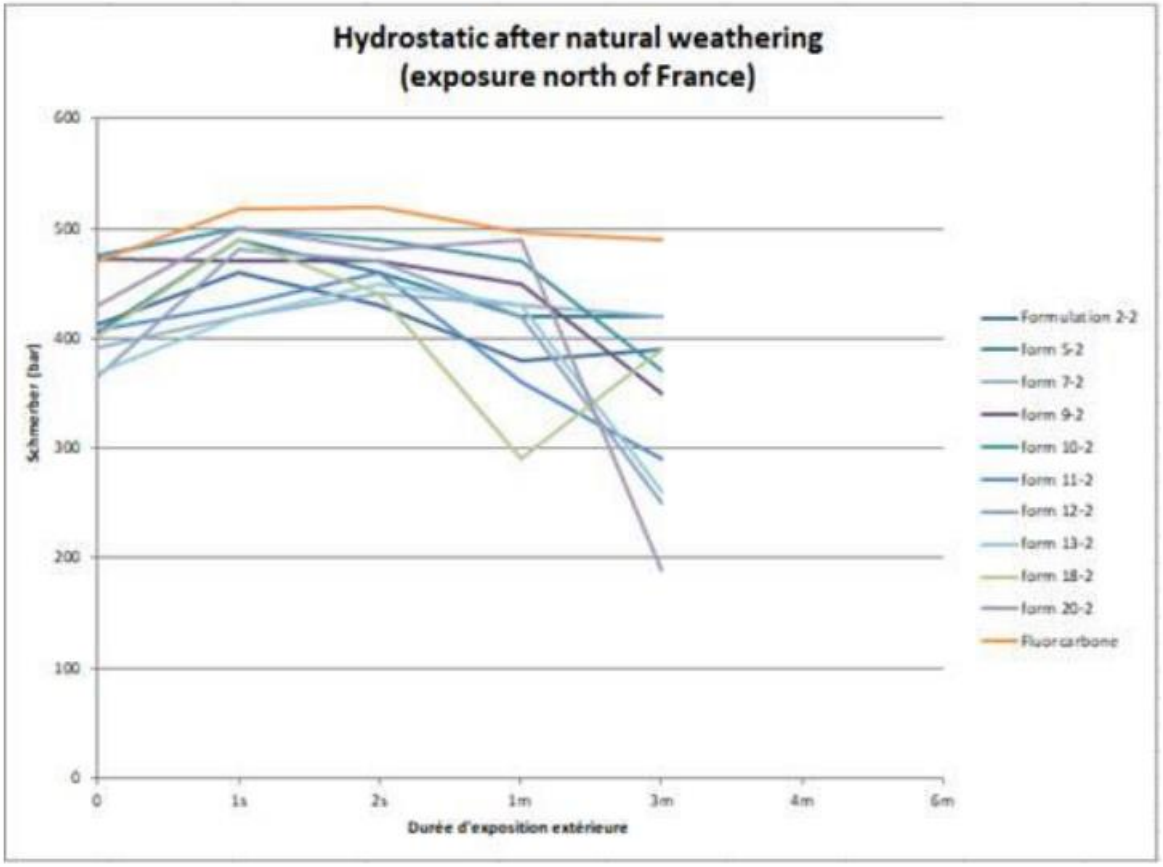

Figure 2: Comparative test results on hydrostaticity after natural weathering for fluorine-free substances and fluorocarbon

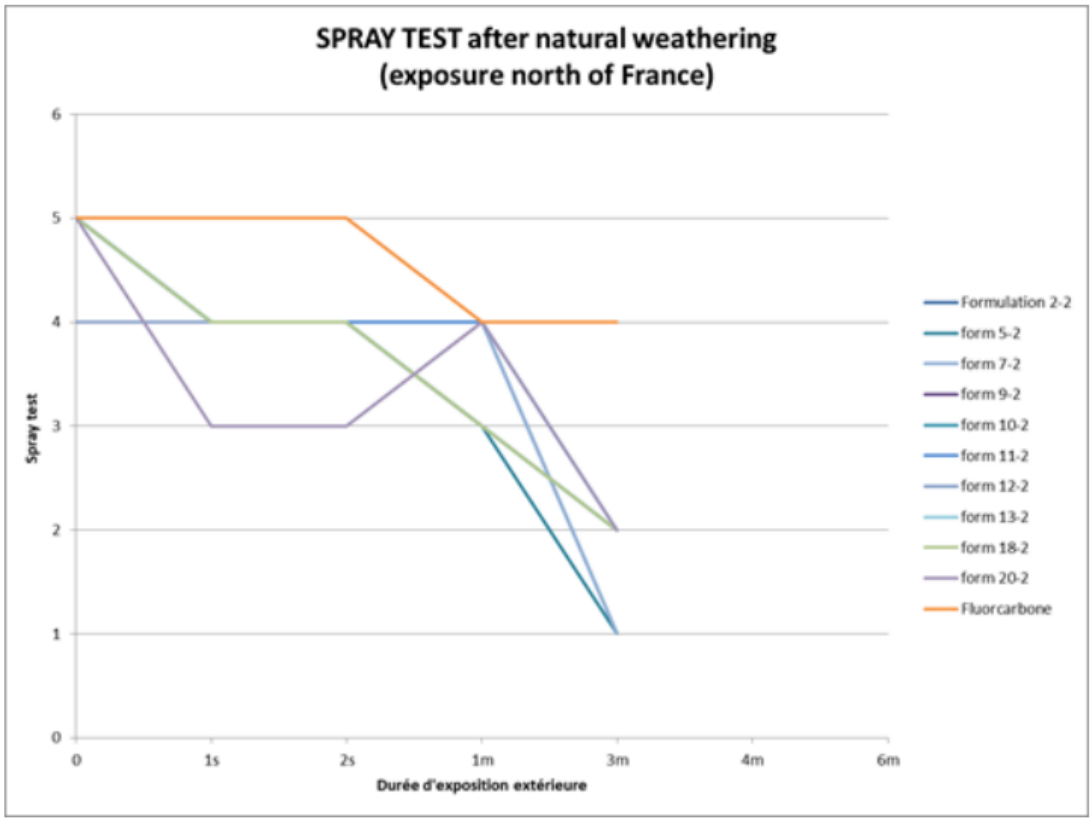

Figure 3: Comparative test results on Spray Test after natural weathering for fluorine-free substances and fluorocarbon

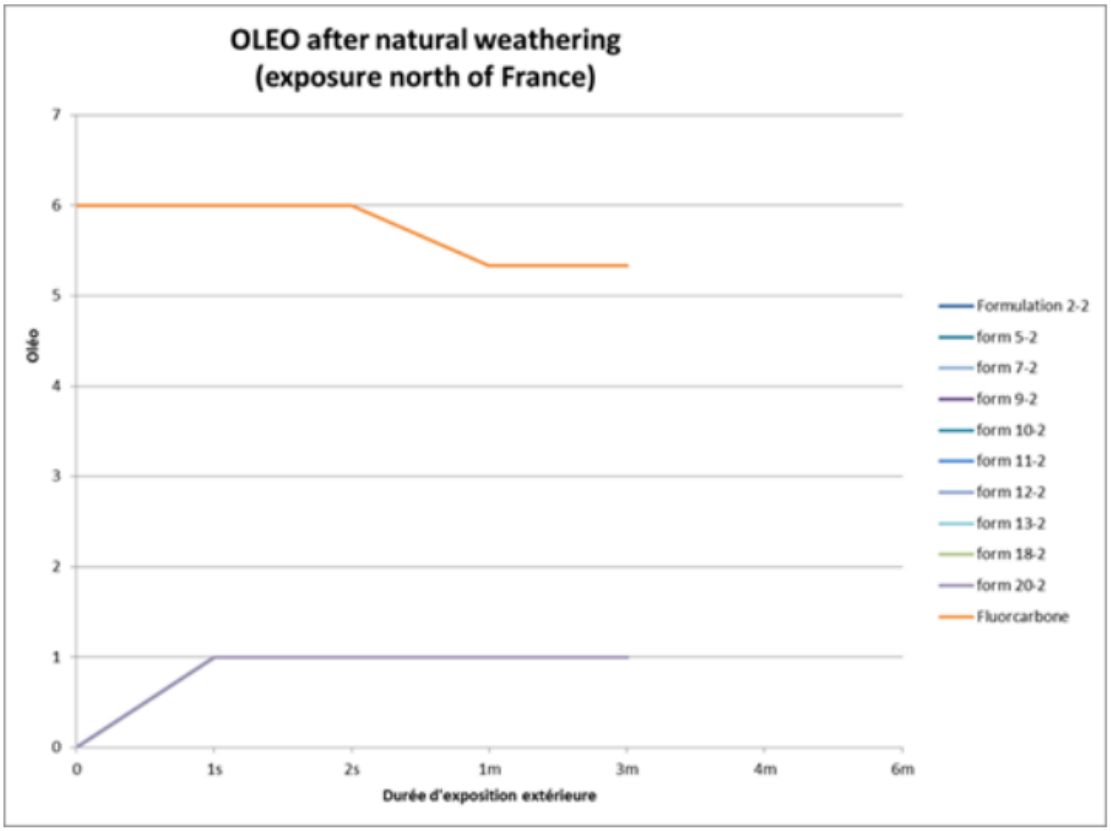

Figure 4: Comparative test results on OLEO after natural weathering for fluorine-free substances and fluorocarbon

In case of a restriction, the end-user would stop buying the product to replace it by PVC solutions. One downstream user has reported that 95% of the fabrics are finished with C6 due to the switch made from C8 to C6 chemistry. As a result, a restriction would lead to the end of the activity as well as numerous job losses.

3. Technical apparel – sportswear for which specific requirements are necessary

Sportswear for which specific technical requirements are necessary must meet the following norms:

- DIN EN 14360 (Protective clothing against rain - Test method for ready-made garments - Impact from above with high energy droplets)
- AATCC TM 22-water repellency: spray test
- AATCC TM 22-water repellency: spray test

- AATCC TM 42-water resistance: impact penetration test
- AATCC TM 127-water resistance: hydrostatic pressure test
- ISO 9865-water repellency: Bundesmann rain shower test
- AATCC TM 118-oil repellency: hydrocarbon resistance test
- AATCC TM 130-soil release: oily stain release method
- FIA-Standard 8856 (protective clothing for automobile (racing) drivers)
- EN ISO 343 Protective clothing - Protection against rain
- EN 14058 Protective clothing - Garments for protection against cool environments
- EN 342 Protective clothing - Ensembles and garments for protection against cold

For the time being, no suitable fluorine-free alternative has been found to meet other properties than medium-water repellency, which is not sufficient to fulfil the required function of the application. In addition, this is uncertain whether fluorinefree alternatives would be less hazardous to the environment. Part of them, such as silicon-based alternatives, release critical substances, e.g. D4, D5, and D6. The rest of them present very few data available.

4. Technical textiles for gas and oil filtration

Technical textiles for gas and oil filtration must meet the following norm: VDI 3677 Blatt 3:2012-11 Certified Filtration Textiles for aggressive gases/fluids (environment protection). Key C6 properties of water repellency, oil repellency, durability and resistance against heat cannot be met with fluorine-free alternatives. In addition, the repellent effect of fluorine-free alternatives degrades faster under extended heat exposure and cannot provide effective hot gas filtration.

5. High performance technical textiles used for NVH (noise, vibration, harshness) insulation and engine ignition protection in means of transport.

Due to the surface tension of diesel, there are no commercial non-fluorinated alternatives available that can provide the same level of repellence as C6 (which constitutes the adequate level of repellence).

In the absence of fluorocarbon, the deposit of flammable materials can overload the flame-retardant properties of the substrate when ignited, thus creating a significant risk of fire in case of a car crash.

Suppliers have informed us that there are alternative methods or chemicals to provide repellency **only against water.**

- Waxes – Mainly synthetic, but some natural waxes
  - Waxes are dissolved into diesel, will not provide repellence
- Fluorinating the actual substrate using plasma deposition
  - Very unreliable process, as not predictable which chemistry is fluorinated
- Surface modification from plasma etching
  - Creates a very brittle effect that is destroyed from light rubbing
- Lamination
  - Does not stop diesel build up on the plastic unless fluorocarbon is added

Commercial non-fluorinated alternatives to side-chain fluorinated polymers (SCP) are not suitable to provide a combination of oil, petrol, diesel and water repellency. In particular, non-fluorinated alternatives cannot repel non-polar solvents which are the main risk factors for the engine bay (e.g. kerosene and diesel fractions).

There are therefore no non-fluorinated alternatives available on the market that could provide combined repellency against oil, petrol, diesel and water. Without this high level of repellency provided by C6, flammable liquids would accumulate in the engine bay area which would put the vehicle and passenger safety at risk.

To our knowledge, there is no other chemistry able to provide similar repellent effect for oil, diesel and petrol. The surface tension of all existing potential alternatives is too high to repel oil, diesel and gasoline (they all have a very low surface tension).

<u>Comparative test between materials with and without fluorocarbon in nonwoven fabric</u>:

The basic effect of repellency is based on the physical principle of surface tension. A liquid can only wet a surface if its surface tension is lower than the surface tension of the surface. Textile articles treated with C6 based side-chain fluorinated polymers have a surface tension of 10-19 mN/m while textiles articles treated with non-fluorinated substances have a surface tension of 30-50 mN/M. The surface tension for gasoline is 22 mN/m and 75 mN/m for water. This shows that only C6 side-chain fluorinated polymers can provide the appropriate surface tension able to repel both gasoline and water.

According to the automotive industry requirement in terms of repellency (see list of technical standards below) the nonwoven material should be able to retain a 1 mL drop of oil/petrol/diesel/water on the surface for more than 15 minutes.

	With Fluorocarbon (C6)	**Without Fluorocarbon**
Nonwoven	1 ml drop (oil/petrol/diesel/water) → The drop stays for >15 min on the surface	1 ml drop (oil/petrol/diesel/water) → Immediate absorption into the fabric

Standards

Examples of test standards for repellency used in the automotive sector:

- ISO 4920 – Water repellency
- ISO 14419 – Oil repellency, Hydrocarbon resistance test, level 3 or 4 required by most car manufacturers
- 3M Water repellency – (Water/Isopropanol)
- PV 3922 – Planar Fabrics and Molded Parts: Oil- and Water-Repellent Behaviour (Volkswagen/Audi)
- Fiat 50496/01 – Water and Oil Repellant Properties of Occupant Compartment Trim Fabrics

Non-fluorinated alternatives are unable to pass the above technical requirements of the automotive / transport manufacturers, except for water repellency. Especially, the minimum level for oil repellency (level 3) required by ISO 14419 cannot be reached, leading to the immediate absorption of

the combination of water, petrol, diesel and oil into the fabric, and in turn, to endanger the vehicle and passenger safety.

Therefore, there is no non-fluorinated alternative currently used by competitors to provide combined repellency to water, oil, petrol and diesel.

6. Filtration and separation media

The Company would like to refer to the following performance standards:

Filtration and separation media - Performance in terms of repellency	Performance Standards
Water repellency	EN20811 (Hydrostatic pressure)
	ISO811 (Hydrostatic pressure)
	EDANA NWSP 080.6 (Hydrostatic pressure)
	Mil Std 282 (Q-101) (Hydrostatic pressure)
	NWSP 080.11.R0 (15) Mason Jar
	WSP 80.11 (09) Mason Jar
	ASME-AG-1-2017; FC-I-3241 (prior to gamma irradiation)
	ASME-AG1-2017; FC-I-3242 (after gamma irradiation)
Oil repellency	ISO 14419
	AATCC 118
	Tappi T559

Despite the fact that different chemistries have been tested, they are not suitable for high performance filtration applications. If C6 is not used, the filter would have a higher pressure drop, implying a higher energy consumption for the air to pass through the media. It would therefore decrease the energy class and lead to a lower product performance. A restriction would lead to a cessation of supply of high-performance filtration media resulting in significant safety implications. Overall, this would mean a decrease in EU's competitiveness on the filtration market.

7. Coating for electronic circuits

There are currently no suitable alternatives to C6 for electronic grade coating allowing to provide the necessary product durability.

8. Additives for LCD panels

There are currently no suitable alternatives to C6 for additives for materials allowing to provide the same product standards. A restriction would threaten the supply of FPD products for airplanes, automotive, any other industrial applications, and even medical devices, in the EU. In addition, there are no suitable fluorine-free alternatives that would provide the same level of performance.

The Company continues the research to identify suitable alternatives to C6 based repellent products with an established dedicated R&D department.

Socio-economic implications

The technical textile sector, but also key automotive technologies, battery production, water purification etc. which highly rely on C6, would suffer from a loss of competitiveness with production moving outside Europe, which in turn would have a severe impact on the EU industry.

Implications for Downstream users

1. Professional apparel (including PPE)

A restriction could lead to the end of the production of workwear protective textiles in Europe, as well as of a loss in turnover and in jobs for the entire value chain. In case of C6 intensive production in Asia, European companies would go bankrupt. A restriction would also lead to a lower protection for some professionals, therefore provoking extremely dangerous situations, increased injuries, and loss of lives (e.g. firemen, soldiers, policemen, …).

2. High performance technical textiles used for NVH (noise, vibration, harshness) insulation and engine ignition protection in means of transport.

A direct consequence of the use of fluorine-free alternatives instead of C6 is to have the internal hood of the car full of oil, which drastically increases the risk of fire. Therefore, fluorine-free alternatives do not allow to meet the safety requirements in terms of flameretardancy. In addition, automotive and

aerospace are highly competitive industries subject to price pressure, meaning that fluorine-free alternatives are used when suitable.

An absence of exemption for the use of C6 in technical textiles used in engine bays for the automotive sector would lead to immediate losses in productivity and sales, which would in turn result in market shares and job losses. Under these circumstances, production plants are likely to shut down and the car manufacturing business could terminate in the EU.

Since C6 is the only substance that can be used to pass the technical standards from the automotive industry, and in the absence of non-fluorinated alternatives available, the demand for C6 products will remain at its current level after the entry into effect of the restriction. In this context, the production would shift outside the EU, EU companies would no longer be competitive and dependency on other continents (e.g. Asia) would increase.

In terms of impact to society, an absence of exemption could push the automotive industry to lower down its technical standards, with a subsequent potential loss of life in case of fires caused by accidents. It could also result in the termination of the car manufacturing business in Europe with loss in competitiveness and massive losses of jobs.