

Application Number	E.2.10 (Transport Aircraft)
Application Name	PTFE-containing composite packings, gaskets, fluorine-based elastomer seal materials
Candidate Substance CAS RN to be regulated	9002-84-0
Name of Candidate Substance to be regulated	PTFE, fluororubber
Generic Name of End Product for Application	Piping, valves, pumps, vessels
Generic Name of Part for Application)	(Seat gaskets, fluorine-based elastomers O-rings, gland packings)
Description of Application (Details) (Drawings, Diagrams, Photographs, Videos, etc.)	"VALQUA_Group_Sustainability_Report_2022(extract)r1" "zm01_2007_Elastomer(extract)r2" "zy03_0611_Gland_Packing(extract)r2" "zy03_1601_Gasket(extract)r2"
Explanation of Irreplaceable Technology (Pictorial Photographic Data, Information on Reference Websites, etc.)	Materials that can be used for seal members are selected according to the temperature and fluid. In specifications where fluorine-based materials are used, temperatures of 150°C or higher, resistance to fluid, or purity is required, and they are expensive, but are used because they cannot be substituted with other materials. (see catalogs for the upper section)
Shipping Volume Information)	The amount of raw materials used for this product in Japan for the applications is estimated to be 2,700 ton/year for both fluororubber and fluorine resin (based on statistical data from the Japan Fluoropolymers Industry Association. The amount used in one product is <20~50% by weight, which has a huge impact on the transportation sector where it is used. Applications include valves, piping, and fittings in transport aircrafts. Without this part, operation would be impossible, as they are mainly used for hydraulic piping lines for fuel and equipment operation. (Impact on industry) The following three examples are given within the transport aircrafts sector. In both of the case where the product is used inside and the case where manufacturing plants are operated to produce it, production would be impossible without this part, which would have a significant impact.

	<table><tr><td rowspan="3">Cars</td><td>Company Name</td><td>TOYOTA</td><td>HONDA</td><td>NISSAN</td><td>MAZDA</td></tr><tr><td>Sales</td><td>19 trillion yen</td><td>4.3 trillion yen</td><td>3.9 trillion yen</td><td>570 billion yen</td></tr><tr><td>Production Output</td><td>3.73 million units</td><td>640,000 units</td><td>454,000 units</td><td>780,000 units</td></tr><tr><td rowspan="3">Ships</td><td>Company Name</td><td>Kawasaki Heavy Industries</td><td>Mitsui E&S</td><td>Hitachi Zosen</td><td>Namur Shipbuilding</td></tr><tr><td>Sales</td><td>300 billion yen</td><td>500 billion yen</td><td>126 billion yen</td><td>70 billion yen</td></tr><tr><td>Production Output</td><td>200,000 tons</td><td>2.83 million horsepower</td><td>425 million horsepower</td><td>500,000 tons</td></tr><tr><td rowspan="3">Rail Vehicles</td><td>Company Name</td><td>Kawasaki Heavy Industries</td><td>Hitachi</td><td>Nippon Sharyo</td><td>Japan Transocean Engineering</td></tr><tr><td>Sales</td><td>130 billion yen</td><td>313.8 billion yen</td><td>94 billion yen</td><td>62.6 billion yen</td></tr><tr><td>Production Output</td><td>300 units</td><td>700 units</td><td>300 units</td><td>200 units</td></tr></table>	Cars	Company Name	TOYOTA	HONDA	NISSAN	MAZDA	Sales	19 trillion yen	4.3 trillion yen	3.9 trillion yen	570 billion yen	Production Output	3.73 million units	640,000 units	454,000 units	780,000 units	Ships	Company Name	Kawasaki Heavy Industries	Mitsui E&S	Hitachi Zosen	Namur Shipbuilding	Sales	300 billion yen	500 billion yen	126 billion yen	70 billion yen	Production Output	200,000 tons	2.83 million horsepower	425 million horsepower	500,000 tons	Rail Vehicles	Company Name	Kawasaki Heavy Industries	Hitachi	Nippon Sharyo	Japan Transocean Engineering	Sales	130 billion yen	313.8 billion yen	94 billion yen	62.6 billion yen	Production Output	300 units	700 units	300 units	200 units
Cars	Company Name		TOYOTA	HONDA	NISSAN	MAZDA																																											
	Sales		19 trillion yen	4.3 trillion yen	3.9 trillion yen	570 billion yen																																											
	Production Output	3.73 million units	640,000 units	454,000 units	780,000 units																																												
Ships	Company Name	Kawasaki Heavy Industries	Mitsui E&S	Hitachi Zosen	Namur Shipbuilding																																												
	Sales	300 billion yen	500 billion yen	126 billion yen	70 billion yen																																												
	Production Output	200,000 tons	2.83 million horsepower	425 million horsepower	500,000 tons																																												
Rail Vehicles	Company Name	Kawasaki Heavy Industries	Hitachi	Nippon Sharyo	Japan Transocean Engineering																																												
	Sales	130 billion yen	313.8 billion yen	94 billion yen	62.6 billion yen																																												
	Production Output	300 units	700 units	300 units	200 units																																												
Heat Resistance (Highest Working Temperature)	260°C (PTFE), 200°C (fluororubber)																																																
Weather Resistance	No influence of direct sunlight																																																
Chemical Resistance	Stable against most chemicals. Slightly affected by molten alkali metals (solutions), high-temperature fluorine, and chlorine trifluoride.																																																
Non-Adhesiveness	Wet resistance (Contact angle with water ≥ 110°)																																																
Purity	No impurities are eluted (ppb level or less) when in contact with chemicals																																																
PVC	Heat resistance < 90°C																																																
PP	Heat resistance < 130°C																																																
High-Density PE	Heat resistance < 70°C																																																
Silicon Resin	Silicone resin is inferior in solvent resistance, chemical (strong acid and strong alkali) resistance, and water resistance																																																
Silicon Rubber	Silicon rubber is inferior to fluororubber in mechanical strength and solvent resistance when used as a seal member																																																
EPDM	Heat resistance < 150°C, EPDM is inferior to fluororubber in oil resistance																																																
NBR (NBR (Nitrile Rubber))	Heat resistance) < 130°C, NBR is inferior to fluororubber in oil resistance																																																
PEEK (Polyether Ether Ketone)	Heat resistance < 240°C, (PEEK is inferior to PTFE in acid resistance.) PEEK is basically injection-molded, and cannot be blended with materials																																																
Remarks	Heat resistance https://www.kda1969.com/study/study_pla_compare.htm Chemical resistance https://www.kda1969.com/study/study_pla_chem.htm List of physical properties of rubber https://www.kayo-corp.co.jp/common/pdf/rub_propertylist.pdf																																																