Nissan Position on THE ANNEX XV DOSSIER OF THE UNIVERSAL PFAS RESTRICTION PROPOSAL

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Nissan Motor Corporation Ltd.

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1. About Nissan

About Us

Nissan Motor Corporation continues its quest to optimize product development and deliver highly innovative technology. Today, in various countries and regions around the world, Nissan enjoys a stellar reputation for creating truly innovative vehicles and service programs.

Nissan's Environmental Principle

Nissan's Environmental Philosophy - Symbiosis of people, vehicles and nature
As Nissan strives to understand the environment better, all of us at Nissan bring to our activities a shared concern for people, society, nature and the earth. This commitment and concern is embodied in every Nissan product and in all of the company's operations, including sales, as the driving force of Nissan's ongoing contributions to a better society.

Nissan's Environmental Initiatives

To realize the promise of its environmental philosophy "a Symbiosis of People, Vehicles and Nature," Nissan has promoted a series of midterm environmental action plans under the name "Nissan Green Program (NGP)." Under NGP2016, our previous plan, the company continued taking steps toward its ultimate goal of reducing environmental dependence and impact to levels that nature can absorb. The targets set for four key initiatives under the program, "Zero-emission vehicle penetration", "Fuel-efficient vehicle expansion", "Corporate carbon footprint minimization", and "Natural resource use minimization" were fully achieved.

Environmental Initiative and Framework

With the world population expected to reach 9 billion by 2050, communities and the business sector will play growing roles in solving social issues and working to realize the Sustainable Development Goals (SDGs) adopted by the United Nations. The automobile industry, too, faces an increasingly important responsibility to provide value to society by delivering safe, secure and sustainable mobility for all.
Nissan supports the Sustainable Development Goals.

2. Executive summary

- The PFAS REACh regulation is expected to have a significant impact on the automotive industry.

• This document is Nissan's first response to the public consultation and revised Annex XV document published on March 22, 2023 (nd).
• The auto industry and Nissan share a desire to reduce the use of PFAS wherever possible. However, this proposal is not consistent with Nissan's view on this issue.
• The automotive industry is a major downstream user of many PFASs, including fluoropolymers, fluorinated gases and short-chain PFASs.
Fluoropolymers are used in several key technical components such as gaskets, hoses, joints, O-rings, seals, cords, cables and sleeves.
• The current proposal does not allow exemptions for such uses. There are many cases which the alternatives do not exist and are not evaluated.
• Nissan expresses great concern that this restriction will continue to be enforced.
• It is requested that fluororesins (including fluoroelastomers and perfluoropolyethers) are to be exempted from the regulations as much as possible.
• Application of the PFAS regulation must be done in two stages for the automotive industry:

o As a first step, PFAS will be banned only in newly type-approved vehicles, in accordance with the Code of Practice for Regulations applicable to the automotive sector.

o General prohibition of all vehicles in production once relevant alternatives (use by non-global use) are eligible.

• Ensure maintenance and repairability of vehicles that are no longer produced when the restrictions come into effect. This allows for a more sustainable industry and adheres to the principle of "repair what is produced".
• Ensuring that machines that produce vehicles and their parts on industrial sites can be maintained and repaired for a long service life under high industry standards and emission-avoiding regulations.
• Nissan recognizes the need to regulate PFAS, but the current proposed regulation is too broad and has too much impact, so it cannot be called an appropriate restriction.
• In principle, Nissan would like fluororesins (including fluoroelastomers) to be exempt from this regulation. And the “repaired as produced”” principle should be applied to all existing vehicles.
• Nissan requests the authorities to consider introducing a review mechanism to allow further extensions to be applied for before the exemption period expires similar to that currently in place for exemptions from the RoHS and ELV Directives. Fluorine-free alternatives are not always available and even safer. The reality is that there are applications for which there are no prospect of replacement.

3. General Comments)

1) About PFAS and PFAS regulations

- The PFAS regulation is proposed to regulate chemical compounds through a grouping procedure already adopted for other fluorochemicals such as PFOA and PFOS.
- However, Nissan believes that the proposed restrictions cover a much broader group of chemicals (thousands of substances) and that there has not been a proper scientific hazard and risk assessment of each substance or group of substances.
- In the case of materials like PFAS, it should be recognized that the inherent property of persistence provides desirable properties of high durability and unique functionality to products manufactured and treated with this chemistry.
- For example, electrical equipment is used in a variety of potentially harsh conditions and must function perfectly under those conditions. To maintain this high level of reliability and performance, components must be moisture, water and rust resistant, and withstand corrosion and extreme temperatures.
- In order to meet the above requirements, functions such as low dielectric constant, low dielectric loss tangent, low refractive index, and oil repellency are essential.
- Only PFAS materials can provide all the required functions and performance simultaneously in one material.
- Currently there is no alternative to show the combination of all the above properties.
- A recent review stated that '16 unique families of commercially popular fluoropolymers meet OECD criteria'. The abstract reads:

Fluoropolymers are irreplaceable in many applications due to their unique combination of properties and unrivaled functional performance that are important to the products and manufacturing processes they enable.

- A safety profile has been documented for fluoropolymers. They are thermally, biologically and chemically stable, practically insoluble in water, non-migratory, non-bioavailable, non-bioaccumulative and non-toxic.
- Fluoropolymers fit the structural definition of PFAS, but have significantly different physical, chemical, environmental and toxicological properties when compared to other PFASs.
- Large molecules, such as polymers, are continuous and nothing can penetrate into the cell membrane. Polymeric PFAS should be reconsidered as out of scope.

2) Global impact on auto parts

- PFAS have been widely used in industry due to their unique properties:

Very high stability, high temperature and high pressure resistance, electrical insulation, chemical resistance

• Fluororesins and fluoroelastomers are both classified as PFAS and will be prohibited by this proposal, but by using them as coating agents, friction between materials can be reduced. This characteristic is very important for the automotive industry.

• F-gas is also widely used as a refrigerant in the automotive industry, and currently the main gas used in mobile air conditioners is R-1234yf. For further details, please refer to the views of the Japan Automobile Manufacturers Association and the European Automobile Manufacturers Association.

• Please note that Nissan, as a downstream user, will be greatly affected by the following sub-use bans.

- Lubricant
- Application of fluororesin to batteries and fuel cells
- About the use of PFAS in electronics and semiconductors
- Fibers and fabrics used in automobiles

• As vehicle OEM is not the direct manufacturer of such goods or products above, Nissan shares relevant data collected on this subject.

• The committee should refer to relevant submissions from professional associations to gain a clear understanding of the issues in a global perspective.

• Nissan attached the investigation result for each item to clarify Nissan's position and provids them in the end of this document.

3) Maturity of alternative products

• In the automobile industry, consideration of alternatives for some PFASs has progressed, but sufficient progress has not been made in examining alternatives for all PFASs.

• Due to many of the properties that can be obtained from the use of PFAS, other alternatives for obtaining the same properties may influence the design of these applications themselves, making their validation and implementation more complex.

• Finding alternative materials requires evaluating many parameters of candidate materials. Such an evaluation is a complex process, as a car is a highly complex product with thousands of parts and likewise dozens of different operating conditions.

• This evaluation includes physical testing of the product for durability, temperature, humidity, crashes, and more. This test is time-consuming and can be expensive (several million euros per substance).

• Therefore, it seems an unrealistic expectation for industry to systematically evaluate all possible substitutes for restricted PFASs in order to conclude the need for deregulation.
• In general, such assessments should be focused on the specific use of the substance. In this case, the problem is that the use of PFAS in industry is still poorly informed, as stated in the Annex XV document. And a suitable replacement should be available:

a. Be in sufficient quantity;
b. Be of acceptable quality;
c. Have the same performance and functionality (meet OEM-specific requirements that may vary by OEM)
d. Consistent delivery over the life of the contract between supplier and OEM
e. Comparable to the original material in terms of cost

• Also Nissan must avoid substituting the materials that are less safe, sustainable and durable. by applying essential use definitions.
• Such substitutions may result in trade-offs in long-term reliability, safety and emissions performance, or compromise the long-term sustainability of automotive products.
- The default transition period should be at least 48 months or more to ensure a sufficient transition period, considering the given complexity and impact of the current proposed restrictions on multiple industry value chains, this is not realistic.
- For reference, ECHA proposed a transition period of 36 months in its proposed limits for PFHxA and its salts.
- Given the much broader scope of the proposed PFAS restriction, Nissan considers the 48-month transition period is to be a strict minimum for the industry to adapt its products and ensure compliance with the restriction.

4) Necessity to set the timing for reviewing the exemption period

• Nissan requests a mechanism to allow further extensions to be applied for before the exemption period expires.
• The industry wants to make every effort to find alternatives and develop alternative technologies for substances with demonstrated unacceptable risks. However, as noted above, fluorine-free alternatives are not always available and even safer. **The reality is that there are applications for which there are no prospect of replacement.**
• It may not be possible to develop a suitable replacement before the extended transition period fixed for a particular exemption expires. Nissan therefore asks the authorities to consider introducing a review system similar to that currently in place for exemptions from the RoHS and ELV Directives.

5) Maintenance and Sustainability

• The proposed regulatory states that general regulation of PFAS will come into force around 2026/2027, with the potential benefit of short-term and long-term exemptions for certain uses.
• Nissan's current understanding is that only a few automotive applications will benefit from the exemption under this draft, and the majority of automotive applications will, following issuance of this proposed restriction, Nissan has to redevelop, validate and implement on all models in production.
• Furthermore, the maintenance of vehicles whose production will end in 2026/2027 will no longer be possible with spare parts according to the current definition, for example with the current air conditioning fluid (R1234yf).
• Products placed on the market require the same spare parts that were originally used in the original product. Redesigning spare parts often requires redesigning the entire product. Otherwise, the original performance (that is, safety and durability) cannot be guaranteed. Given the supply chains and production processes of many manufacturers, such a redesign is almost never possible.
• Maintenance and repair are key points in a vehicle's long life cycle. As past consultations have shown, phasing out substances in legacy spare parts is neither economically nor technically feasible. This issue was originally raised and resolved during the discussion and implementation of the EU's End of Life Vehicles (ELV) Directive (2000/53/EC).
• The exemption of these spare parts under the ELV Directive has been confirmed by the Member States and the EU Commission ("repaired as produced"). This decision allows transport vehicles to be serviced, repaired and maintained in a manner that does not impair their function, safety and reliability, without limiting the types or categories of components.
• The absence of exemptions for spare parts of any kind would seriously undermine the supply of spare parts and prevent vehicles from being serviced, repaired and maintained, strongly contradicting the overall strategic goal of a circular economy.
• As such, Nissan supports mitigation measures that enhance the sustainability of its existing fleet in order to promote a 'repaired as produced' policy.

6) Regarding the traceability of PFAS in the supply chain

• It is highly unlikely that the auto industry will be able to manage global PFAS regulations with the current proposals. The identification of PFAS is still in progress and it will likely take many years for the entire supply chain to provide relevant information.
• Therefore, the time schedule of 18 months from entry into force is too short and most industries will not be able to meet it.

- This is likely even considering that the auto industry already has tracking tools and strong databases to identify substances. But many suppliers and other industry sectors do not have access to the extensive tools that the automotive industry has.
- Therefore, in this proposal, the time schedule to make the whole exemption period longer should be reconsidered.
- The concentration limits set out in the Annex XV dossier are due to the lack of testing standards for fluorinated substances and the lack of a legal obligation for international supply chains to communicate PFAS content in parts and materials. Need to considers that the limit value cannot be applied under the present circumstances.
- Although there are thousands of PFAS substances, currently only about 40 types of PFAS are registered in the database of the automobile industry.
- The only thing Nissan can actually do is to ask each supplier about the actual usage situation, and support the schedule, cost, and quality confirmation plan regarding the possibility of substitution and switching in case of substitution.
- For each item that Nissan believes requires an exemption, Nissan has provided relevant information and stated them at the end of this document.
- Nissan has not finished investigating seal applications, lubricating oil applications, lubricants, electronic component applications, and heat-resistant harnesses at present. Further investigation will take more time.
  Iit is estimated that there will be cases which would be difficult to substitute for applications that Nissan has not been able to grasp so far, when Nissan asks suppliers to switch in the future.
- Nissan would like to clarify as much as possible and submit additional information by the comment deadline in September.

4. Exception for each use

1) Semiconductor manufacturing process

[Current state of use]

It has been found that PFAS are being used in the following manufacturing processes of semiconductors:

・ Etching process

(1) C4H8, CH2F2 and other PFAS are used as etching gas (in formation of microcircuits)

(2) Used in cooling refrigerant to keep wafer temperature down (precision temperature control)

・ Equipment materials

(1) Used in high-quality fluorine rubber in the product form of vacuum sealants (highly clean, heat resistant, plasma resistant)
(2) Used in fluororesins in the product form of chemical tubes, joints, valves

[Possibility of substitution / Time needed for substitution]

Reportedly, at present there are no means of replacing the PFAS used in the manufacture of high-performance semiconductors. A grace time is definitely necessary to develop substitute technologies for these PFAS, or automobile production will become impossible. While Nissan cannot state exactly when such substitute technologies will be completed, our best projection is a minimum grace requirement of 13.5 years.

According to the explanations given by experts, the PFAS used in the semiconductor manufacturing process do not infiltrate into any automotive product.

2) Lithium-ion batteries

[Current state of use]

Indispensable for lithium-ion batteries, fluorine-based materials are used in these batteries in large amounts. Examples of use are as follows:

・ **Separator**

The separator is the porous material that transmits lithium ions across itself and is placed between the positive and negative electrodes in order to prevent their direct contact and thus their internal short-circuiting.

For realizing its above-mentioned function, the separator must be made electrically insulated and ion-conducting.

For its stable operation, the lithium-ion battery requires a chemical stability (e.g. electrolyte resistance, humidity resistance), an electrochemical stability (e.g. reduction resistance against negative electrode, oxidation resistance against positive electrode), and a mechanical strength.

Furthermore, for the safety of the lithium-ion battery as a whole product, a shut-down function and a heat-resistant characteristic are required.

To satisfy these requirements, PFAS such as polyvinylidene fluoride (PVDF: CAS 24937-79-9) are applied to the separator as a coating fluororesin.

· **Binder**

An electrode active material adjoining with aggregates (e.g. metal foil) or with electrolytes, the binder comes in a powder body.

In many cases, a binding or bonding agent is used to maintain a layer of electrode active materials adjoining with themselves or with aggregates, etc.

The electrode binder is required to have properties such as chemical stability, electrochemical stability, high adhesiveness (peel strength), and minimum increase in internal resistance.

Most representative of organic solvent binders is the crystalline thermoplastic PVDF which boasts a marked mechanical strength and excellent workability.

Also highly chemical/heat resistant, PVDF is in wide use as binder for positive electrode.

[Possibility of substitution / Time needed for substitution]

Despite the passage of 30 years since the successful development of lithium-ion batteries, Nissan still lacks materials that can substitute for PVDF used in lithium-ion batteries.

PVDF is also used in non-lithium-ion batteries such as ASSB and Na batteries.

According to the product development roadmaps drawn by battery suppliers, batteries that use PVDF will continue to be the mainstay until around 2035.

Consequently, it would be reasonable to estimate a requirement of 10 years for the development of a substitute material, another 10 years for the validation of PFAS-free batteries, and an additional 10 years for the practical application of these batteries to vehicles--amounting to a total grace period of 30 years.

We, Nissan, would therefore seek an indefinite grace period initially; then review the grace period at the 10 year after entry into force (EiF).

3) Coating and finishing

3) -1 Surface coating

[Current state of use]

PFAS are used in the surface coating of parts and components.

As mentioned early, Nissan is downstream users of PFAS. As such, Nissan is asking our business partners for possible shift to substitute materials, while our survey on the impacts of PFAS restriction is still underway. Nissan is proud to say that Nissan models live up to the high technological levels demanded in the European safety and environmental regulations.

At the same time it is true that each one of the parts and component comprising vehicle, if its material is altered, can have significant impacts on the required safety and environmental levels. To identify these potential impacts, a large number of tests and a long period of time are required.

As for other actual conditions, Nissan believes that the same consideration, as the plating solution described below, is necessary for electroless nickel phosphor plating and flake baking coating (Geomet treatment) ,they are under investigation though.

- Topcoats of electroless nickel phosphorous plating contain PTFE for a different reason than in chrome plating, and which use of PTFE is essential.

There is information that some plating solution companies are preparing PFAS-free products, Nissan believes that it is necessary to secure a sufficient supply volume in the plating solution market and ensure a sufficient period of time for upstream suppliers to supply plating products that meet the quality requirements of automobile OEMs. Zinc flake baking coating (Geomet treatment), which is widely used for automobile parts, involves immersing parts in a treatment solution containing zinc flakes and baking them to form a strong coating film.

At the moment, Nissan has not received any reply from the supplier that it is possible to replace it, and the number of adopted parts per vehicle is enormous. When setting exemption deadlines, consideration should be given to sufficient time to allow supply chains to switch.

3)-2 Plating solutions (chrome/general plating)

Nissan is aware that for hard chrome plating a grace of 6.5 years (1.5 year from publication to implementation + 5 years) has been proposed.

5o. [hard chrome plating until 6.5 years after EiF]

In addition to the above-mentioned 6.5 years, Nissan as OEM sees a need for at least 3 years of grace for access to a satisfactory plating solution, for the plating supplier's compliance testing on plated products, for the OEM's quality check on anti-rust durability and fastening power, and for the normal procedure on vehicle type approval. (Adding the period requested by the Japan electro-plating industry association, Nissan believes the proposed grace of 6.5 years should be extended to around 10 years.)

[Details]

Assuming that a plated product has proved its required performance:

- 1 year needed for the plating supplier's product assessment + Check on the product's anti-salt/anti-rust durability and fastening power (e.g. axial force)
- 2 years needed for OEM's check on the part/component performance and on the assembly work procedure involved
- A minimum total of 3 years is needed

4) Position on Safety Polymers

[Scope of safety]

In the Annex 15 report, the following applications are subject to reconsideration of potential derogation:

6o. [applications affecting the proper functioning related to the safety of transport vehicles, and affecting the safety of operators, passengers or goods until 13.5 years after EiF]

Regarding the "safety of transport vehicles", Nissan considers it more appropriate to alter the above definition to "safety of all the parts and components of transport vehicles".

The reasons for the recommended alteration are: 1) Automobiles (four/two-wheeled vehicles) themselves are products for which a high level of safety is demanded. 2) To ensure the safety of automobiles, all their parts and components must function properly and continuingly throughout their lifecycle.

Rather than limiting the scope to “proper functioning” and “the safety of operators, passengers and goods” in Annex 15, it would be more appropriate to include all the parts and components of the automobile in the scope.

The following parts and components are particularly important for safety, and Nissan would like to provide information on them in the subsequent sections. If Nissan obtains more information in the weeks ahead, Nissan may submit an additional report.

- Surface coating
- Airbags, seatbelts and other safety-related devices
- Brake pads, wipers
- Wheel weight affixing tapes

5) Fuel/intake piping systems

[Current state of use]

The fuel piping system has many requirements to be fulfilled, such as heat resistance, chemical resistance, physical flexibility, low fuel permeability from the pipe surfaces, low friction characteristics for static electricity suppression, and low elution of fuel from the pipe surfaces.

In response to these requirements, there are many kinds of materials or structures of the hoses used in the fuel piping system and have been developped. For example,

NBR/PVC single-layer rubber hoses to 2-layer rubber hoses with FKM (fluororubber) as a barrier layer, or

A resin/rubber composite type in which a thin film resin of PVDF (polyvinylidene fluoride) is attached to the inner surface of the hose, and furthermore,

ETFE (ethylene-tetrafluoroethylene copolymer) and PA12 (polyamide 12) resin corrugated type, as well as GECO (epichlorohydrin rubber), CSM (Chlorosulfonated polyethylene), and POM (polyacetal resin) etc.

For the similar purpose, FKM is widely used for the O-rings to connect and seal of UREA SCR (Selective Catalytic Reduction) system, in order to purify the diesel exhaust emission (i.e. NOx).

The intake hose for the connecting the turbo and intercooler is exposed to mixed high temperature air compressed by the turbo and the EGR oil mist (blow-by gas). So, FKM is used in the ICE intake piping (hose, tube) system and the back pressure sensor hose for diesel engines, which require both heat and oil resistant properties.

PTFE (polytetrafluoroethylene) is also applied for hoses in the air conditioner piping which require heat resistance, chemical resistance, flexibility, and low permeability properties.

[Possibility of substitution]

Presently there are no alternative materials to satisfy the above-mentioned characteristics.

[Time needed for substitution]

Assuming that a promising substitute material has been found, its actual performance must be validated in part/component state and in vehicle state. Consequently, 10 years will be required from the finding of the substitute material.

[Necessary grace period]

Although a period of 13.5 years from EiF has been proposed, Nissan wish to recommend extension of the proposed exemption to an indefinite period of time since a suitable substitute material has not yet been found. This indefinite period can be reviewed at the 10th year from EiF.

6) Membranes

[Current state of use]

PTFE membrane filters are used in great many types of parts/components to prevent the infiltration of liquids (e.g. water, oil) and contaminants (e.g. dust) while maintaining the pressure inside the equipment. Typical parts/components of these filters include various control units (e.g., engine control unit), lamps (e.g. headlamp, rear lamp, fog lamp), batteries, sensors (e.g. humidity sensor, air sensor, tyre air pressure monitoring system), drive controllers, inverters, converters, millimeter wave radars, and onboard cameras.

As their common characteristic, these parts and components require a certain level of breathability so that their sealed areas will not be damaged through repeated internal/external pressure gaps caused by changes in temperature and altitude during driving. From the damaged sealed site rainwater and dust infiltrate into the part, causing malfunction and impairing safety. On the other hand, the use of non-fluorine filters would alter their surface condition in the long term through the effect of water, oil, dust. This would cause clogging and water intrusion, thus ruining the required durability of the automobile.

[Possibility of substitution / Time needed for substitution]

Since no substitute technology exists at present, it is not possible to estimate the length of necessary grace time.