MONOPOL COLORS

The Center of Excellence for Paints

Consultation on ECHA's proposal to restrict the production, placing on the market and use of per- and polyfluoroalkyl substances (PFAS)

This document is to comment on the public consultation on a proposed restriction on the production, marketing and use of per- and polyfluoroalkyl substances (PFAS).

1. General remarks

The proposed restriction is extremely broad. The proposal neither provides a structure of the more than 10,000 substances with very different intrinsic properties, nor does it differentiate between the risk profiles of the substances. A comprehensive ban of the entire class of substances is proposed, i.e. both for substances for which a restriction makes sense, but also for substances those use is harmless and from which no environmental hazards emanate.

By pursuing a completely generic approach, where - apart from the manufacture and placing on the market - every type of use is prohibited with the exception of some time-limited exemptions, goes much further than previous restriction proposals.

The restriction proposal lacks a risk-based approach, as it does not include a risk assessment for individual substances or at least for groups of substances with comparable properties. Consequently, the chosen restriction approach does not meet the criteria of Article 68, paragraph 1, of the REACH Regulation, which states that restrictions may be introduced if there are "unacceptable risks". Consequently, the imposition of restrictions on substances used in applications, which do not pose risks, goes beyond the legal framework of the REACH Regulation.

The proposal for restriction is primarily justified based on the persistence of the substances concerned, as well as on other potential hazard properties such as mobility or bioaccumulation. The necessary risk assessment, as stated in Article 68, paragraph 1, of REACH, which takes into account both hazard properties and exposure from different uses, has not been carried out. In order to achieve a legitimate, appropriate and proportionate regulation of these substances, a differentiated approach is needed. This approach should consider the specific properties of each substance and assess whether a PFAS substance or its use poses an uncontrollable risk to the environment or human health. It is important to note that a complete ban is not justified if certain uses do not lead to environmental exposure.

It is essential to allow the continued safe use of certain PFAS if no suitable alternatives are available. Otherwise, the proposal for restrictions would be disproportionate.

Our purpose in writing this letter is to demonstrate that the PFASs we use do not pose an uncontrollable risk.

2. Structure of the entry

This assessment looks at all emission-related and socio-economic aspects of our PFAS applications.

3. Interest of Monopol Colors

Monopol Colors is a Swiss paint and coatings manufacturer who develops and produces paints for metallic façades, industrial as well as anti-corrosion coatings.

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Fluoropolymer paints (hereinafter called FP) based on FEVE are an important product segment, which are mainly used for the ultrahigh-quality and ultrahigh-durable metallic façades, bridges as well as steel construction. For this purpose, Monopol Colors uses FEVE binders from AGC Asahi Glass Co.

4. Emissions during the product life cycle

a. Wastes from and in production and laboratories of Monopol Colors

i. Containers, drums and sample plates
Used metal containers/drums from raw material deliveries as well as from the production process are emptied of drips. The resulting paint sludge is disposed of separately → see item Paint sludge (4.a.ii).
The emptied containers and drums as well as the dried metallic sample sheets from quality assurance and the color lab are collected and recycled by Moser Recycling (moser-recycling.ch).
Enclosure: Letter «Moser Recycling»
Result: The materials to be recycled are melted down in a steelworks foundry at 1450 - 1600 °C and cast into new material. Flue gas cleaning systems are then used to clean the flue gases. No PFAS are released into the environment.

ii. Paint sludge
The production tanks and machines are cleaned with organic solvents. The contaminated solvents are then distilled in-house and the distillate is reused for cleaning. The remaining paint sludge is disposed of externally via the specialized waste disposal company Cridec (cridec.ch).
Enclosure: Letter «Disposal of Paints_Cridec»
Result: The paint sludge is added to cement plants as a fuel in the combustion process at 1450 °C. The high temperature of the paint sludge is the reason for the high emissions. Thanks to the high temperatures, the formation of harmful substances is minimized. The flue gases are cleaned in the corresponding flue gas cleaning plants. The residues or ash (inorganic components, minerals) are incorporated into the cement. In the specific case of fluoropolymers, the PFAS are incinerated. The resulting product is calcium fluoride and other fluorides, which are added to the cement as inert substances. No PFAS are released into the environment.

iii. Other waste
Cardboard, paper, stirring rods, cups, latex gloves of staffs, etc., which come into contact with FP, are disposed of together with the household waste. This is incinerated in the waste incineration plant KVA Turgi.
Result: According to the confirmation of the KVA Turgi, the waste is incinerated at approx. 1000 °C and the flue gases are freed from the pollutants in a three-stage process (electrostatic precipitator, flue gas scrubber, catalyst). No PFAS are released into the environment.

iv. Sewerage
Our FP are not water soluble and can only be cleaned or washed with organic solvents. Consequently, a FP/solvent mixture is produced, which is distilled internally at our plant. The resulting paint sludge is disposed of as described under "Paint sludge" without any risk to the environment.
Result: No PFAS are released into the environment.

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v. Estimated emissions
Not relevant, as no PFAS can be released into the environment.

b. Emissions at our customers (paint application, waste, etc.)

i. Painting process (paint waste, emissions in production, drums)
Our customers work analogously to us, i.e. the drums with the paint, coated aluminum waste are collected by specialized recycling companies and treated safely analogously (see point 4.a.i).
Residual paint and paint sludge is specially recycled analogously to our paint sludge and added to the cement industry as a valuable material (see point 4.a.ii).
Result: No PFAS are released into the environment.

ii. Waste in the production of aluminum panels
The production of aluminum composite panels or aluminum plates generates waste in the form of painted aluminum. This waste is collected and returned to aluminum recycling companies. According to confirmation from Kaspar Rohstoffe (www.kaspar-rohstoffe.de), this waste is shredded and ground. They are then added to cement production as a substitute for fossil fuels. This is a high-temperature incineration process. The dusts are not dangerous, as they are mainly mineral dusts that are incorporated into the cement process. There are no residues from this incineration (see also point 4.a.ii).
Result: No PFAS are released into the environment.

iii. Estimated emissions
Not relevant, as no PFAS can be released into the environment.

c. Utilization / product use

i. Emissions due to coating thickness degradation
The binder manufacturer Asahi Glass Co., in cooperation with the Japanese Ministry of Land, Infrastructure and Transport, has made extensive tests in Japan on bridges and sample panels exposed near the sea. Some of these practical tests have lasted more than 25 years.
The field tests have shown that the paints based on the FP binder - depending on the exposure - have a film thickness degradation of 0 - 1.1 µm in 15 years. Other coating systems tested in parallel produced massively more microplastics due to a film thickness degradation of 22 - 28 µm in the same period.
Enclosure: «Erosion of FEVE-coating»
Result: FP are a solid in the final state and polymerized, i.e. no PFAS are released to the environment. In addition, the risk of PFAS emission is negligible due to low coating thickness degradation over time.

ii. Eluate Test (Leaching Test)
In June 2021, we collaborated with the Swiss Federal Railways SBB (Department Infrastructure- Safety, Quality, Environment) to have leaching tests (eluate test) performed on a fluoropolymer topcoat in RAL 7001 (silver grey). The tests were commissioned by Basler & Hofmann AG, Engineers and Planners, from Bachema AG, Analytical Laboratories.
Two eluate tests were carried out: before and after aging. For aging, the coating foils (coating film was detached from the substrate) were exposed to 1000 h accelerated weathering (Xenon Arc lamps, 60 W/m2 @ 300 - 400 nm, Daylight-Q filter, 102 min light @ 63 °C BPT, chamber temperature and rel. humidity unregulated, 18 min light and

spray water). The test was carried out in a chamber with a temperature and rel. humidity control.
Enclosure // Confidential Information: «Leaching results before aging», «Leaching results after aging»
Result: The PFAS content in the eluate was below the limit of quantification of < 0.0000002 g/l (< 0.02 µg/l, equivalent to 0.00002 ppm). The Swiss Federal Railways have classified the use of fluoropolymers as harmless.

iii. In case of average, e.g. in the event of a fire
In 2005, we carried out thermal decomposition tests with our FP system at the TNO test institute (Eindhoven, NL). The aim was to find out whether toxic substances are emitted during combustion (e.g. in a fire).
Enclosure // Confidential Information: "Pyrolysis of two coating system", TNO-report 43/05.013246/sec from 17.1.2005
Result: " ... Based on the results of the analyses it can be concluded that no hazardous components can be detected ..."

iv. Estimated emissions
Not relevant, as only insignificant amounts of PFAS (< 0.00002 ppm) can be released into the environment.

d. Recycling

At the end of the service life of a metallic facade, it can be easily deconstructed and recycled. The paint can be removed either by thermal, chemical or mechanical recycling. The paint waste is then shredded and ground in the same way as waste is treated in the production of aluminium panels. They are then added to the cement production (see points 4.a.ii and 4.b.ii).

A project of the Karlsruhe Institute of Technology (KIT) and the Société Générale de Surveillance (SGS) has investigated whether FP are completely incinerated without the formation of short-chain or long-chain PFAS.

The preliminary report (as of June 2023) states:
"The study clearly demonstrated that fluoropolymers are converted to inorganic fluorides and carbon dioxide. The inorganic fluorides detected were hydrogen fluoride. A large majority of samples indicated that long-chain PFAS were below levels of 1 ng/m3 (> 99% of samples associated with 860°C condition and > 98% of samples associated with 1100°C condition). There were no short chain PFAS detected post incineration. TFA was non-detectable in all samples with a reporting limit of 14 µg/m3. **The results confirm that fluoropolymers at their end of life when incinerated under representative European municipal incinerators conditions do not generate any measurable levels of PFAS emissions and therefore pose no risk to human health and the environment."**

Enclosure: Pilot-Scale Fluoropolymer Incineration Study-Preliminary report-June 2023

5. Socio-economic impact

Enclosure: «Comparison of different coating systems»

Longevity

While the persistence of PFASs is the main reason for the targeted ban, this longevity is the decisive advantage for architectural coatings. Metallic facades should remain protected and attractive for decades. This can only be guaranteed with FP coatings (whether FEVE or PVDF), as our more than 30 years of experience with these coating materials impressively proves.

Extensive tests with various binders have shown that only FP coatings provide a service life of over 50 years in terms of color stability, gloss retention and chalking.

Other binder systems degrade strongly when exposed to UV radiation and weathering. In practice, these systems show severe chalking, gloss degradation and color change after only a few years. This is not only a visual or cosmetic impairment, but above all a deterioration of the protective function. Chalking degrades the binder, the coating erodes and becomes porous as well as permeable. This means that the substrate is no longer sustainably protected.

As soon as the coating no longer fulfils its protective function, costly renovation or restoration is necessary. In the best case, the facade can be completely renovated on site or must be replaced by a new façade.
It is obvious that a façade protected with FP, which allows a service life of more than 50 years, is much more resource-efficient than a façade that has to be completely renewed after an average of 10 years. If we consider that, on average, we use up 1.75 times the ecological resources[3] available on earth per year, the longevity of products - such as metal façades here - is a very important factor.

Extensive trials in Japan have shown that the Japanese standard JIS K 5629 ("Long durable paints for steel structures") concerning the requirements for the durability of coating materials in combination with the requirement for bridge structures, which specifies a service life of > 50 years, can only be met with FP.
Enclosure: «Results on the durability of different coating systems»

Hydrophobic surfaces

FP coatings have a high contact angle (almost 100°), which makes them very oil and dirt repellent. This hydrophobic effect makes it difficult for graffiti, dirt, moss, algae, lichen, etc. to adhere and can consequently be easily removed. This easy-to-clean effect is, in turn, not only an optical advantage, but also helps to maintain the protective function of the coating, since impurities massively attack and ultimately destroy the coatings.
Enclosure: «Results on the longevity of different coating systems»

Coolest White and Cool-Roof systems

FP coatings, as they are UV-reflective, can be applied together with special pigments for roofs, thereby reducing the surface temperature (cool roof). On the one hand, this means that the building envelope heats up less and the interior needs to be cooled less (energy saving). On the other hand, less heat is released into the environment, which helps to combat the urban heat island effect.
For this purpose, we have developed the "Coolest White" (www.coolestwhite.com) in collaboration with the Dutch architectural firm UNStudio.

[3] According to calculations by the US environmental organization Global Footprint Network. On the one hand, the organization calculates what nature can produce and absorb without losses in a year (e.g. raw materials, drinking water, food, around man-made waste and CO2 emissions, etc.). On the other hand, it analyzes what people consume with their way of life and economy.

<u>Alternative coating systems</u>
The OECD published a comprehensive study on PFAS in coatings and their alternatives in 2022[4] .
The summary (page 11) states:

«FP-based paints are available for use on bridges and from the evidence reviewed here, their weatherability and durability performance is superior to that of alternatives such as PU. FP-based paints are significantly more expensive at the outset, although after 30 years PU coatings are more expensive than PFAS coatings because they require more frequent recoating, with associated labour, stoppage and material costs. ...»

The OECD study examined key functional characteristics of PFAS coatings and alternatives:

- **Anti-soiling**
  «No non-PFAS alternatives have yet been identified as anti-soiling agents.» (3.4.2, page 31)

- **Performance in architectural applications**
  «From the above the weatherability and durability of PVDF and FEVE-based resins is better than alternatives, meaning they are likely to perform better in these respects for example in external architectural applications.» (7.2.1, page 58)

- **Total Cost of Ownership**
  "FP-based paints are commercially available for use on bridges and from the evidence identified in this study their weatherability and durability performance is superior to that of alternatives such as PU. An analysis on the costs over time of field painting a bridge with a FP-based paint (FEVE) system and a nonPFAS alternative (polyurethane), paint system, was conducted (University of Wisconsin-Milwaukee, 2013) and the conclusion was that per coating it would cost approximately 26 % more with the FPbased coating compared to polyurethane. However, after 30 years it was concluded that the total cost for the polyurethane coating would cost 16 % more than the FP-based coating, owing to the faster degradation of the non-PFAS coating and therefore a need for more frequent recoating, with associated labour and material costs." (9.3, page 63)

PFAS-free binder systems continue to evolve and progress has been made in recent years in terms of durability. We are constantly monitoring the binder market and testing new binder systems. Most of the alternatives mentioned in the OECD study have already been tested by us,

The following overview of UV exposure tests (QUV-B) shows the comparison between FEVE and a commonly used HDPE (High Durable Polyester) and a new PFAS-free development ("new ICM"):

Grey Color	FEVE	HDPE	New «ICM»
QUV-B after 1000 h			
• Color Change dE	0.09	0.69	0.30
• Residual Gloss	110 %	84 %	100 %
QUV-B after 3000 h			
• Color Change dE	0.16	1.18	0.59
• Residual Gloss	100 %	36 %	80 %

[4] OECD (2022), Per- and Polyfluoroalkyl Substances and Alternatives in Coatings, Paints and Varnishes (CPVs), Report on the Commercial Availability and Current Uses, OECD Series on Risk Management, No. 70, Environment, Health and Safety, Environment Directorate, OECD.

Despite the quality improvement of the "New ICM" compared to the HDPE, however, a noticeable difference in color shade and gloss degradation compared to the FP can already be detected after 3000 hours.

Currently, there is no PFAS-free alternative that can meet the needs of high-end architectural applications.

6. Conclusions and request

PFAS, and in particular FP, are essential for the functioning of a modern society and are key to innovative technologies.

Safe: FP for architectural applications are safe and, despite their persistence, do not pose an unacceptable risk to human health or the environment.

Sustainable: By extending renovation or restoration intervals, FP contribute to resource preservation and are sustainable. Less frequent renovations mean less resource consumption and CO2 emissions.

No alternatives: currently, there are no comparable alternatives to FP to protect buildings against sun and weathering beyond 50 years.

For this reason, we request that fluoropolymers be excluded from the proposed restriction on PFAS chemicals.

If ECHA decides to leave fluoropolymers in the proposed restriction, we request that a 12-year derogation be granted for these fluoropolymer applications. This derogation should be reviewed every five years from inception to determine if industry has been able to develop new PFAS-free systems that meet the technical performance of current fluoropolymer products.

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