Updated Annex 3 to Japan 4EE input: Non-Exhaustive PFAS Essential Application list A: Explanation based on PFAS as chemical materials
As of 7 September 2023 (Contents updated after 1st input are shown with underline and in yellow cells.)

PFAS classification	Representative Chemical Materials	Ref. No.	Intended use in electrical and electronic equipment (EEE) [Derogations for EEE should be set at this level.]	Non-exhaustive examples of uses	Reasons why PFASs are un-replaceable	Functions of EEE requiring the use of PFAS (Link to Column C of List B (Annex 4))	Functions of EEE requiring the use of PFAS (Link to Column G of List B (Annex 4))	Corresponding question and related derogation proposal in the dossier
Fluoropolymers and Perfluoropolyethers	PTFE PFA FEP ETFE PVDF PCTFE FKM FFKM FEPM FFKO PFPE	1	Sliding elements in mechanical section	Plain bearings Conductive plain bearings Sliding parts of various electric components (motors, connectors, switches, etc.) Sliding parts of various mechanical components (bearings, gears, winder, etc.) Fixing and photoconductive components, etc., in printing equipment	Fluoropolymers with multiple functions such as excellent self-lubrication (low coefficient of friction), electrical insulation property, chemical resistance, releasability, heat resistance and flame retardancy are used in sliding elements in mechanical section of EEE and its components to function normally in various environments. The Non-PFAS alternatives mentioned in the ANNEX XV RESTRICTION REPORT cannot be used as they exhibit the worst performance. In addition, some components are required to maintain their indispensable sliding characteristics over a long period of time under severe conditions such as high temperature, high pressure, high voltage, and high friction. Fluoropolymers are the only materials that resist such severe conditions, and substituting other materials is impracticable.	4.Sliding function in mechanical section	Motor, Printer, Industrial equipment, Camera All the EEE in RoHS categories 1- 11 would need this function.	Question 8 (Electronics); related derogation is not proposed.
		2	Optical elements	Optical fiber materials, optical adhesives	Optical element used in EEE and its components requires fluorine materials with no absorption at specific wavelengths, high weather resistance, and low refractive index. Therefore, it is impossible to substitute to the Non-PFAS alternatives mentioned in the ANNEX XV RESTRICTION REPORT.	1.Optical function	Camera, Lighting, Monitor/Panel, Optical cable, Smartphone Other products in RoHS categories 1- 11 would need this function if they use optical function in control panels for example.	Question□(Electronics); related derogation is not proposed.
		3	Piezoelectric elements	Piezoelectric elements- pressure sensitive films, speakers, microphones, piezo pickups for acoustic guitar	PVDF and its copolymers with unique dielectric and piezoelectric properties, which are also excellent in durability, electrical insulation property, and heat resistance are used in piezoelectric elements used in EEE and its components. Therefore, it is impossible to substitute to the Non-PFAS alternatives mentioned in the ANNEX XV RESTRICTION REPORT.	3.Piezoelectric function	Touch panel, Speaker, Various sensor Other products in RoHS categories 1- 11 would need this function if they use touch panels or sounds for example.	Question 8 (Electronics); related derogation is not proposed.
		4	Insulating material requiring flame-retardancy and/or heat-resistant, where the use is needed for safe functioning and safety of equipment	Cables, heat insulator, tubes, wire coating	Insulating material used for product safety of EEE and its components requires multiple functions of fluoropolymers such as electrical insulation property, heat resistance, flame retardancy, and durability. Therefore, product safety of EEE and its components cannot be guaranteed if the Non-PFAS alternatives mentioned in the ANNEX XV RESTRICTION REPORT are used singly or in combination.	6.Safety and safety functions	Cable, Monitor, Medical equipment, Electric appliance, Industrial control equipment All the EEE in RoHS categories 1- 11 would need this function.	Question□(Electronics); related derogation is not proposed.
		5	Optical elements for LCD panels	Anti-fingerprint layer on panel surface and anti-reflection (high light transmittance) layer	The fluoropolymer on the panel surface has a refractive index of 1.3, which is almost half the refractive index of 1.0 for air and 1.5 for TAC film of the polarizer, and suppresses surface reflection. This translates to a 3% increase in backlight utilization efficiency (i.e. energy efficiency). In addition, since the visibility of the panel is improved by preventing fingerprint stains on the surface, the brightness of the panel can be reduced. Only fluoropolymer has the above properties. It cannot be substituted with silicone or other resins that are considered substitutes.	1.Optical function	Camera, Lighting, Monitor/Panel, Optical cable, Smartphone Other products in RoHS categories 1- 11 would need this function if they use optical function in control panels for example.	Question 8 (Electronics); related derogation is not proposed.
		6	Electronic circuit boards for high-frequency applications	Electronic substrate materials	Electronic circuit board used in high-frequency applications requires low dielectric constant and low transmission loss. Additionally it needs functions such as electrical insulation property, high water and oil-repellent property, thermal and flame resistance. Fluoropolymers are the only materials that have those multiple functions, therefore it is impossible to substitute to other materials.	2.High speed communication and transmission function	Smartphone, PC, Antenna, Base stations Other products in RoHS categories 1- 11 would need this function if they use communication function to operate or update it for example.	Question□(Electronics); related derogation is not proposed.
		7	Anti-dripping agent used for safety and to enhance flame retardancy	Anti-dripping agent to enhance flame retardancy	PTFE is used as anti-dripping agent to enhance flame retardancy, as it is flame-retardant and has an extremely high melt viscosity. Product safety of EEE and its components cannot be guaranteed if the Non-PFAS alternatives mentioned in the ANNEX XV RESTRICTION REPORT are used singly or in combination.	6.Safety and safety functions	Cable, Monitor, Medical equipment, Electric appliance, Industrial control equipment All the EEE in RoHS categories 1- 11 would need this function.	Question 8 (Electronics); related derogation is not proposed.
		8	High performance materials for mold release and protection purposes used in the article molding process	Developer additives and resin additives used in electrical and electronics manufacturing processes Coating material (use as mold release agent)	Fluorine compounds such as PFAS are the only materials that can simultaneously provide and exhibit multiple functions, such as low dielectric constant, low dielectric loss tangent, low refractive index, oil repellency, electrical insulation, water repellency, heat resistance, chemical resistance, weather resistance, mold releasability, flame resistance, separability, wear resistance, surface properties (friction coefficient), bending strength, stretching properties, non-flammability, etc. which are necessary for electrical and electronic devices as well as manufacturing equipment of components for such devices to function normally under various environments, making substitution by other materials described in dossier extremely difficult.	4.Sliding function in mechanical section 6.Safety and safety functions 7.Functional surface	Motor, Printer, Industrial equipment, Camera Cable, Monitor, Medical equipment, Electric appliance, Industrial control equipment, Cooking appliance, Touch panel, Smartphone All the EEE in RoHS categories 1- 11 would need this function.	Question 8 (Electronics); related derogation is not proposed.
		9	Batteries *Please refer to the input from the battery industries, such as those from RECHARGE (Ref.No. 3925 in RCOM Part.2) or from Battery Association of Japan (BAJ) (Ref.No.4331 in RCOM part 14), for the concrete details.	Battery materials	Please refer to the relevant industry association's comments for details on the reasons why substitution is not possible. For example, RECHARGE, the rechargeable and lithium batteries association in Europe have submitted the comment on this dossier (Ref.No.3925 in RCOM Part.2)□	10.Energy supply (Battery)	Battery All the EEE in RoHS categories 1- 11 would use batteries.	Question 8 (Energy) ; related derogation is not proposed.
		10	Film, sheet or membrane requiring surface performance which ensures multiple functions such as electrical insulation property, chemical resistance, heat resistance, flame resistance, flex resistance and excellent elongation followability at the same time	Film material, electrostatic adsorption belt, Waste Powder Collection Filter, Friction Reduction Tape, peeling tape, ventilation film, moisture permeable film, Dial (Polarizing plate, plastic raw material), protective film, release sheet Films for analytical testing	Multiple functions such as electrical insulation property, chemical resistance, heat resistance, flame resistance, flex resistance and excellent elongation followability are also required for films, sheets, and membranes that require performance based on low surface free energy (water repellency, oil repellency, lubrication, non-adhesiveness) used in the facilities for manufacturing EEE and its components. Fluoropolymers are the only materials that have those multiple functions at the same time, therefore it is impossible to substitute to other materials.	6.Safety and safety functions 7.Functional surface	Cable, Monitor, Medical equipment, Electric appliance, Industrial control equipment Cooking appliance, Touch panel, Smartphone All the EEE in RoHS categories 1- 11 would need this function.	Question□; Similar a little to 5.cc, 5.ee, 6.m
		11	Hermetic sealant requiring low percentage of the compression set as well as simultaneously other functions such as excellent elongation followability, durability, flame resistance, heat and hot water resistance, low water absorption, low moisture permeability, chemical resistance and/or low outgassing..	Gasket materials, sealing materials, rubber valves (umbrella valves, duckbill valves, etc.), four-way reversing valve, check valve, ball valve, O rings, buttons on the operating unit, sealing materials, encapsulating materials and tube element for various electronic component	The compression set of a material is the permanent deformation remaining after removal of a force that was applied to it. The percentage of the compression set of hermetic sealant used in the facilities for manufacturing EEE and its components to function normally in various environments must be low. And at the same time, sealant as EEE parts needs other functions such as excellent elongation followability, durability, flame resistance, heat and hot water resistance, low water absorption, low moisture permeability, chemical resistance (including resistance to chlorine contained in tap water), low outgassing (to avoid contamination of impurities and to maintain the vacuum of instrument). Fluoropolymers are the only materials that have those multiple functions at the same time. If the Non-PFAS alternatives mentioned in the ANNEX XV RESTRICTION REPORT are used singly or in combination, the worst performance is exhibited. Therefore, it is impossible to substitute to those alternatives.	4.Sliding function in mechanical section	Motor, Printer, Industrial equipment, Camera, Display All the EEE in RoHS categories 1- 11 would need this function.	Question 8 (Electronics); Similar to 6.a.
		12	Fluid tubes and containers requiring chemical resistance, high cleanliness	Chemical supply tubes, Tube for flow path of analytical equipment Air tubes used in air piping, etc. tube for a chemical supply system chemical-resistant containers	Fluoropolymers with multiple functions such as chemical resistance, excellent fluid barrier properties, high cleanliness and low surface tension are used for fluid tubes and containers in the facilities for manufacturing EEE and its components. If the Non-PFAS alternatives mentioned in the ANNEX XV RESTRICTION REPORT are used singly or in combination, the worst performance is exhibited. Therefore, it is impossible to substitute to those alternatives.	6.Safety and safety functions	Cable, Monitor, Medical equipment, Electric appliance, Industrial control equipment All the EEE in RoHS categories 1- 11 would need this function.	Question□(Electronics); Similar a little to 6.c.

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		13	PFAS used for semiconductor manufacturing process, semiconductor manufacturing equipment, and semiconductor	Construction of polymer substrates and dielectric materials, manufacturing equipment for adhesives, underfills, filter, die bond resins, valve seals, etc., heat transfer fluids surface protection	Fluorine compounds such as PFAS are the only materials that can simultaneously provide and exhibit multiple functions, such as low dielectric constant, low dielectric loss tangent, low refractive index, oil repellency, electrical insulation, water repellency, heat resistance, chemical resistance, weather resistance, mold releasability, flame resistance, separability, wear resistance, surface properties (friction coefficient), bending strength, stretching properties, non-flammability, etc. which are necessary for semiconductor manufacturing processes, semiconductor manufacturing equipment and semiconductors to function normally under various environments, making substitution by other materials described in dossier extremely difficult. Additionally, for more information on why PFAS cannot be substituted in semiconductors, please refer to information from the Semiconductor Industry Association. For example, the following information from SIA PFAS Consortium of the Semiconductor Industry Association of America: "The Impact of a Potential PFAS Restriction on the Semiconductor Sector2" https://www.semiconductors.org/wp-content/uploads/2023/04/Impact-of-a-Potential-PFAS-Restriction-on-the-Semiconductor-Sector-04_14_2023.pdf	8.Semiconductor	Semiconductor All the EEE in RoHS categories 1- 11 would use semiconductors.	Question 7; Similar to 5.ee
		14	PFAS used for thin-film device (Micro Electro Mechanical System/ MEMS, SAW device, Capacitor, etc) manufacturing process, thin-film device manufacturing equipment, and thin-film device	Construction of polymer substrates and dielectric materials, manufacturing equipment for adhesives, underfills, filter, die bond resins, valve seals, etc., heat transfer fluids surface protection	Fluorine compounds such as PFAS are the only materials that can simultaneously provide and exhibit multiple functions, such as low dielectric constant, low dielectric loss tangent, low refractive index, oil repellency, electrical insulation, water repellency, heat resistance, chemical resistance, weather resistance, mold releasability, flame resistance, separability, wear resistance, surface properties (friction coefficient), bending strength, stretching properties, non-flammability, etc. which are necessary for thin-film device(Micro Electro Mechanical Systems/MEMS, SAW, Capacitor, etc) manufacturing processes, thin-film device manufacturing equipment and thin-film device to function normally under various environments, making substitution by other materials described in dossier extremely difficult. Additionally, for more information on why PFAS cannot be substituted in thin-film devices, please refer to information from the Semiconductor Industry Association. For example, the following information from SIA PFAS Consortium of the Semiconductor Industry Association of America: "The Impact of a Potential PFAS Restriction on the Semiconductor Sector2" https://www.semiconductors.org/wp-content/uploads/2023/04/Impact-of-a-Potential-PFAS-Restriction-on-the-Semiconductor-Sector-04_14_2023.pdf	9.Thin-film device manufacturing process	Car navigation system, Sphygmomanometer (blood pressure meters), Inkjet printer, Smartphone, PC Other products in RoHS categories 1- 11 may use thin-film devices	Question 7; related derogation is not proposed, but similar to 5.ee.
		15	Functional material used in printing process *Please refer to the input from the related industries, such as Japan Business Machine and Information System Industries Association (JBMIA), for the concrete details.	Toner additives, Ink additives, Developer additives	Printing process need various functions such as electrical insulation, water repellency, oil repellency, chemical resistance, surface activity, low surface tension, and high negative charge. These functions are achieved by adding fluorinated materials to toner, ink, developers, organic photoconductors etc. Only fluorinated-based materials can achieve above functions simultaneously. It is impossible to achieve this with alternative materials in the dossier.	Materials such as "Printing inks/Toner" used in "printing process". These would be separately covered by stakeholders such as printing industry, therefore our current Application list B (Annex 4) does not cover them. For the details on chemicals used in printing process, please see the input from the related industries.		For ink and toner: Question 6 (printing ink)/ for others: Question 8 (Electronics); related derogation is not proposed.
Fluoroalkyl compounds with functional groups (such as -OH, -COOH, N-R, etc.) and Side-chain fluorinated polymers	PFHxA, PFBA, PFBS, Polyfluoroalkyl (meth)acrylate	16	High performance materials for mold release and protection purposes, which ensures multiple functions such as electrical insulation, heat resistance, chemical resistance or flame resistance, etc. at the same time	Resistive/Conductive Paste, Mold release agent, Antistatic agent, Solder flux, flame retardant	Fluorine compounds such as PFAS are the only materials that can simultaneously provide and exhibit multiple functions, such as electrical insulation, heat resistance, chemical resistance, flame resistance, etc. which are necessary for electrical and electronic devices as well as manufacturing equipment of components for such devices to function normally under various environments, making substitution by other materials described in Dossier extremely difficult.	6.Safety and safety functions 7.Functional surface	Cable, Monitor, Medical equipment, Electric appliance, Industrial control equipment Cooking appliance, Touch panel, Smartphone All the EEE in RoHS categories 1- 11 would need this function.	Question (Electronics) ; related derogation is not proposed.
		17	Semiconductor manufacturing process	Photoacid generator Photoresist	Various materials have been considered for the photoacid generators and photoresist needed for the semiconductor manufacturing process, but in the end only fluorine materials remained and are currently used. The alternative materials described in Dossier have been studied in the past and when they are used, their performance is poor and they are not practical. Additionally, for more information on why PFAS cannot be substituted in thin-film devices, please refer to information from the Semiconductor Industry Association. For example, the following information from SIA PFAS Consortium of the Semiconductor Industry Association of America: "The Impact of a Potential PFAS Restriction on the Semiconductor Sector" https://www.semiconductors.org/the-impact-of-a-potential-pfas-restriction-on-the-semiconductor-sector/	8.Semiconductor	Semiconductor All the EEE in RoHS categories 1- 11 would use semiconductors.	Question 7; Similar to 5.ee If proposed PFAS restriction covers also PFHxA, at least following derogation proposed in the final SEAC Opinion on PFHxA should be incorporated : "7. Paragraphs 1 and 2 shall not apply until XX XX XXXX [12 years after the entry into force] to: (b) semiconductors and semiconductor related equipment"
		18	Thin-film device (Micro Electro Mechanical Systems/MEMS, SAW, Capacitor, etc) manufacturing process	Photoacid generator Photoresist	The thin-film device (MEMS(Micro Electro Mechanical Systems), SAW, Capacitor, etc.) manufacturing process, which started by making mechanical components using semiconductor manufacturing technology, uses fluorinated materials for photoacid generators and photoresist for the same reason as the semiconductor manufacturing process. The alternative materials described in Dossier have been studied in the past and when they are used, their performance is poor and they are not practical. For more information on the reasons, please refer to information from the Semiconductor Industry Association. For example, the following information from SIA PFAS Consortium of the Semiconductor Industry Association of America: "The Impact of a Potential PFAS Restriction on the Semiconductor Sector" https://www.semiconductors.org/the-impact-of-a-potential-pfas-restriction-on-the-semiconductor-sector/	9.Thin-film device manufacturing process	Car navigation system, Sphygmomanometer (blood pressure meters), Inkjet printer, Smartphone, PC Other products in RoHS categories 1- 11 may use thin-film devices	Question 7; related derogation is not proposed, but similar to 5.ee.
		19	Functional material used in printing process *Please refer to the input from the related industries, such as Japan Business Machine and Information System Industries Association (JBMIA), for the concrete details.	Toner additives, Ink additives, Resin additives, Developer additives, Organic photoconductor additives	Printing process need various functions such as-water repellency, oil repellency, chemical resistance, releasability, surface activity,-flame resistance (anti-drip function), low surface tension, and high negative charge. These functions are achieved by adding fluorinated materials to toner, ink, resin, developers, organic photoconductors etc. Only fluorinated-based materials can achieve above functions simultaneously. It is impossible to achieve this with alternative materials in the dossier.	Materials such as "Printing inks/Toner" used in "printing process". These would be separately covered by stakeholders such as printing industry, therefore our current Application list B (Annex 4) does not cover them. For the details on chemicals used in printing process, please see the input from the related industries.		For ink and toner: Question 6 (printing ink)/ for others: Question 8 (Electronics); related derogation is not proposed.
Fluoroalkanes and fluoroalkenes, and Fluoroethers and fluoro-ketones	HFC, PFC, HFO, HFE	20	Refrigerant used in various appliances such as those for Refrigeration, Air Conditioning and Heat Pump (RACHP) products *Please also see the input from the related industries, such as Japan Refrigeration and Air Conditioning Industry Association (JRAIA) (the first input is Ref. No.4292 in RCOM part 13 and the 2nd will be submitted soon.), About the details of the essentiality of the PFAS refrigerants.	Refrigerant is used in various refrigeration, air conditioning and heat pump products. Such RACHP products are not only used in refrigerators, freezers or air conditioners but also further incorporated into may other products for medical, measurement, manufacturing, etc.	Fluorine-based refrigerant has excellent thermodynamic properties in a wide range and is also excellent in temperature followability. Moreover, because of its low flammability and low toxicity, it does not ignite the surroundings or cause harm to the human body, even if equipment or pipes are damaged by an earthquake or storm and then the refrigerant leaks. Natural refrigerants such as ammonia (NH3), hydrocarbon (propane, isobutane, etc.) are not applicable to all the appliances as they are highly flammable or toxic. Please refer to the comments of the related industries, such as Japan Refrigeration and Air Conditioning Industry Association (JRAIA) (the first input is Ref. No.4292 in RCOM part 13 and the 2nd will be submitted soon.), for details on why fluorine-based coolants cannot be substituted.	11.Cooling function (Refrigerant)	Refrigerant All the EEE in RoHS categories 1- 11 may use refrigerant if needed.	Question 7 (F-Gas); Similar to 5.i, 5.j, 5.p, 5.q, 5.dd, 5.ee
		21	Refrigerant, coolant, cleaning agent and solvent used for semiconductor process	Cooling of manufacturing equipment	Fluorinated compounds such as PFAS are the only media that can be used over a wide range of operating temperatures for safe and efficient heat transfer, while simultaneously possessing excellent properties such as electrical insulation, inertness, and extremely low surface tension, along with excellent thermodynamic properties, making substitution by other materials extremely difficult. For more details on why fluorinated coolants cannot be substituted in semiconductor processes other than etching, please refer to the comments of the relevant industry associations.	8.Semiconductor	Semiconductor All the EEE in RoHS categories 1- 11 would use semiconductors.	Question 7 (F-Gas); 5.ee
		22	Refrigerant, coolant, cleaning agent and solvent used for thin-film device (Micro Electro Mechanical Systems/MEMS, SAW etc) process	Cooling of manufacturing equipment	Fluorinated compounds such as PFAS are the only media that can be used over a wide range of operating temperatures for safe and efficient heat transfer, while simultaneously possessing excellent properties such as electrical insulation, inertness, and extremely low surface tension, along with excellent thermodynamic properties, making substitution by other materials extremely difficult. For more details on why fluorinated coolants cannot be substituted in thin-film device processes other than etching, please refer to the comments of the relevant industry associations. A similar exemption to Exemption 5.ee is needed for the thin-film device manufacturing process, since the thin-film device manufacturing process uses the same materials and technologies as the semiconductor manufacturing process.	9.Thin-film device manufacturing process	Car navigation system, Sphygmomanometer (blood pressure meters), Inkjet printer, Smartphone Other products in RoHS categories 1- 11 may use thin-film devices	Question 7 (F-Gas); related derogation is not proposed, but very similar to 5.ee.

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		23	Chemicals for ultra-fine processing applications, as typified by semiconductor and MEMS manufacturing processes *HFC-23 (CHF 3), HFC-32 (CH 2 F 2), HFC-152 a (CHF 2-CH 3) , HCFC-141 b (CCl 2 F-CH 3), HFO-1132 a (CH 2=CF 2) are outside the scope definition of this regulation (from Annex A Appendix A .3 .9 Applications of Fluorinated Gases). Minor uses; In the electronics and semiconductor industries, fluorinated gases are used in etching and chamber cleaning processes to form nano-level fine semiconductor integrated circuits, etc., including CHF 3, CF 4, perfluoroethane, perfluoroalkane, and cycloalkane (Annex A A.3.9.1.7)	Etching gas for semiconductor and glass substrates Equipment such as etching equipment/CVD equipment Substrate cleaning gas	In the semiconductor industry, perfluorogas and polyfluorogas are used in etching and chamber cleaning processes to form nano-level fine semiconductor integrated circuits etc.. Although the amount used is small, today's electronics products require extremely complicated and delicate processing to realize various functions such as high performance, multi-function, and low power consumption. To achieve this, we combine various gases to perform processing with advanced and delicate control. There is no substitute for the gas currently in use in the semiconductor manufacturing process, which is highly and finely assembled. If its use is prohibited, all semiconductor manufacturing will be stopped. The semiconductor industry controls the chemical substances used at all stages of the manufacturing process. Most of the chemical substances used are decomposed during the manufacturing process, and equipment is installed to decompose and recover unreacted residual gases in order to reduce emissions. The continued use of PFAS in the semiconductor manufacturing process is an essential component of the supply of electronics products that support wide range of current and future daily necessities and social infrastructure and is a fundamental prerequisite for semiconductor production. For this reason, it is considered essential to exempt semiconductor manufacturing, the semiconductor itself, and related equipment from the scope of regulation as essential use. PFAS gases are always stable, easy to handle, and very reactive with the material to be etched (such as semiconductor or glass substrates) in reactive ion etching (RIE). Moreover, only fluorinated compounds such as PFAS gases can etch Si, and other materials gases have high volatility (high vapor pressure) of reaction products (such as SiF4), making it difficult to substitute them.	8.Semiconductor 9.Thin-film device manufacturing process	Semiconductor Car navigation system, Sphygmomanometer (blood pressure meters), Inkjet printer, Smartphone All the EEE in RoHS categories 1- 11 would use semiconductors. Other products in RoHS categories 1- 11 may use thin-film device.	Question 7 (F-Gas); For semiconductor, 5.ee. For thin-film devices, related derogation is not proposed, but very similar to 5.ee.
		24	Fluids for immersion processes (testing, measuring or adding function) in production processes and laboratories	Test solvent for gross leak test, etc., high-precision temperature characteristic measurement, and voltage application medium for polarization of piezoelectric ceramic elements	Fluorinated compounds are the only media that can maintain the quality of an object without leaving stress or contamination on the object in the process due to their extremely low surface tension and high volatility. Furthermore, fluorinated compounds simultaneously possess excellent functions such as excellent thermodynamic properties, electrical insulation, and inactivity, which ensure the stability and accuracy required in the process. The MIL standard (MIL-STD-883/750) specifies the use of hollow packages in airtight testing, which is essential to ensure their airtight performance. Therefore, it is difficult to substitute other substances.	This application is described not in current Application List B (Annex 4) , but in current Application List C (Annex 7), under: 1. Immersion process.	Car navigation system, Sphygmomanometer (blood pressure meters), Inkjet printer, Smartphone. Other products in RoHS categories 1- 11.	Question 8 (Electronics); related derogation is not proposed.
Others (PFAS other than ones mentioned above)	Fluorinated engineering plastic materials such as fluorinated polyimide and Liquid crystal materials. Other fluorinated compounds	25	Transparent electronic circuit board and circuit	Transparent printed circuit board for touch panels	Fluorinated polyimide has transparency, heat resistance, and low water absorption required for touch panels used in smartphones and tablets. The high water absorbency of transparent heat-resistant plastic (polyether sulfone) reduces low dimensional stability and impairs the linearity of touch panels, so it cannot be used.	1.Optical function	Camera, Lighting, Monitor/Panel, Optical cable, Smartphone Other products in RoHS categories 1- 11 would need this function if they use optical function in control panels for example.	Question 8 (Electronics); related derogation is not proposed.
		26	Liquid crystal display (LCD) elements	Liquid crystal substances (small molecules), Vertical alignment liquid crystal display device, Interlayer spacer to control the cell gap of LCD panels.	"Fluorinatad Liquid Crystal substances (PFAS LC)" have low driving voltage, high response speed, and low temperature dependence of driving voltage, which are required for low power consumption video displays that require multiple functions simultaneously. Cyano-based crystal substances cannot meet these requirements simultaneously. So it was replaced by "PFAS LC" as a technological breakthrough. The power consumptions of other displays (e.g. OLED) are higher than LCDs using PFAS LC. Fluorinated polyimides with long-chain fluorinated alkyl groups in the side chains have high heat resistance and stable. For other LCD elements, fluorinated polyimides with long-chain fluorinated alkyl groups in the side chains have high heat resistance and stable vertical orientation over a wide temperature range. These properties cannot be replaced by polyimides with hydrocarbon side chains. The structural materials for maintaining uniform cell gap of a large-sized liquid crystal panels are required to have high precision thickness uniformity, no contamination in the manufacturing process, chemical resistance, no influence to optical system and heat resistance at the same time. These are not able to be replaced by silicone or acrylic resin..	5. Display function(Liquid crystal display / LCD) 7. Functional surface	Liquid crystal display panel (TV, Monitor for various device) Other products in RoHS categories 1- 11 would need this function if they use control panels or monitors for example.	Question□(Electronics); related derogation is not proposed.
		27	Optical elements	Additives for polyamideimides, polyimides, and polyester tapes	By introducing a trifluoromethyl group or the like into the polyimide, low refractive index, low dielectric constant, separation, light transmission, and flexibility can be imparted. In this way, the fluorinated material introduced with fluorine as a substituent in the engineer plastic material has excellent electrical properties, water and oil-repellency, surfactant resistance, flame retardancy (anti-drip function), low surface tension It can simultaneously impart and express multiple functions, and If the Non-PFAS alternatives mentioned in the ANNEX XV RESTRICTION REPORT are used singly or in combination, the worst performance is exhibited. Therefore, it is impossible to substitute to those alternatives.	1.Optical function	Camera, Lighting, Monitor/Panel, Optical cable, Smartphone Other products in RoHS categories 1- 11 would need this function if they use optical function in control panels for example.	Question□(Electronics); related derogation is not proposed.
		28	Functional materials used in printing process *Please refer to the input from the related industries, such as Japan Business Machine and Information System Industries Association (JBMIA), for the concrete details.	Toner additives, Ink additives, Developer additives, Organic photoconductor additives	Printing process need various functions such as water repellency, oil repellency, chemical resistance, releasability, surface activity, low surface tension, and high negative charge. These functions are achieved by adding fluorinated materials to toner, ink, developers, organic photoconductors etc. Only fluorinated-based materials can achieve above functions simultaneously. It is impossible to achieve this with alternative materials in the dossier.	Materials such as "Printing inks/Toner" used in "printing process". These would be separately covered by stakeholders such as printing industry, therefore our current Application list B (Annex 4) does not cover them. For the details on chemicals used in printing process, please see the input from the related industries.		For ink and tonar: Question 6 (printing ink)/ for others: Question 8 (Electronics); related derogation is not proposed.
All the PFAS (fluoropolymers and others)	PTFE, PFA, FEP, ETFE, PVDF,PFHxA Polyfluoroalkyl (meth)acrylate	29	Functional coatings* (* "Functional coating" is a coating applied to an article in order to give it the required functions, such as low dielectric properties, low dielectric loss tangent, electrical insulation, heat resistance, UV resistance, chemical resistance, corrosion resistance, weather resistance, water repellency, oil repellency, slipperiness, low refractive index and so on. "Functional coating" includes, but not limited to, "conformal coating" used to protect electronic materials. In our input, we use the term "functional coating" because the required functions are not only to protect the objects.)	Electronic circuit boards, semiconductors, small electronic components (e.g. capacitors, resistors, coils, diodes, transistors, switches, connectors and their electrical junction points), casing, motors, voice coils, parts to protect optical features (e.g. liquid crystal panels, touch panels, optical sensors, LED, Toslink, optical fibers, lenses for electronic cameras, projection lenses, polarizers), printing process (Toner/ink adhesion prevention, toner/developing carrier themselves), oil barrier, fan, razor blade, and so on.	Fluorine compounds are the only coating materials that can simultaneously provide and express multiple functions required for the proper functioning of electrical and electronic equipment in various environments, such as low refractive index, low dielectric constant and low dielectric loss tangent, electrical insulation, oil repellency, water repellency, heat resistance, UV resistance, chemical resistance, weather resistance, mold release and optical protection (i.e. for optical sensors, lenses and so on). In addition to the above, toner/development carriers are also required to be fluidity, charging characteristics, and durability.	1.Optical function 2.High speed communication and transmission function 4.Sliding function in mechanical section 6.Safety and safety functions 7.Functional surface	Camera, Lighting, Monitor/Panel, Optical cable, Smartphone, PC, Antenna, Base stations Motor, Printer, Industrial equipment, Cable, Medical equipment, Electric appliance, Industrial control equipment, Cooking appliance, Touch panel, All the EEE in RoHS categories 1- 11 would need this function.	Question 8 (Electronics); related derogation is not proposed. If proposed PFAS restriction covers also PFHxA, at least following derogation proposed in the final SEAC Opinion on PFHxA should be incorporated : "13. Paragraphs 1 and 2 shall not apply to functional coating used in electrical and electronic equipment until XX XX XXXX [7 years after entry into force]."
	PTFE, PFPE, PFHxA, PFBS	30	Lubricants where the use takes place under harsh conditions or the use is needed for safe and intended functioning and/or safety of equipment	Electronic cameras, lens systems for electronic cameras, moving parts of the helicoid of projection lenses and moving ball frames, driving parts of ultrasonic testing equipment, drives for optical discs, torque limiters for scanners and other moving parts of precision equipment in electrical and electronic equipment.	To protect the mechanical properties of the moving parts of precision components in electrical and electronic equipment, the lubricant (e.g. grease) is given an autophobic property to prevent wetting and spreading. If the lubricating components applied to the operating parts of precision components become wetted and diffuse, the durability and performance of the product will be significantly reduced. To prevent this, fluorine compounds are added which have good dispersibility in lubricants (e.g. grease) and can provide oil repellency due to their self-hydrophobic properties. Only fluorine compounds with low surface free energy can provide oil repellency and are difficult to replace. In addition, due to the recent miniaturisation and high integration of components, it is difficult to avoid them due to the structure of the components.	4.Sliding function in mechanical section 6.Safety and safety functions	Motor, Printer, Industrial equipment, Camera, Cable, Monitor, Medical equipment, Electric appliance, Industrial control equipment All the EEE in RoHS categories 1- 11 would need this function.	Question□(lubricant) ; related derogation is not proposed.