Detailed information on rubber products using PFAS

Product	Sector	Application	Key functionalities provided by PFAS for the relevant use	Availability of technically and economically feasible alternatives	Socio economic impact of restrictions	Lifecycle emissions
Rubber hoses and tubes	Transport	Automotive rubber hoses and tubes	Fluoro rubber is used in fuel hoses and tubes for internal combustion engines in automobiles, ships, etc. because it combines properties not found in other rubbers, such as fuel permeability resistance, oil (swelling) resistance, chemical resistance and heat resistance.	Because PFAS is chemically structured to combine the left properties, there are no non-PFAS alternatives that are technically and economically viable for rubbers with other chemical structures. Low gasoline permeability Test medium: Fuel C - Fluorine rubber 6 g/mm/day/m² - Fluorosilicone rubber 100 g/mm/day/m² - Epichlorohydrin rubber 150 g/mm/day/m² - Nitrile rubber 200 g/mm/day/m² The low permeability of fluoro rubber can be met by resins such as Teflon film, which is also restricted as a PFAS.	If PFAS is restricted, the supply of such components may not be available, which could affect the manufacture of cars, motorcycles, construction machinery, outboard motors, etc. for the EU. If other rubbers are used, performance such as fuel permeability resistance cannot be met, increasing the environmental impact. As low gas permeability is also an important factor in the fuel cell sector, fluoro rubbers are also used as gaskets and seals in fuel cells, and there are currently no alternatives or alternative technologies. It should be noted that in 2022, 398,420 passenger cars were exported from Japan to the EU, worth approximately 1,124.4 billion yen, and 35,067 buses and trucks, worth approximately 85.6 billion yen. (Source: Trade Statistics of Japan, Ministry of Finance Japan)	With regard to products, the materials used are marked according to the instructions of the customer and are manageable. As for the waste of automotive parts, etc., we do not have sufficient information as we are not an end-product manufacturer, i.e. not an automobile manufacturer.
Rubber gaskets	Transport	Automotive fuel tank gaskets	Fluoro rubber is used in fuel tank gaskets for internal combustion engine vehicles because it combines properties not found in other rubbers, such as fuel permeability resistance, oil (swelling) resistance, chemical resistance and heat resistance.	Because PFAS is chemically structured to combine the left properties, there are no non-PFAS alternatives that are technically and economically viable for rubbers with other chemical structures. Low gasoline permeability Test medium: Fuel C - Fluorine rubber 6 g/mm/day/m² - Fluorosilicone rubber 100 g/mm/day/m² - Epichlorohydrin rubber 150 g/mm/day/m² - Nitrile rubber 200 g/mm/day/m² The low permeability of fluoro rubber can be met by resins such as Teflon film, which is also restricted as a PFAS.	Demand for petrol vehicles in the EU is declining, but restrictions could affect their production. As low gas permeability is also an important factor in the fuel cell sector, fluoro rubbers are also used as gaskets and seals in fuel cells, and there are currently no alternatives or alternative technologies. It should be noted that in 2022, 398,420 passenger cars were exported from Japan to the EU, worth approximately 1,124.4 billion yen, and 35,067 buses and trucks, worth approximately 85.6 billion yen. (Source: Trade Statistics of Japan, Ministry of Finance Japan)	With regard to products, the materials used are marked according to the instructions of the customer and are manageable. As for the waste of automotive parts, etc., we do not have sufficient information as we are not an end-product manufacturer, i.e. not an automobile manufacturer.
Rubber belt	Transport	Engine transmission toothed belts (timing belts)	To improve the sliding properties of engine transmission toothed belts (timing belts), PTFE lubricant (dry lubricant) in fine powder or fibre form is used in the tooth surface protection canvas. This material is indispensable for the long life and compactness of toothed belt power transmission systems, including pulleys, as it increases sliding properties with the pulleys and dramatically improves the wear resistance, transmission capacity and durability of the toothed belts. As a result, it contributes to the reduction of resources used in the manufacture of toothed belts and pulleys, as well as end-of-life waste, making it highly economical.	As alternatives to fine PTFE as a lubricating additive, Annex E.2.14.2.3 mentions graphite, molybdenum disulphide (MoS2) and boron nitride (BN), but tests carried out during the product development phase showed that these materials were not as good as PTFE in terms of lubricity and the durability of the products was far below that of products using PTFE. They are also economically more expensive than PTFE, making them impractical. Annex E.2.14.2.3 suggests the use of thickened silicone oil as a lubricant as an alternative, but toothed belts are mainly used in greaseless dry environments and this is not a realistic alternative. As it stands, there are no materials with lubricating properties equivalent to PTFE fine powder and PTFE fibres. Therefore, the proposed 12-year derogation period is not a suitable option and toothed belts for transport equipment should be exempted from this proposed restriction.	If restricted, sales in the EU would be lost and EU distributors would also suffer economic losses, leading to a reduction in employment. In addition, it would be difficult to extend the service life and compactness of toothed belt power transmission systems, resulting in increased energy losses and CO2 emissions, reduced economic efficiency and durability, and increased resource consumption and industrial waste. It should be noted that in 2022, 398,420 passenger cars were exported from Japan to the EU, worth approximately 1,124.4 billion yen, and 35,067 buses and trucks, worth approximately 85.6 billion yen. (Source: Trade Statistics of Japan, Ministry of Finance Japan)	This product is manufactured outside the European area, but the PFAS emitted during production are landfilled in a controlled environment as industrial waste. Emissions during use of the product are likely to include very small quantities of PFAS in the worn gear cloth, but most of these are likely to remain within the equipment and emissions to the external environment are estimated to be even smaller. End-of-life products are also landfilled in a controlled environment as industrial waste, so it is estimated that emissions to the uncontrolled environment during the lifecycle from manufacture to disposal are negligible.
	Electronics and semiconductors	Transfer belts for OA equipment such as copier, multifunction printer	PFAS is used for the surface layer of the rubber transfer belt, which controls the electrical properties of these belts, as it determines print quality, an important performance feature of OA equipment. If the electrical properties are not well controlled, toner is transferred to areas that should not be printed, or colour loss occurs in areas where printing is required.	There is no information on alternatives at this stage. Even if alternatives do emerge, it would take up to 10 years to make the switch.	It affects the performance of OA equipment being shipped to the EU, thus reducing the convenience of general customers in the EU market.	It is considered that the manufacturer of the rubber product in question can follow up to the procurement of raw materials, manufacturing and transportation of the rubber product, but only the OA equipment manufacturer can know what happens after the final product. In addition, the industry dealing with the final product does not identify information on suppliers.
	Multi-sector	High-load transmission toothed belts (timing belts) for industrial machinery (e.g. electric injection moulding machines)	PTFE lubricant in fine powder or fibre form (dry lubricant) is used in the tooth surface protection canvas to improve the sliding properties of high load transmission toothed belts (timing belts) for industrial machinery such as electric injection moulding machines. This material is indispensable for the long life and compactness of toothed belt power transmission systems, including pulleys, as it improves sliding properties with the pulleys and dramatically improves the wear resistance, transmission capacity and durability of the toothed belt. As a result, it contributes to the reduction of resources used in the manufacture of toothed belts and pulleys, as well as waste after use, making it highly economical.	As alternatives to fine PTFE as a lubricating additive, Annex E.2.14.2.3 mentions graphite, molybdenum disulphide (MoS2) and boron nitride (BN), but tests carried out during the product development phase showed that these materials were not as good as PTFE in terms of lubricity and the durability of the products was far below that of products using PTFE. They are also economically more expensive than PTFE, making them impractical. Annex E.2.14.2.3 suggests the use of thickened silicone oil as a lubricant as an alternative, but toothed belts are mainly used in greaseless dry environments and this is not a realistic alternative. As it stands, there are no materials with lubricating properties equivalent to PTFE fine powder and PTFE fibres. Therefore, the proposed 12-year derogation period is not a suitable option and toothed belts should be exempted from this proposed restriction.	If restricted, sales in the EU would be lost and EU distributors would also suffer economic losses, leading to a reduction in employment. In addition, it would be difficult to extend the service life and compactness of toothed belt power transmission systems, resulting in increased energy losses and CO2 emissions, reduced economic efficiency and durability, and increased resource consumption and industrial waste.	This product is manufactured outside the European area, but the PFAS emitted during production are landfilled in a controlled environment as industrial waste. Emissions during use of the product are likely to include very small quantities of PFAS in the worn gear cloth, but most of these are likely to remain within the equipment and emissions to the external environment are estimated to be even smaller. End-of-life products are also landfilled in a controlled environment as industrial waste, so it is estimated that emissions to the uncontrolled environment during the lifecycle from manufacture to disposal are negligible.
Rubber rollers	Electronics and semiconductors	Rubber rollers for OA equipment (developing rollers, transfer rollers, fixing and pressure rollers)	Fluoropolymers (PTFE, PFA) are used on the surfaces of developing rollers, transfer rollers and fixing/pressure rollers in OA equipment such as copier, multifunction printer to provide electrical characteristic control functions, releasability, non-adhesiveness, heat resistance, dimensional stability and high durability.	The only materials that can ensure the required performance are fluorinated polymeric materials, and there are no alternatives or alternative technologies at present.	Rubber rollers for OA equipment using PFAS are employed in copiers, multifunctional machines and printers for the EU, and if PFAS is restricted, it will be impossible to manufacture OA equipment not only for businesses but also for consumers. As a result, the image quality and functional stability of OA equipment will be reduced, and social convenience will suffer. In addition, if PFAS cannot be used, the durability of OA equipment can no longer be ensured and the frequency of parts replacement will increase, with a consequent rise in environmental impact.	It is considered that the manufacturer of the rubber product in question can follow up to the procurement of raw materials, manufacturing and transportation of the rubber product, but only the OA equipment manufacturer can know what happens after the final product. In addition, the industry dealing with the final product does not identify information on suppliers. However, the rollers are built-in parts of the printing equipment and there is little concern that they will be discharged as general waste, and the amount of PFAS emissions due to such factors as wear during use is negligible, so the impact on the environment is considered to be minimal.
	Electronics and semiconductors	Cleaning rollers for dust removal systems	Cleaning rollers that collect dust on the surface of the object to be cleaned by electrostatic force are installed in dust removal systems used at the manufacturing sites of electronic components and materials such as semiconductor PCBs and liquid crystal films, where a clean environment is required. PFAS is used as a release agent (lubricant) to provide release properties to the surface of the cleaning rollers. In order to facilitate the collection of dust on the surface of the cleaning roller, it is necessary to provide the roller surface with adequate release properties. Adding a fluorine-based material to the surface material facilitates the collection of dust and maintains the cleaning performance. In addition, contamination of the cleaning roller surface can be controlled and durability can be improved.	The only material that can effectively add release properties to the surface of the cleaning roller is a fluorinated polymeric material, and there are no alternatives or alternative technologies available at present.	The reduced stability of cleaning roller functions increases the frequency of roller cleaning and replacement in production lines for such products as semiconductor PCBs and liquid crystal films, which increases the environmental impact and also reduces productivity.	The cleaning rollers are built-in parts of the dust removal systems and there is little concern that they will be discharged as general waste, and the amount of PFAS emissions due to such factors as wear during use is negligible, so the impact on the environment is considered to be minimal.
	Multi-sector	Industrial rubber rollers (e.g. for coaters, coater backing, laminating, papermaking, film processing, expanders, etc.)	Fluoro rubber is used as industrial fluoro rubber rollers in applications where its outstanding heat, oil and chemical resistance is required. Fluororesin is also used as industrial fluororesin (FEP, PFA) tube-coated rubber rollers in applications requiring its outstanding heat, oil and chemical resistance, non-adhesiveness and low friction, and its high dimensional stability enables it to be coated on rubber rollers, metal rollers and carbon rollers.	At present, there are no alternatives that can ensure the performance of the current products.	Industrial rubber rollers have a very wide range of applications, for example, coater rollers are used for coatings on films, sheets, etc. that are used in optical products (organic EL, liquid crystal, etc.), secondary and solar batteries, electronics and semiconductors, transport machinery, food, pharmaceuticals, etc. If PFAS are restricted, products cannot be manufactured for these wider applications, making it difficult to achieve the goals of the European Green Deal of both decarbonisation and economic growth. It should be noted that in 2022, 398,420 passenger cars were exported from Japan to the EU, worth approximately 1,124.4 billion yen, and 35,067 buses and trucks, worth approximately 85.6 billion yen. (Source: Trade Statistics of Japan, Ministry of Finance Japan)	N/A
Rubber cushioning materials	Electronics and semiconductors	Heat press cushioning materials used in the printed circuit boards (PCBs) production process	In the press moulding of copper-clad laminates (CCL), printed wiring boards (PWB), etc., a heat press process at temperatures of 200°C or higher is required. In this process, a sheet of heat press cushioning material consisting of a laminated structure of fluoro rubber and aramid fibres or glass cloth is used as a secondary material. Thermal conductivity, heat resistance, durability, resilience and non-adhesiveness are required of heat press cushioning materials, and fluoro rubber is used as a material that satisfies all these requirements.	At present, there are no alternatives that can ensure the performance of the current products.	The lack of suitable heat press cushioning materials may have an adverse effect on the production and quality assurance of PCBs, which are important key components in the electrical and electronics industry. Although not all PCBs are produced with heat press cushioning materials, the global market for PCBs was worth USD 67.3 billion in 2022.	The heat press cushioning materials are manufactured outside the EU and the PFAS waste used during their production is landfilled in a controlled environment as industrial waste. The shipped heat press cushioning material is used as a sub-material in the production of PCBs at the customer site for approximately one year, after which it is landfilled in a controlled environment as industrial waste. From the above, it is estimated that there is only a small amount of emissions into the uncontrolled environment during the lifecycle from production to disposal.
Transparent polyurethane sheets for optical use	Electronics and semiconductors	Release film for polyurethane transparent sheets for optical use.	The addition of an antistatic agent is essential because static electricity is generated when the release PET film is peeled off. PFAS is used for levelling this antistatic agent, and without the addition of PFAS, stable film formation is not possible.	There are no alternatives and the film cannot be deposited evenly without the use of fluorinated materials.	The absence of PFAS leads to static adhesion of foreign matter, resulting in lower yields and increased economic and environmental impact.	The fluorinated release PET film accompanying the product can be recovered by the manufacturer of the end product. The amount of PFAS used is very small and the environmental impact is low.

Product	Sector	Application	Key functionalities provided by PFAS for the relevant use	Availability of technically and economically feasible alternatives	Socio economic impact of restrictions	Lifecycle emissions
Rubber sheeting	Multi-sector	Industrial rubber sheeting (diaphragms, automotive engine covers, packing for bearing seals, bellows, ducts, protective clothing, petrol storage tanks, seals for chimneys, sealing materials for electronic equipment, etc.)	The products concerned are composites of fluoro rubber and synthetic fibres and are used in various applications where heat resistance, oil resistance and durability are required.	At present, there are no alternatives that can ensure the performance of the current products.	Industrial rubber sheeting has a very wide range of applications. If PFAS are restricted, products cannot be manufactured for these wider applications, making it difficult to achieve the goals of the European Green Deal of both decarbonisation society and economic growth. It should be noted that in 2022, 398,420 passenger cars were exported from Japan to the EU, worth approximately 1,124.4 billion yen, and 35,067 buses and trucks, worth approximately 85.6 billion yen. (Source: Trade Statistics of Japan, Ministry of Finance Japan)	N/A
Rubber products in general	Multi-sector	Demoulding and release agents for rubber and urethane products to be moulded.	PFAS has high demoulding and release properties. In the case of tyre products, poor demoulding properties can result in the transfer of mould stains to the tyre, affecting appearance quality, as well as reduced productivity due to the tyre not coming out of the mould after vulcanisation, and rubber loss due to excessive force on the tread pattern when coming out of the mould. As stated in Annex A Table A.1. Overview of PFAS applications and the level, applications in the plastics and rubber/elastomer product sectors are not yet researched in detail.	Non-PFAS alternatives as release agents exist, but they are not economically viable because they cannot be demoulded, contaminate the mould, do not ensure conventional release properties and require cleaning each time.	The impact on business with the EU and on EU customers is significant. It should be noted that in 2022, 398,420 passenger cars were exported from Japan to the EU, worth approximately 1,124.4 billion yen, and 35,067 buses and trucks, worth approximately 85.6 billion yen. (Source: Trade Statistics of Japan, Ministry of Finance Japan)	A small amount of mould release agent is transferred to the product side during demoulding and is emitted in small quantities, but the amount is extremely small and the risk of it being emitted into the environment is considered to be low.
Fluoro rubber paint	Multi-sector	Industrial fluoro-rubber paints (gaskets for engines, gaskets for fuel tanks, coating of chimneys, exhaust ducts, fans, etc., coating of concrete floors, walls, etc., exterior lining of tanks, pipes, pumps, etc., impregnated coating of cloth materials, for adhesion and repair of metal, rubber and resin, etc.)	PFAS is used in various applications due to its excellent heat, cold, oil, chemical and weather resistance, as well as good adhesion and processability.	At present, there are no alternatives that can ensure the performance of the current products.	This is only an example, but gaskets using fluoro rubber paint as a sealing material are also used in car and motorcycle engines for Europe, and if PFAS is restricted, these will not be able to be manufactured. It should be noted that in 2022, 398,420 passenger cars were exported from Japan to the EU, worth approximately 1,124.4 billion yen, and 35,067 buses and trucks, worth approximately 85.6 billion yen. (Source: Trade Statistics of Japan, Ministry of Finance Japan)	N/A