

A. GENERAL COMMENTS

Our company is pleased to provide the comments to the Consultation on PFAS in Annex XV of the REACH Regulation. Our company fully supports the effort of Europe to decrease the quantities of harmful substances used in products. We are electronics company of global “imaging equipment such as printer and copier” manufacturers but also video projectors, robots, watches.

Due to the unprecedented restriction proposal, with a very broad scope, it is very challenging for an electronic company, especially a global one to assess with accuracy, in a limited time, the impact of such regulatory proposal. Indeed, EEE are made by thousands of different parts. Each part has its own technical property and PFAS brought very specific and critical physical and technical properties to some parts. EEE supply chain is a complicated one, and each supplier needs to be involved in this assessment to be sure to transition to PFAS free products. Among the 10,000 PFASs that exist, if the legislator will first focus on PFAS with known hazardous properties, it would be more manageable for the whole supply chain, to phase them out in a reasonable timeline. and 1000ppm can be controlled. However, proposed thresholds of 25 parts per billion (ppb) and 50 parts per million (ppm) for articles are extremely difficult for downstream users like us to control. In terms of hazard or exposure, based on the current scientific state of play, not all 10,000 PFASs meet the Persistent or Bioaccumulation criteria. For this reason, we strongly believe that only PFAS with Persistent or Bioaccumulation hazard should be regulated at this stage. Indeed, we should avoid as much as possible to phase out PFAS that don't meet the criteria of Persistent or Bioaccumulation by substances that may be more harmful.

There are certain specific instances of PFAS use that are unique to printer hardware and for which the knowledge and know-how concerning the underlying functional requirements is limited to the printer manufacturers.

Certain - sometimes common and commonly used - PFAS compounds are necessary and even essential in printer hardware because they possess the right combination of properties to meet functional requirements that are very specific to printers.

In several cases, it is anticipated that PFAS-free alternatives can be found and deployed in a timely manner within the projected timeline of the PFAS restriction proposal.

However, for some specific applications in printer hardware, this is not the case and a longer transition period of, at least, 12 years is indispensable to safeguard the production of state-of-the-art printers.

In terms of socio-economic impacts, if PFAS were to be regulated as proposed, we would not be able to substantially produce printers and copiers but also any other EEE products. This would not only affect our group company but would also have far-reaching negative impacts on component and raw material manufacturers. In modern society, copiers and printers are essential products. In this case most of the printers will not be available on European market the impact for businesses and end users would be huge. For this reason, our company requests derogation for critical uses for printers. We describe exemptions in detail in specific information request 6. Currently, our company has not been able to identify suitable alternatives to phase out PFAS used for some key components. Therefore, we would like to request exemptions for non-replaceable and essential uses of PFAS for printing and copying processes, the uses are listed in section 2. Our company is already looking for suitable alternatives to replace PFAS, however it will take time to identify and qualify alternative materials to fulfil all characteristics required for these key components in printing and copying processes. **For this reason, we request a derogation of 12 years for all uses described in this document, uses that are critical for printers' high-quality functions.**

In addition, we strongly request that the annual import volume reporting obligation targets only substances and that articles will be out of the scope. First, only some PFASs have been confirmed to be harmful. Secondly, long-life articles such as EEE are designed not to release the contained substances in normal condition.

Additionally, PFAS survey in importing finished products is extremely overloaded and facing difficult with long supply chain. Under this circumstance, it will take enormous cost, meanwhile, rarely to be obtained valuable information. We explain the more realistic way of reporting in Section C of this document.

Regarding opinions on this regulation related to imaging equipment, we would also like relevant members to be referred to the following written opinions that have already been proposed by industry groups.

- JEITA: RCOM Part21 Page56 Entry No4543
- I & P Europe: submission number – d4e4ed3c-72ad-4639-b640-be2a32ec53de
- Study by Ricardo Energy & Environment, commissioned by the European Chemical Industry Council (Cefic), estimated the final economic impact of the PFAS restriction on various end-use sectors. The results clearly demonstrate that the PFAS restriction, should it enter into force in its currently proposed form, would have a devastating impact on the economic performance of the electronics industry in Europe. The annual overall turnover losses for computers, small and large

printers, electronic and optical products are estimated at 78% against a 2021 baseline. For electronic components, an 84% turnover loss is estimated. This strongly underlines the need for the derogations requested in this document.

Emissions in the end-of-life phase:

For printer industry, there is no manufacturing process in which PFAS are, under normal condition, disposed of in the form of by-products or losses during manufacturing.

In some models, a small amount is added to the ink, so the amount fixed on the paper and discharged amount is not zero.

Emissions in the end-of-life phase:

In the first place, the amount of fluoro resin used in electronics is small, and end of life EEEs are subject to EU WEEE Directive. We think that end-of-life EEE have been collected and recycled / dispositioned appropriately in accordance with the Directive. We think that the use of PFAS in electronics has less impact on the environment. If there are concerns about PFAS in waste EEE, we believe that it can be effectively managed by strengthening the management of separate processing and treatment facilities through recycling and waste laws such as the WEEE Directive, rather than by regulating them under the REACH Regulation.

In addition, the reduced environmental impact of reducing PFAS in electronics will be small compared to the increased waste generated by substitution. Fluorine-based materials have both high functionality, high durability, and high stability, resulting in long life and low waste volume. Even if PFAS could be reduced, the environmental impact would increase in other aspects, because the reduction of PFAS would increase waste.

Impacts on the recycling industry:

For recycling of the articles, derogation for articles already placed on the market before implementing the restriction should be provided like other restriction covering articles under Annex XVII to REACH. With such derogation, used, repaired or refurbished products would be able to be used after the restriction without problems.

We request that the following derogations should be added to the proposed EU universal PFAS restriction under REACH:

- Spare parts for repair of finished consumer electronic equipment already placed on the market,
- Spare parts for repair of finished professional business-to-business electronic equipment already placed on the market,
- Re-supply of articles already placed on the market (pre-owned products)

These derogations are critical to help achieve EU goals of avoiding premature obsolescence and for compliance with laws promoting product longevity. The concepts of “right to repair” and allowing resale of pre-owned products have been broadly incorporated into other EU substance restrictions, and other EU REACH restrictions, and it is essential to incorporate them into the EU PFAS restriction to avoid major market disruptions.

In addition, considering that each country's PL law under Council Directive 85/374/EC (Product Liability Directive) imposes product liability for 10 years, service parts must be supplied to customers who purchase copiers and printers for at least 10 years.

Missing uses – Analysis of alternatives and socio-economic analysis:

The PFAS used for printers and copiers include PTFE, PFA, PVF, other polymers, and PFPE (lubricant).

There are only a few dozen of imaging equipment manufacturers. However, if the use of PFAS is prohibited as proposed, the production of copiers/printers will not be possible. At the same time, a wide range of parts and raw material suppliers will be affected. In addition, copiers/printers are an essential product in the social economy, and if they become unavailable due to the PFAS restriction, all companies, government offices and individuals using printers and copiers will be affected. In other words, the impact will be widespread in the worldwide beyond the EU.

In the search for alternative materials, it is required that they have the same characteristics as PFAS, such as deformability, flame retardancy, chemical stability, wear resistance, etc. In addition, it is necessary to select materials that do not fall under the persistent nature regarded as the proposed PFAS regulatory basis, and there is currently no substitute material. At present, we do not know any materials to fulfil heat-resistant and non-adhesive functions at the same time, and for example, even a Silicone polymer system which claims releasability / heat resistance is insufficient. In addition, although several decades have passed since consideration of the substitution of fluoropolymer for sliding property, no alternative substance other than fluoropolymer has yet been found. To actually apply it to products such as printers and copiers, it is necessary to examine the processing conditions for the parts and to meet many evaluation criteria such as strict image quality, durability, and safety for each printer and copier, and it is necessary to re-acquire various safety standards and environmental certifications for each printer and copier in accordance with the change of components. Some manufacturers produce and sell hundreds of different printers and copiers with different printing speeds and functions to meet various customers' demands, and it is impossible to develop, evaluate, and obtain certifications for all printers and copiers at the same time, so even if alternative materials are found in the future, it is impossible to replace all

products with alternative materials in 12 years.

There are currently no alternatives, so costs cannot be calculated. Even if there is an alternative in the future, it will take, at least, 12 years (Including several years for the investigation of alternative materials, five years for development, and a warranty period for service parts). When fewer durable materials are used, the user frequently needs to replace/repair parts, and the burden of replacement/repair costs becomes enormous. No alternative provider information available.

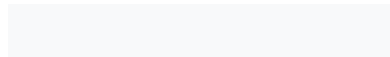
As mentioned above, the loss of printers and copiers, which are already part of the social infrastructure, will affect everyone in the EU. In addition, for businesses that use printed matters as their products, the deterioration of image quality will increase the number of unsuitable printed matters, which will significantly reduce profits and cause problems such as delay in delivery.

For further details, please refer to the written opinion submitted by I&P Europe (d4e4ed3c-72ad-4639-b640-be2a32ec53de).

Other identified uses – Analysis of alternatives and socio-economic analysis:

We considered the economic loss and social impact of the inability to produce electrophotographic copiers/printers due to PFAS restrictions. The statistics currently available from information shared by the Japanese Imaging Equipment Industry Association JBMIA do not accurately calculate volumes of printer and copier in the EU market, but the economic impact would be equivalent to billions of Euros in annual sales in the EU, and the losses would have a direct impact on related supply chains in Europe. In other words, not only will we, original manufacturers, suffer losses, but the people and companies involved in the supply chain in the EU are also likely to suffer losses.

Furthermore, there are likely to be tens to hundreds of millions of existing copiers/printers already on the market in the EU. If PFAS were to be completely restricted, maintenance and service parts would be unavailable before the end of the copier/printer's life. Even working copier/printer can become a waste soon if it runs out of maintenance parts, this is against the EU green deal goals. The environmental impact of the increase in waste is a concern.



B. SEPCIFIC USES – REQUEST FOR 12 YEARS DEROGATION

1. Optical Sensor

Description of optical sensor technology in printers

An optical sensor is a mechanism used on an ink cartridge to detect the existence of ink in the cartridge using light. When there is ink on the surface of the optical sensor, it reflects light, whereas when there is no ink on the surface of the optical sensor, it allows light to go through into the cartridge. This difference makes it possible to detect the existence of ink in the cartridge. Therefore, the area where the sensor is located on the cartridge needs to keep clean to achieve its function. Indeed, if some ink is left on the optical sensor surface, the printer will continue to move even if there is no ink in the cartridge.

Description of PFAS technical properties for optical sensor

PFHxA are used as water-repellent in the optical sensor technology. With the optical sensor technology, it is essential that there is no ink remaining on the surface of the optical sensor, and this is only possible by using PFAS. Always keeping the optical sensor clean enables printers to fully function to detect the existence of ink in the cartridge.

Information on (lack of) alternative solution

Detailed information on the lack of alternatives can be found in the confidential appendix 1. It is concluded that there are no viable alternatives to the use of PFAS for water repellent used for the optical sensor.

2. Print head

The print head is a unique technology and each material in the printhead has been chosen for its technical properties, ensuring a very high quality printing. 3 main parts of the printhead contain PFAS, all technical properties are listed in the below sections.

Because the printhead is a component inside the printer, the user cannot touch it directly. There is no intended release of PFAS during printing process. The quantities of PFAS used in the print head is very small, in addition, printer products are properly disposed in accordance with the WEEE Directive. This ensures a safe management of the end of life of our printers with a minimal impact to the environment.

Impact if fluorine surface treatment cannot be applied to the print head:

① Inkjet printers will no longer be manufactured.

If PFAS were restricted as the current restriction proposal, it would be almost impossible to manufacture most printers. This situation will affect all the supply chain from raw material suppliers to end users. Printers are an essential infrastructure, and their disappearance would have a huge impact on users.

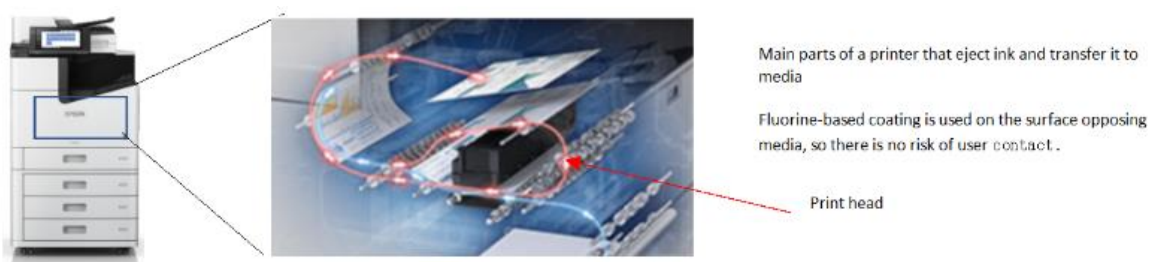
② Sales of inkjet heads for industrial and commercial use will become impossible.

Our company continues to grow in sales of inkjet heads for digital printing for industrial and commercial use and is expanding from analog printing to digital printing in a wide range of printing industries, including cloth, tiles, cardboard, flexible packaging, signage, and electronic substrates. And we are leading the transformation.

The shift from analog printing, which requires printing plates, to digital printing has led to reductions in environmental impact, such as reductions in disposal losses, water and ink waste, and power consumption. If the fluorine-based material cannot be used and the water repellency is lowered, the ink on the nozzle surface cannot be properly removed, which leads to ejection failure and seal failure, which leads to a brake on the above-mentioned digital conversion movement.

a. Part surface opposing media

Description of print head part surface opposing media technology in printers



Print head is an essential technology for inkjet printers to stably eject ink and transfer it to the media. A printing media can be photographic paper (coated), business documents (uncoated paper), cloth, tiles, cardboard, flexible packaging, signage, electronic boards, etc.

Description of PFAS technical properties for surface opposing the media

A fluorine coating is required to ensure the following functions:

- Water/oil repellency: To achieve normal ejection, there should be no spreading or sticking of ink on the opposing surface.

→Water and oil repellency on the surface opposing the media is required.

- Scratch resistance : No ejection failure or sealing failure due to contact with maintenance parts or media.

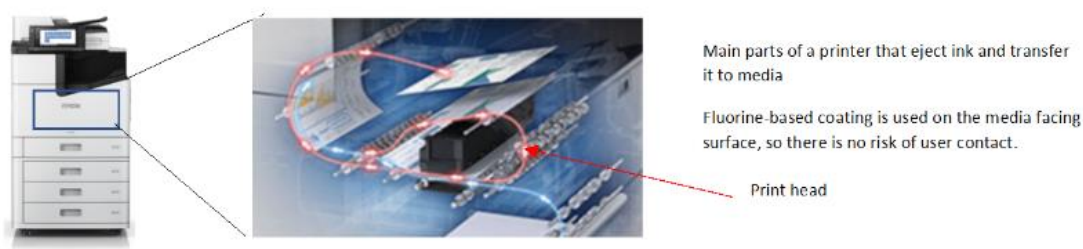
→ It is necessary that there is no decrease of water repellency due to abrasion resistance.

Information about (lack of) alternatives

Detailed information on the lack of alternatives can be found in the confidential appendix 2.

b. Function of pressure regulating valve

Description of the pressure regulating valve in the print head



An essential function for a stable printing is to ensure a control of the pressure in the channel that supplies ink to the print head for an inkjet printer.

Description of PFAS technical properties

There are two main characteristics required for pressure regulating valves:

- Seal ability : The sealing performance must be maintained without the adhesion of wear and deposits due to the opening and closing of the valve.
 - The valve material surface needs to be antifouling.
- Ink resistance : Valve opening/closing performance should not be deteriorated by the ink components.
 - Water and oil repellency is required to protect the valve material (base material) from deterioration by inks.

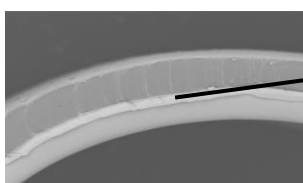
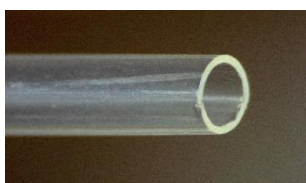
Information about (lack of) alternatives

Alternative candidate evaluation results on the lack of alternatives can be found in the confidential appendix 3.

4. Ink supply tube

Description of ink supply tube

The ink supply tube is multi-layered structure tube with a layer of PFA, the copolymers of tetrafluoroethylene and perfluoroethers. It is used as ink supply tube for inkjet printers.



PFA layer (Inner layer)

Description of PFAS technical properties

The key functionalities provided by PFAS for ink supply tube are:

- Ink resistance: Excellent durability against solvent ink, no deterioration or deformation.
- Barrier properties: Excellent barrier performance against liquids and gases, preventing changes in ink properties and the formation of air bubbles in the tube.

Information about (lack of) alternatives

The following table shows the comparison of materials. At this moment, there are no available alternatives for (PFA) inner layer of the ink supply tube. In case, PFAS will be restricted, the ink will degrade

	Ink resistances	Liquid / Gas barrier properties
PFA tube	Excellent	Excellent
Polyethylene tube	Good	Poor
Various rubbers and elastomers	Good	Poor

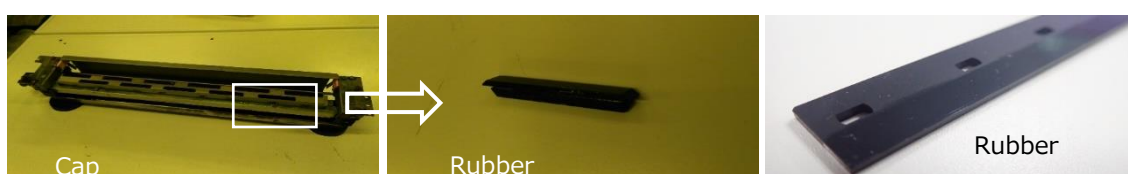
the ink supply tube, resulting ink leaks. Moreover, if the barrier performance is poor, the viscosity of the ink increases, and air bubbles are generated inside the tube. The movement of them will clog printer head. As the result, the print quality will decline and will not meet customers' expectations.

5. Rubber cap and wiper

Description of Rubber Cap and Wiper components

The print head of UV ink and solvent ink printers must keep clean by cap and wiper components. Fluorine elastomer is used in the rubber part of these components.

- Rubber cap: It prevents the surface of print head nozzle drying and covers the print head when not printing.
- Rubber wiper: It removes ink, paper dust, etc. from the surface of print head nozzle.



Description of PFAS technical properties

The following functionalities provided by PFAS are required to rubber cap and wiper:

- Ink resistance
- High water repellences for various liquids

UV and solvent inks would degrade parts if the materials used don't meet the above functionalities;

(1) Loss of elastic performance due to swelling and shrinkage of the material.

(2) Inadequate water repellence causes adverse effects due to fixation of ink components.

Deterioration of parts leads to the following problems:

- Cap parts: Due to the deterioration of the moisturizing function and the adhesion, the solvent evaporates from the tip of the nozzle, leading to clogging.
- Wiper mechanism: The wiping ability deteriorates, and foreign matter enters the printer head nozzle.

Information about (lack of) alternatives

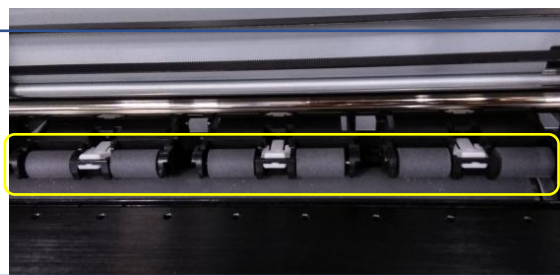
At this moment, no suitable alternatives have been identified to replace fluorine elastomers. The below table describe the different alternatives tested and the reasons why they don't meet the technical requirements for the rubber cap and wiper.

	Ink resistances	Water repellences	Liquid / Gas barrier properties
Fluorine elastomers	Excellent	Excellent	Good
Silicone rubber	Correct	Good	Poor
EPDM rubber	Poor	Poor	Good

6. Paper Feeding Driven Roller with PTFE (PF roller)

Description of Paper Feeding Roller

Feeding driven rollers used PTFE has assembled in printer to prevent electrification during paper feeding.



PTFE roller

Description of PFAS technical properties

Page feed rollers with PTFE have characteristics that prevent ink mist marks on the printer roller. (This problem is caused by the electrical charges induced by the peeling of PF rollers and printed paper during paper feed.)

The electrical charges increase with the distance between 2 materials as shown in the following triboelectric series. For large format printers designed to use a large amount of PVC coated paper, paper feed rollers with PTFE, which is the closest distance to PVC in the series, can avoid the electrical charges.

source: [Triboelectric Series - Triboelectric Effect, Triboelectrification, FAQs \(byjus.com\)](https://byjus.com/physics/triboelectric-series/)

Information about (lack of) alternatives

There are no alternative materials that fulfil the required function (water repellence and chemical substance). In particular, PTFE has the high performance of water/oil repellence and can act as a barrier film to prevent liquids from entering the formed hole, which cannot be achieved with other materials.

	Water repellency	Chemical resistance to ink ingredients
PTFE porous membrane	+	+
Nylon Membrane	-	-
PP membrane	-	+: good performance

If this material cannot be used, a large amount of air bubbles will remain in the ink supply system and flow into the print head, causing problems such as inability to print or poor print quality. In addition, if other materials with low water repellency are used, the ink passes through the material and ink may leak out of the machine.

8. Moisture permeable membrane

PFAs Description of Moisture Permeable Membrane

(1) Ink internal storage tank in printer

Polytetrafluoroethylene PTFE porous membrane has been used on the top of ink internal storage tanks in printers. The porous membrane allows the air to enter into the tanks. The porous membrane can also prevent ink leakage from the tank when the printer is overturned.

PTFE porous membrane



Ink internal storage tank is one of parts consisting of ink flow system.



(2) Printhead cap

The ink flow path mounted on the printhead cap, is the part that prevents the printhead from drying when not being operated, it is formed by the porous membrane. Inks with increased viscosity due to drying can absorb moisture through the porous membrane.

Printer head cap



Printer cap is covered with sheet metal parts and sponges.



Description of PFAS technical properties

PTFE moisture permeable membrane has the best technical characteristics; It is permeable to water vapour but impermeable to water drops. These properties ensure keeping a high quality during the full printer life. At this moment, no other materials with these characteristics have been found.

Information about (lack of) alternatives

(1) Internal ink storage tank in printer

- A considerable alternative material is silicone material. However, when ink adheres to silicone materials, its moisture permeability is greatly reduced. As a result, ink is no longer supplied to the printhead, causing ejection failures.
- To prevent ink leakage, another solution is to arrange the ink flow path in a complex way. This solution could clog the ink flow path, and also cause ejection failures.

(2) Printhead cap

- PTFE porous membrane can repel waste ink ejected from the print head while allowing moisture on the opposite side of the print head to pass through. If we can't use PTFE porous membrane, the concentration of the moisturizer will change and the moisturizer cannot perform the function to prevent the printer head from drying, and thus it will increase the probability of ink clogging issues.

9. Fuser roller for Paperlab

Description of quick-drying grease

Purpose of use

1. Ensuring smooth movement of sliding parts on the paper path inside a printer
2. Preventing printing defects caused by adhesion and deposition of ink to Star Wheel

Description of PFAS technical properties

Fluoropolymer is optimal for ensuring sliding properties.

Information about (lack of) alternatives

No alternative material exists as of this moment. If the use of PFAS became prohibited, it will lead to a decline in product quality due to defects such as sliding defects.

Detailed information on the lack of alternatives can be found in the confidential appendix 6.

10. Fuser roller for Paperlab

Description of fuser roller use for PaperLab

The fuser roller is used to melt thermoplastic materials and bind paper fibers together. During the binder melting process of used paper recycling equipment, the thermoplastic material dispersed between the fibers is supported by rollers, etc., and the fibers are bound together by heat and pressure.

Fuser roller : Covered or coated with PFA tube on the surface.



Fuser roller



Applicable product

Description of PFAS technical properties

As mentioned above, to use it as a melting function for thermoplastic materials, high mold releasability (water contact angle) and heat resistance are required.

Information about (lack of) alternatives

Ceramic coatings and non-adhesive resin coatings are also available as materials having high releasability and heat resistance. However, since these materials are hard materials, they are not flexible, and if they

are used on the surface of an elastic body such as a heat roller, they lose their elastic function and do not satisfy the properties required for their melting function.

Fluorinated resins that satisfy the above three characteristics are essential materials for this function and, at this moment, there is no alternative materials from our best of knowledge meeting the requirements.

Characteristic comparison chart of each materials :

Type of material	Water contact Angle (Degree)	Water contact energy (dyne/cm)	Heat resistance(°C)
Fluorinated resin PTFE	114	42~43	≧327
Fluorinated resin PFA	109	42~43	≧260
Fluorinated resin FEP	115	42~43	≧260
Silicone resin	90~110	47.8~72.7	≧200~250
Paraffin	10.5~10.6	52.7~53.8	≧65
Polyethylene	88	75.2	≧70~110
Polyamide (nylon)	77	97.7	≧80~150
Phenolic resin	60	109	≧150~180
Copper	9.6	144.2	≧1000
Aluminum	4.6	145	≧660

Detailed information on the lack of alternatives can be found in the confidential appendix 7.

C. SMALL PARTS – ALTERNATIVE OF EXEMPTION

① Proposal on introducing threshold for “small” parts as another alternative of exemption for articles.

- a) weight of part (purchased unit)
- b) weight of component which PFAS is contained
- c) concentration of PFAS (0.1 wt%)
- d) amount of PFAS contained

Based on our available information, the amount of PFAS contained in articles, which were confirmed to contain PFAS, is very small (An example is already restricted PFOA restriction level. But please pay attention as a premise this chemical substance is considered to be able to substitute to another). On the other hand, EEE uses hundreds of (tens of thousands of, in some cases) parts and it needs huge workload for reporting of such PFAS information even if the information is collected with known or reasonably ascertainable level of information. Regarding c) concentration, 0.1wt% (1000ppm) is the feasible and de minimis threshold which enables investigation, management, and reporting. From economic rationality point of view, we would like to propose abovementioned threshold for the “small” parts.

② Supporting finite list of PFAS subject to reporting

It is very difficult to carry out the investigation to upstream supply chain unless PFAS subject to reporting are identified by unique identifier like CASRN.

③ Supporting simplified reporting forms for article importers

Article importers can obtain only limited information compared to PFAS manufacturer. As a more practical solution, we would like to request to enable reporting volume/quantity per final product in addition to per article consisting of the final product.