RICOH

Ricoh Group's

Green Procurement Standards

<Annex>
Ricoh Criteria for
Environmentally Sensitive Chemical Substances

Sept 2011 (Version 5.1)

Ricoh Company.,Ltd.
Ricoh Group

Contents

1. Purpose

The purpose of this criteria is to make suppliers well aware and thoroughly understood of the intention of Ricoh Group to obtain information of and control the status of chemical substances contained in a part or material constituting Ricoh Group brand products, and to ban or reduce the use of environmentally sensitive chemical substances, for the ultimate goal of reducing the impact of Ricoh products as a whole on the environment.

2. Scope of Application

2.1 Scope of application to products

(1) The criteria apply to products with Ricoh Group brand*
Instruments and products designed, manufactured and sold by Ricoh Group.

(2) Instruments and products whose design and manufacture are commissioned by Ricoh Group to the third party, and sold with Ricoh brand.

(3) Instruments and products designed and manufactured by the third party, and sold with Ricoh Group brand.

* Ricoh Group brand refers to the following brand.

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2.2 Scope of application to parts and materials

(1) A part or material constituting the main body, peripheral equipments, or optional parts, etc. of products
(2) Packaging materials and packaging parts of instruments and products
(3) Instruction books
(4) Parts for service
(5) Consumables for manufacturing such as grease, adhesives, double-faced adhesive tape, packaging tape, etc.
(6) Supplies and packaging materials

3. Definition of Terms

3.1 Environmentally sensitive chemical substances

(1) Chemical substances whose uses, purposes for use or content volumes are required by the law and regulations of Japan and overseas, or voluntary criteria such as environmental label, etc. to be regulated, or expected to be regulated in the future.

(2) Chemical substances whose information on inclusion in products is required to be disclosed under laws and regulations or voluntary standards like eco-labeling at home and abroad

(3) Chemical substances whose information on inclusion in products is possibly requested by customers at the time of bidding and the like

(4) In addition to the above, chemical substances whose information on inclusion in products must be identified, because there is a likelihood that the restriction or information disclosure may be required with respect to the purpose of use or the content quantity of these substances in products in the near future.

3.2 Article

An object of specific shape, appearance, or design provided during manufacture which determines functions in final use at a level beyond that provided by its chemical composition.

In the case of equipment products, component parts and consumable supplies that are intentionally attached to the products or the packaging materials which remain with the final products fall under this category. Of those, however, the portion that is intentionally released is regarded as substances/ preparations, and therefore, not articles.

As regards supply products, paper, ink, ribbon, thermal paper and so forth fall under the category of articles. Of these, the portion that is intentionally released is regarded as substances/preparations, and therefore, not articles.

3.3 Substances/preparations

Chemical substance: a chemical element or compound that exists in nature or is obtained via a manufacturing process. A substance includes impurities introduced in manufacturing processes, and additives required for maintenance of stability. Solvents that can be separated without affecting the stability of the single chemical substance or without changing its composition are excluded from this definition.

Preparation: A mixture or solution intentionally comprising two or more individual chemical substances.

3.4 Substance whose inclusion is banned

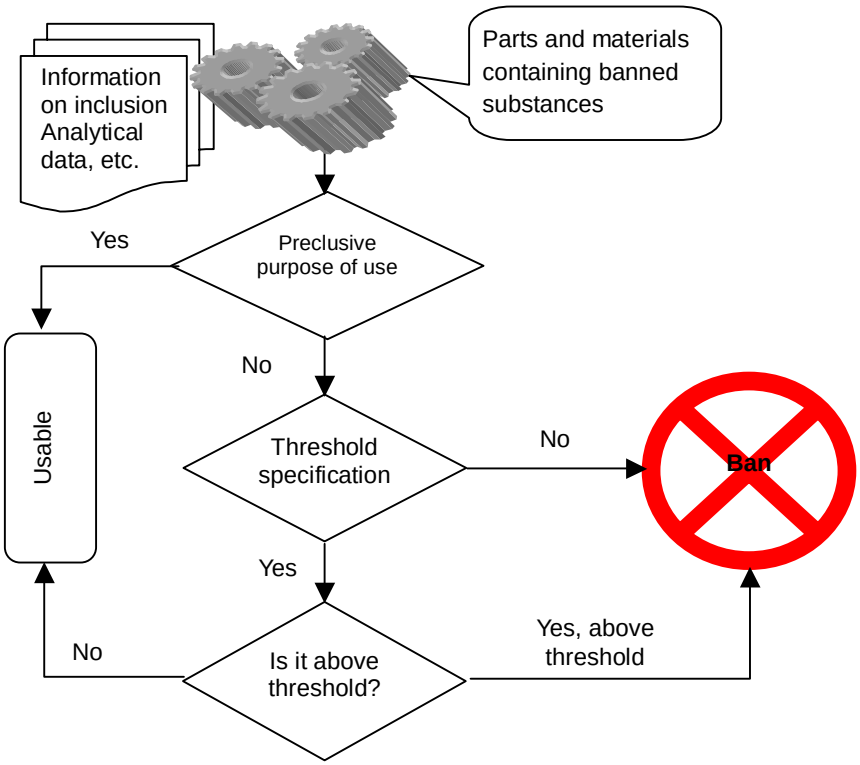
A substance whose inclusion in equipment products or articles constituting equipment products is banned. The following is the definition of “inclusion is banned”.

(1) Inclusion of substances in equipment products or articles that constitute equipment products in the amount above threshold is banned. However, as regards heavy metals in packaging materials (cadmium, hexavalent chromium, lead and mercury), intentional addition is also banned (See Table 4-1-3).

(2) As regards substances without threshold, they are banned when information on inclusion can be obtained, for instance, when they are intentionally added, or information on inclusion can be obtained from upper stream in the supply chain, or inclusion can be identified by analysis as needed.
(3) Use is permitted for a purpose exempt from application of this standard, and for the amount below the threshold.

[Figure 1] Flow chart on the definition of substances whose inclusion is banned (Excluding packaging materials)

* "Parts and materials containing banned substances" are applicable when it is possible to identify the inclusion of banned substances by some methods, such as mentioned in the definition in the above.



3.5 Substances whose inclusion is regulated

Substances of which use in equipment products and articles constituting equipment products for certain purposes are banned. The said subjects may be reviewed from the viewpoint of environmental impact and safety, as well as social conditions.

3.6 Substances subject to controlled use

Substances whose information on inclusion in equipment products and articles constituting equipment products must be grasped and controlled.

3.7 Inclusion (existence)

Inclusion may be intentional by addition, or it may be unintentional. We regard that the relevant substance is included when the inclusion is identifiable by some method, for instance, by the fact that it is added intentionally during the in-house process, or by information from the upper stream in the supply chain, or analysis of part and materials when necessary.

3.8 Intentional addition

Refers to the fact that said substances are used for the purpose of improving the performance of a part or material, or changing its characteristics. In addition, when said substances are used in manufacturing process, etc. and so it is clear that they are contained in the final products, it is also regarded as intentional addition.

3.9 Unintentional inclusion

Refers to the case when said substances are contained in natural materials and cannot be removed technologically in the refining processes, also when they are mixed or bonded unintentionally in manufacturing processes. Refers to so-called impurities.

3.10 Inclusion threshold

Content of a substance included in a part and material, or the maximum latitude of content density.

In the case of complex part that has multiple substances (materials) inside, the content density is defined as density in Homogeneous Material* containing the subject substance, not as the value defining the whole part as a denominator.

3.11 Homogeneous Material

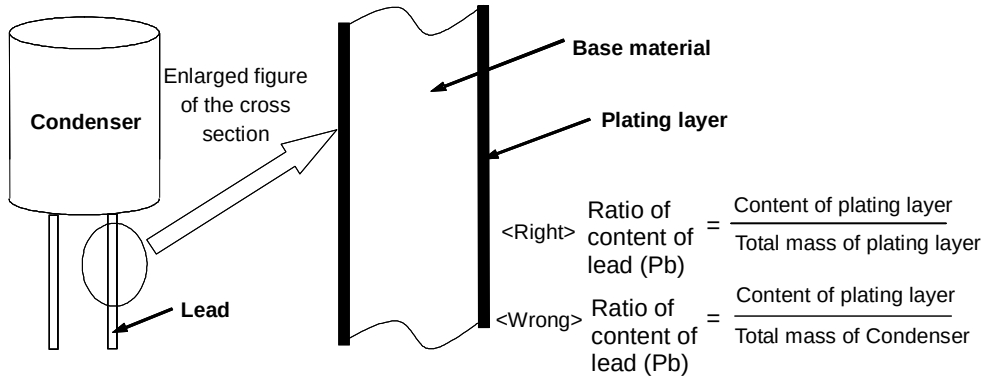
Refer to a material which cannot be mechanically separated into two or more different materials.
The following are some examples of homogeneous material.

・Metal alloy, polymer alloy, chemical compounds, etc.
・Paint, adhesive, ink, paste, plastic polymer, glass powder, ceramic powder, etc.

A part applied with paint, print or plating can be mechanically separated into material part and coating of paint, ink or plaiting. So, each of these is a homogeneous material. “Mechanical separation” means that a material is separated into pieces by mechanical actions such as removing screws, cutting, crushing, grinding, polishing and so forth.

[Figure 2] [Example of a condenser]

When the surface of lead is plated with solder containing lead, a material part and plated layer can be mechanically separated from each other, so each of them is a homogeneous material.



3.12 Control level

Contained chemical substances are classified into the following two levels based on laws and regulations, etc.
(1) Banned: The use that is not allowed by laws and regulations.
(2) Exempt: The use that is not limited by laws and regulations, and that substitute does not exist.

3.13 Schedule to discontinue delivery

(1) Immediately: Delivery discontinuance becomes effective immediately
(2) From __/ __/__: Delivery will be discontinued on the specified
(3) Date under assessment: Currently, the delivery is not a subject to discontinue.
The delivery discontinuance will be scheduled accordingly when it is determined that the introduction of substitute is possible based on changes of social conditions or technological/economical situations.

4. Ricoh criteria for managing environmentally sensitive chemical substances

4.1 Substances whose inclusion is banned

Table 4-1-1 indicates substances whose inclusion is banned.
In case of intentional addition, use of any of these parts or materials is prohibited, regardless of whether the content is below the threshold limit.
Table 4-1-2 indicates the control level of substances whose inclusion is banned, examples of purpose of their use, the content thresholds and the period when delivery is prohibited.

◇Table 4-1-1 List of substances whose inclusion is banned

No.	Name of substance
1	Polychlorinated Biphenyls (PCBs)
2	Polychlorinated Terphenyls
3	Polychloronaphthalenes (Cl=>3)
4	Polybrominated Biphenyls (PBBs)
5	Polybrominated Diphenyl ethers (PBDEs)
6	Short Chain Chlorinated Paraffins
7	Asbestos
8	Ozone Depleting Substances
9	Cadmium and Cadmium Compounds
10	Hexavalent Chromium Compounds
11	Lead and Lead Compounds
12	Mercury and Mercury Compounds
13	Perfluorooctane sulfonates
14	Certain Azocolourants and Azodyes
15	Tri-substituted organostannic compounds
16	Dibutyltin (DBT) compounds
17	Dioctyltin (DOT) compounds
18	Dimethyl fumarate（DMF）

*1 Those perfluorooctanesulfonic acid and its salts (PFOS) derived from the following molecular formula are controlled.
[Molecular formula] C7F17SO2X (X = OH, Metal salt, halide, amide, and other derivatives including polymers).
*2 Certain Azocolourants and Azodyes that form certain amines. See Appendices Table 4 for the detailed list of certain amines.
*3 Includes bis tributyltin oxide (TBTO), tributyltins (TBTs) and triphenyltin (TPTs).

◇Table 4-1-2 Ricoh criteria for substances whose inclusion is banned

(Note) 1. Since examples of purposes and uses do not cover all cases, please check with the publisher if you are not sure.
2. When there is no indication of exempt in the control level, it means “there is no exempt purposes and uses.”
3. See Appendices Table 2 for the details of each substance group. As for ozone depleting substances, see Appendices Table 3.

No.	Name of substance	Control level	Examples of purposes and uses	Content threshold	Period when delivery is prohibited
1	Polychlorinated Biphenyls (PCBs)	Banned	Insulating oil, Lubricant, Electric insulating medium, Solvent, Electrolyte	—	Immediately
2	Polychlorinated Terphenyls	Banned	Insulating oil, Lubricant, Electric insulating medium, Solvent, Electrolyte	—	Immediately
3	Polychloronaphthalenes (Cl=>3)	Banned	Lubricant, Paint, Plastic stabilizer, Electric insulating medium, Flame retardant	—	Immediately
4	Polybrominated Biphenyls (PBBs)	Banned	Flame retardant	1000ppm	Immediately
5	Polybrominated Diphenyl ethers (PBDEs)	Banned	Flame retardant	1000ppm	Immediately
6	Short Chain Chlorinated Paraffins	Banned	PVC plasticizer, Flame retardant	1000ppm	Immediately
7	Asbestos	Banned	Brake lining pad, Insulator, Filler, Rubbing agent, Electric insulating medium, Filler, Pigment/Paint, Talc, Heat insulator	—	Immediately
8	Ozone Depleting Substances[*1]	Banned	Coolant, Foaming agent, Digestive, Detergent	—	Immediately
		Exemption	When contained as by-product	—	—
9	Cadmium and its compounds	Banned	・ Packaging materials	Table 4-1-3	Immediately
			・ Portable battery, Battery	20ppm	
			・ Paint, ink ・ Additives such as pigment, dye, stabilizer in resin (including gum) materials (excluding impurities) ・ Material or a part treated with cadmium electroplating or cadmium coating. ・ Parts Electroless plated with nickel using luster, containing cadmium ・ Pigment and dye in glass and paint for glass ・ Silver brazing filler metals containing cadmium ・ Material and parts such as zinc, zinc alloy, and zinc compound, etc. (free-cutting brass rods, rubber belt, etc.) ・ Electric point of contact of DC motor, switch, relay, breaker and the like ・ Fuse element of temperature fuse ・ Fluorescent tubes (small-size fluorescent tubes, straight fluorescent tubes) ・ Nickel/cadmium battery ・ Fluorescent material contained in fluorescent indicator	100ppm	Immediately
10	Hexavalent chromium and its compounds	Banned	・ Packaging materials	Table 4-1-3	Immediately
			・ Paint, ink ・ Materials and parts galvanized and treated with chromate (sheet metal, screw, shafts, bearings , etc. used for general machinery components, purchased electronic components, electric power devices, etc.) ・ Materials and parts such as aluminum, copper alloys and zinc alloys chemically synthesized with chromate (treatment before painting)	1000ppm	Immediately

*1. Ozone depleting substances are banned from use in manufacturing process as well. (See Section 4.4)

No.	Name of substance	Control level	Examples of purposes and uses	Content threshold	Period when delivery is prohibited
11	Lead and lead compounds	Banned	・ Packaging materials	Table 4-1-3	Immediately
			・ Lead in polyvinyl chloride electric wire coating	300ppm [*2]	
			・ Paint, ink ・ Additives such as pigment, dye, stabilizer in resin (including gum) materials ・ Material and parts plated with lead alloy (e.g. piano wire plated with tin) ・ Parts containing lead as lubricant (e.g. Dry bearing) ・ Optical glass, filter glass ・ Various alloys containing lead(However, exempt alloys are excluded.) ・ Solder materials (solders with Pb = 85% or less) ・ Soldered parts and units (Printed Circuit Board, electric power device, motor, clutch, sensor, etc) ・ Lead in server and storage (HDD) ・ FFC connector contact part	1000ppm	
		Exempt	・ Glass fluorescent tube with lead content of no more than 0.2wt%	—	—
			・ Up to 0.35wt% of lead contained in steal and zinc-coated steel products as alloy ingredient for the purpose of machine work		
			・ Lead contained in aluminum products as alloy ingredient (no more than 0.4wt%)		
			・ Lead contained in copper alloy (no more than 4.0wt%)		
			・ Lead contained in high melting point solder (Lead alloy with 85wt% or more of lead content)		
			・ Electric and electronic parts containing lead in glass or ceramic exept dielectric ceramic in condenser (example: piezo element), or electric and electronic parts containing lead in glass or ceramic base compound		
			・ Lead in dielectric ceramic in condenser with rated voltage of AC125v or DC 250 or more.		
			・ Lead in dielectric ceramic in condenser with rated voltage of AC125 or less than DC250V. ・ Spare parts for electric and electronic products that are put on market before Jan. 1, 2013, whose exemption period shall end on Sept. 30, 2012, may be used after this date.		
			・ Lead contained in white glass used for optical purposes		
			・ Lead contained in solder composed of more than two kinds of elements, and is used for joining pin and package of microprocessor, of which lead content is more than 80wt% and les than 85wt%. However, spare parts of products put on market before Jan. 1, 2011 only are applicable		
			・ Lead contained in solder necessary for secure electric connection between semiconductor die and carrier inside of chip package (flipchip).		

*2. According to the Proposition65 of the State of California, USA

No.	Name of substance	Control level	Examples of purposes and uses			Content threshold	Period when delivery is prohibited
12	Mercury and mercury compounds	Banned	・ Packaging materials			Table 4-1-3	Immediately
			・ Cell, Battery (A button battery is excluded.)			5ppm [*3]	
			・ Dispensation into pigment, paint, ink and resin ・ Relay, switch and sensor with mercury as contact point			1000ppm	
		Exempt	Mercury in straight tube fluorescent lamp with double caps for generic illumination	Standard lifetime lamp using three band fluorescent light with lamp radius of less than 9mm (Example: T2)	Effective period	5mg	—
					Until Sept. 30, 2011		
					After Oct. 1,2011	4mg	
				Standard lifetime lamp using three band fluorescent light with lamp radius of at least 9mm and no more than 17mm (Example: T5)	Until Sept. 30, 2011	5mg	
					After Oct. 1,2011	3mg	
				Standard lifetime lamp using three band fluorescent light with lamp radius of over 17mm and no more than 28mm (Example: T8)	Until Sept. 30, 2011	5mg	
					After Oct. 1,2011	3.5mg	
				Standard lifetime lamp using three band fluorescent light with radius of over 28mm (Example: T12)	Until Sept. 30, 2011	5mg	
					After Oct. 1,2011	3.5mg	
				Long lifetime (25000 hours) lamp using three band fluorescent light	Until Sept. 30, 2011	8mg	
					After Oct. 1,2011	5mg	
			Mercury included in other fluorescent lamp	Straight tube fluorescent halophosphoric acid lamp with lamp radius over 28mm (Example: T10 and T12)	Until Jan 13, 2012	10mg	
					After Jan 14, 2012	Banned	
			Cold cathode fluorescent lamp for special uses and external electrode fluorescent lamp (mercury included in CCFL and EEFL)	Short lamp (500mm or less) （500mm以下）	Until Sept. 30, 2011	No limitation	
					After Oct. 1,2011	3.5mg	
				Medium length lamp (over 500mm and no more than 1500)	Until Sept. 30, 2011	No limitation	
					After Oct. 1,2011	5mg	
				Long lamp (over 1500mm)	Until Sept. 30, 2011	No limitation	
					After Oct. 1,2011	13mg	
			・ High-pressure mercury lamp used as light source of projector			—	—

*3. Mercury content threshold in battery is calculated by the proportion of the mass of mercury in the total mass of battery cell (i. e., concentration per one battery cell), in the same way as the definition in the EU Battery Directive.

No.	Name of substance	Control level	Examples of purposes and uses	Content threshold	Period when delivery is prohibited
13	Perfluorooctanesulfonic acid and its salts (PFOS)	Banned	・ Preparations (grease, oil, etc.)	50 ppm	From April 1, 2008
			・ Surface treatment, plating, fabric	1μg/m2 or 1000 ppm	
			・ Other than preparations, surface treatment, plating, and fabric	1000ppm	
		Exempt	・ Photoresists or anti reflective coatings for photolithography processes ・ Photographic coatings applied to films, papers, or printing plates. ・ “Mist suppressants for non-decorative hard chromium (VI) plating and wetting agents for use in controlled electroplating systems” where the amount of PFOS released into the environment is minimized, by fully applying relevant best available techniques.	—	—
14	Certain Azocolourants and Azodyes that form certain amines	Banned	・ Fabric and leather parts/products that can come into direct contact with human skin (or mouth orifice) for extended period of time. [*4]	30ppm	Immediately
		Exempt	・ Purpose of use other than the above	—	—
15	Trisubstituted organotin compound	Banned	・ Antiseptic, antimold, paint, colorant, antifoulant paint, cooling medium, bloating agent, extinguishing agent, cleaning agent, stabilization agent, antioxidizing agent/age inhibitor, antibacterial and antifungal agents, antifoulant	1000ppm [*5]	From April 1, 2010
16	Dibutyltin compounds	Banned	・ Use other than the below	1000ppm [*5]	From Oct. 1, 2011
		Exempt	[Befor Oct. 1, 2014] ・ 1component sytem and 2 component system room temperature vulcanisation sealant (RTV-1 and RTV-2 sealant) and adhesives ・ Paint and coating containing DBT compounds as catalyst, when tey are used as articles. ・ Soft polyvinyl chloride (PVC) profile extruded by itself or coextruded with hard PVC.	—	—
17	Dioctyltin compounds	Banned	・ RTV-2 moulding kits) ・ Two uses of articles made of fabric with an intention to come into contact with skin	1000ppm [*5]	From Oct. 1, 2011
		Exempt	・ Use other than the above two uses	—	—
18	Dimetylfumarate (dimethyl fumarate（DMF）)	Banned	Antiseptic of leather products ・Desiccant (silica gel pack)	0.1ppm	From May 1, 2011

*4. Only those instructed in drawings or specifications are applicable
*5. Concentration of tin mass after conversion into metal

◇Table 4-1-3 Ricoh criteria for packaging materials

Banned Substances	Control level	Subject	Threshold	Schedule to discontinue delivery
Cadmium, hexavalent chromium, lead, mercury	Banned	・ Intentional addition	—	Immediately
		・ Packing materials and parts for packing (corrugated cardboard, Styrofoam, plastic bag, adhesive tape, desiccating agent, wire band, staple, etc.)	100ppm in total [*]	
	Exempt	・ Packaging materials and material handling used at the time of delivery of parts or materials to Ricoh Group	—	—

* Total concentration of cadmium, hexavalent chromium, lead and mercury in packaging materials must not be more than 100ppm.

Table 4-1-4 Ozone depleting substances banned from inclusion

The following is a classification list of ozone depleting substances banned from inclusion in products.
Please see Appendices Table 3 for the details.

No.	Name of substance	Group in Montreal Protocol
1	Chlorofluorocarbones (CFC)	Annex A Group I
2	Halons	Annex A Group II
3	Other chlorfluorocharbons (CFC)	Annex B Group I
4	Carbon tetrachloride	Annex B Group II
5	1,1,1-Trichloroethane (Methyl chloroform)	Annex B Group III
6	HBFC	Annex C Group II
7	Bromochloromethane	Annex C Group III
8	Methyl bromide	Annex E Group I
9	Hydrochlorofluorocarbons (HCFC)	Annex C Group I

Regarding exemption of application to supply parts

As a rule, supply parts for products sold on or before June 30 2006 (service parts, maintenance parts, etc.) are exempt from application except for a part or material of products specified by Ricoh Group.

4.2 Substances whose inclusion is subject to restriction

Chemical substances listed in Table 4-2-1 are banned from inclusion for specific purposes only.
Table 4-2-2 indicates control levels; purposes/examples of uses; content threshold; and the period of ban on delivery, of substances whose inclusion is banned. The definition of “ban” is the same as that of “substances whose inclusion is banned”.
As for the detailed list of each substance group, see Appendices Table 2.

Table 4-2-1 List of substances whose inclusion is restricted

No.	Name of substance
1	Polyvinyl chloride (PVC)

*1 For types of certain amines, see Appendices Table 4. “Azo dyes and pigments” do not include diazo dyes.

Table 4-2-2 Ricoh criteria for managing substances whose inclusion is restricted

No.	Control level	Subject	Threshold	Schedule to discontinue delivery	Control level
1	Polyvinyl chloride (PVC)	Banned	・ Internal harnesses of devices for exclusive use by Ricoh Group Example) Electric wires, general AC and DC harness that use connectors, etc [*1]., high voltage harness and output lead wire of high voltage power supply that are registered in the Electronic Parts Authorization System (ΣE) ・ Plastic parts and sheets exclusively used by Ricoh Group	—	Immediately
		—	・ Uses other than the above Example) 1. Harness that uses multicore cables (for LVDS, SATA and USB) 2. Procured electrical units such as motors, clutches, solenoids, sensors and so forth 3. Coating of electronic parts for general use, insulation tubes, tape, sleeves 4. Power supply cord, AC adapter, interface cable 5. In case of use to meet requirements of safety standards of Ricoh Group regardless of inside or outside of equipments	—	—

*1. Wires and connectors registered under the electronic component recognition system refer to components with Ricoh's item number starting with 1

4.3 Substances whose inclusion is subject to management

Substances whose inclusion is subject to management are indicated in **the list of substances subject to management of JAMP [*1]** (hereinafter, referred to as List of substances whose inclusion is subject to management). The information on contained chemical substances are collected and managed by JAMP AIS [*2] in the case of articles, and by JAMP MSDS plus [*2]/MSDS for substances/preparations.

4.3.1 Scope of application of products whose information on contained chemical substances is to be collected

(1) Applicable products are Ricoh Brand equipment products including supplies, and packaging materials of these products which will be transferred to the customers (end users, business partners) eventually.
(2) Also applicable to containers/packaging materials (for materials, parts and products) for transportation, loading platform (such as pallet), and equipments/jigs to be imported to the EU
Ricoh Group will indicate specific target products when it makes a request for the collection of information on inclusion of substances.

For the details concerning how to answer to the request for collection of information on contained chemical substances, see Annex: **Operation Manual of Collection System of Information on Chemical Substances Contained in Products** [*3] (hereinafter referred to as Chemical Substances Information Collection System Operation Manual), **AIS Preparation Guidance** [*3] and Annex: **AIS Preparation Guides** [*3].

*1. The List of Inclusion Managed Substances, is a list that is published by JAMP (Joint Article Management Promotion-consortium) . See the URL at the end of the article.
*2. Data recording sheet for disclosure and transmission of information of chemical substances contained in articles and substances/preparations, provided by JAMP (Joint Article Management Promotion-consortium).
*3. "Chemical substance information collection system operation manual", AIS preparation guidance" and AIS preparation guidebook" are made public to the suppliers who are the users of RaVender NET.

4.3.2 Environmental impact information survey

Of contained substances subject to management, the status of inclusion of chemical substances listed in Table 4-3-1 and Table 4-3-2 in constituent parts and materials of Ricoh Brand equipment products must be identified and managed as it is currently being done.

With respect to Table 4-3-1:**substances "A" whose inclusion is subject to management, information as to whether or not they are contained by intentional addition and their content volumes must be obtained, and their use must be controlled**.
With respect to Table 4-3-2: **substances "B" whose inclusion is subject to management, information as to whether or not they are contained by intentional addition must be identified; and their use must be controlled.**

Table 4-3-1 List of substances "A" whose inclusion is subject to management (Information as to whether or not they are contained by intentional addition and their content volumes must be obtained, and their use must be controlled.)

No.	Name of substance
A1	Brominated flame retardant [*1]
A2	Antimony and its compounds
A3	Arsenic and its compounds
A4	Beryllium and its compounds
A5	Bismuth and its compounds
A6	Nickel and its compounds [*2]
A7	Selenium and its compounds
A8	Radioactive substances
A9	Phthalates

*1. Brominated flame retardants excluding PBBs and PBDE
*2. As for Nickel, it dose not include its alloy (e.g. stainless steel)

Table 4-3-2 List of substances "B" whose inclusion is subject to management (Information as to whether or not they are contained by intentional addition must be grasped, and their use must be controlled.)

No.	Name of substance
B1	Pentachlorophenol and its salts and esters
B2	Chlorine and its compounds
B3	Bromine and its compounds
B4	Fluorine and Fluorine Compounds
B5	Antimony trioxide
B6	Cobalt and its compounds
B7	Lithium and its compounds
B8	Vanadium and its compounds
B9	HFCs, PFCs,SF6 [*3]
B10	Fireproof ceramic textile subject to EU WEEE Directive [*4]
B11	Cyanides
B12	Organophosphorus compounds
B13	Organotin compounds [*5]
B14	Benzene
B15	BisphenolA
B16	Nonylphenol
B17	4-octylphenol
B18	Medium Chain Chlorinated Paraffins (carbon chain length: 14-17) Long Chain Chlorinated Paraffins (carbon chain length: 18-30)

*3. These are the greenhouse gases, reduction of which is requested by the Kyoto Protocol.
HFCs: hydrofluorocarbons ex.: HFC134a
PFCs: perfluorocarbons ex.: tetrafluorocarbon
SF6: sulphur hexafluoride .
*4. The EU WEEE Directive provides the definition of the substance as "A part that contains fireproof ceramic textile described in the EU Commission Directive 97/69/EC of December 5, 1997, which is intended to make EU Council Directive 67/548/EEC concerning classification / packaging / labeling of hazardous substances correspond to the current technological advances."
*5. Organic tin compounds excluding TBTO, TPTs and TBTs

Table 4-3-3 Example of purpose/use of inclusion managed substance A

No.	Name of substance	Subject
A1	Brominated flame retardant	Flame retardant, PVC plasticizer
A2	Antimony and its compounds	Pigment, Paint, catalyst, Lead free soldering material, Stabilizer, n-type dopant, Flame retardant, Polymerized catalyst,
A3	Arsenic and its compounds	Pigment, Paint, colorant, Antifoaming agent of glass, Semiconductor substrate, Flame retardant
A4	Beryllium and its compounds	Ceramic material, alloy, catalyst, Agehardening characteristic alloy material, Alloy material for spring, solder
A5	Bismuth and its compounds	Lead free soldering material, soldering material
A6	Nickel and its compounds	finishing agent, nickel plating
A7	Selenium and its compounds	Photoconductor, Pigment, ink, catalyst, oxidation agent, semiconductor material, Photodetector, Photocell
A8	Radioactive substances	Optical characteristics
A9	Phthalates	PVC plasticizer, Paint, Pigment, ink, adhesive, lubricant agent

Table 4-3-4 Example of purpose/use of inclusion managed substance B

No.	Name of substance	Subject
B1	Pentachlorophenol and its salts and esters	Wire covering material, antiseptic
B2	Chlorine and its compounds	Flame retardant, Print board, Electronic part package sealing material, Wire covering material, plastic
B3	Bromine and its compounds	Flame retardant, cable cover, plastic
B4	Fluorine and Fluorine Compounds	Flame resistance giving, semiconductor dopant, Electrolyte, Electrolyte, finishing agent, optical glass
B5	Antimony trioxide	Flame retardant additives
B6	Cobalt and its compounds	Magnetic material, alloy, Pigment, Rust preventive material, ink, Ceramic element
B7	Lithium and its compounds	electrode, battery, grease, Optical glass
B8	Vanadium and its compounds	alloy,catalyst, Pigment, Magnetic material
B9	HFCs, PFCs,SF6	Semiconductor etching gas, cooling medium, bloating agent
B10	Fireproof ceramic textile subject to EU WEEE Directive	Adiabatic material
B11	Cyanides	Plating agent, curative agent, adhesive
B12	Organophosphorus compounds	antioxidant, Flame retardant, Fungicide, polymerization catalyst, printed board, Electrolyte, finishing agent, Wire covering material, plastic
B13	Organotin compounds	Polymerization catalyst, plastic stabilizer, antioxidant, Fungicide, adhesive
B14	Benzene	adhesive, ink
B15	BisphenolA	antioxidant, adhesive, plasticizer
B16	Nonylphenol	rubber accelerator, Surfactant, ink
B17	4-octylphenol	ink, in-process material
B18	Medium Chain Chlorinated Paraffins (carbon chain length: 14-17) Long Chain Chlorinated Paraffins (carbon chain length: 18-30)	Flame retardant, vulcanization accelerator

4.4 Substances banned from use in manufacturing process

The following substances are banned from use in manufacturing process. Suppliers are required to take voluntary action to abolish these substances (for nonuse).

Table 4-4-1 Management standard for ozone depleting substances banned from use in manufacturing process

No	Name of substance	Group in Montreal Protocol	Banned use in the process	Exempt use in the process
1	Chlorofluorocarbones (CFC)	Annex A Group I	Cleaning in the final stage of product manufacture, final stage of provision of product or circuit board , or for reuse of parts.	- Refrigerant within refrigeration machine and air conditioner and the like - Fire extinguish agent - Quarantine fumigation at the time of export and import
2	Other chlorfluorocharbons (CFC)	Annex B Group I		
3	Carbon tetrachloride	Annex B Group II		
4	1,1,1-Trichloroethane (Methyl chloroform)	Annex B Group III		
5	Hydrochlorofluorocarbons (HCFC)	Annex C Group I		- Refrigerant within air conditioner and the like - Use in manufacturing process of electronic components

Table 4-4-2 List of Chloric organic solvents banned from use in manufacturing process

No.	Name of substance	CAS No.
1	Trichloroethylene	79-01-6
2	Tetrachloroethylene	127-18-4
3	Dichloromethane	75-09-2
4	Carbon tetrachloride	56-23-5
5	1,2- dichloroethane	107-06-2
6	1,1- dichloroethylene	75-35-4
7	cis-1, 2-Dichloroethylene	156-59-2
8	1,1,1- trichloroethane	71-55-6
9	1,1,2- trichloroethane	79-00-5
10	1,3-dichloropropane	542-75-6

【Reference】Analysis method for substances whose inclusion is banned

See the following for the summary of analysis methods for substances whose inclusion is banned.
For more information on the method of analysis of six substances covered by RoHS (Restriction of the Use of Certain Hazardous Substances) Directive (lead, hexavalent chromium, mercury, cadmium, PBB, and PBDE), see "Environmentally Sensitive Substance Analysis" <Annex> to the "GuideRicoh Group Green Procurement Guidelines".

Summary of analysis method for substances whose inclusion is banned

Major category	Object substance	Analysis method
Metals and Metal Compounds	Cadmium and its compounds Lead and its compounds	* Atomic absorption analyzer (AA) * Plasma emission analyzer (ICP-AES / MS) * Fluorescent X-rays analyzer (EDX, WDX)
	Hexavalent Chromium and its compounds	* Visible light spectrophotometer / ＜Diphenylcarbazide absorptiometry＞
	Mercury and its compounds	* Atomic absorption analyzer (AA) / Heating vaporization metal amalgamation method * Fluorescent X-rays analyzer (EDX, WDX)
Halogen Organic Compounds	Polychlorinated Biphenyls (PCBs) Polychlorinated Terphenyls (PCTs) Polychloronaphthalenes (PCN) Short chain chlorinated paraffines (CPs) Chlorinated Paraffins Vinyl Chloride Polymer (PVC) Polybrominated Biphenyls (PBBs) Polybrominated Diphenyl ethers (PBDEs)	* High resolution gas chromatograph mass spectrometer (HRGC - MS)←<extraction - cleanup> * Fourier transform infrared spectrophotometer (FT-IR) * ion chromatograph device * Fluorescent X-rays analyzer (EDX, WDX)
	Perfluorooctane sulfonate acid (PFOS) and its salts	* Liquid chromatograph/tandem mass spectrometer (LC-MS/MS)

Precaution at the time analysis of substances whose inclusion is banned

1)The measurement with Fluorescent X-rays analyzer (EDX)

Object	Precaution at measurement
Resin	・Prepare large amount of specimen to measure (reduce dispersion by increasing signal amount) ・Soft specimen, such as sponge, needs to be compressed before measurement. (reduce dispersion by increasing signal amount)
Plating	・Disjoint plating part to increase the thickness of plating only before measurement.
Metal	・Remove plating from metal base, if plated, and measure only the base material.
Print	・Ink raw materials needs to be measured per individual color.

2) The measurement in detailed analysis (ICP/AA)

Object	Precaution at measurement
Resin/Metal, etc.	・Do not leave residue when dissolving. ・Do not vaporize when heating. ・Consider adhesion to container.
Plating	・Dissolve both of the base material with plating and the base material after removing plating separately if the complete disjointing of plating part is not possible, and proceed with analysis, and then calculate the content of banned substance of plating area by following procedure shown below.
	With [Object element density (A)　Plating main element density (C)] in the whole base material And [Object element density (B)　Plating main element density (D)] in the whole base material after removing plating And plating main elemental density (E) out of the plating The content ratio of object element in plating = A × ((E - D) / (C - D)) - B × ((E - C) / (C - D)) (Usually E can be considered as 100%.　Be cautious since the error can be significant when C□D)
Plating/Resin	・Calculate Cr (□) by multiplying the total Cr content ration and [Density of Cr(□) / Total density of Cr].

Revision History

Revised date	Edition	Content of the revision
December 2006	First Edition	<Annex> Newly established as “Environmentally sensitive substances: Imaging system equipment products Volume” * Content of the revision of Green Procurement Standards Fourth Edition 1) Changed the scope of application from Ricoh Group brand products as a whole to the imaging system equipment products with Ricoh Group 2) Banned substances were reduced from 16 substance groups to 14 substance groups 1. Polyvinyl chloride (PVC) → Transferred to substances subject to regulated use (the new classification) 2. Transferred medium chain and long chain chlorinated paraffines (CPs) to substances subject to regulated use. (Note) Short chain chlorinated paraffines (CPs) shall remain as a banned substance. 3. Transferred HFCs, PFCs and SF_6 to substances subject to controlled use. 3) Newly established a classification of “substances subject to regulated use”. 4) Reviewed the purposes for use and threshold of cadmium ・As for the threshold of content by unintentional addition, 75ppm shall apply as far as the substance is used for surface treatment, coloring and stabilizing agent of plastic. For other uses, the threshold of 100ppm shall apply. 5) With respect to lead in electroless nickel-plating, Intentional addition of hexavalent chromium (threshold of 100ppm) is exempted from the application.. 6) Substances subject to controlled use were reduced from 50 substance groups to 27 substance groups. In addition, control level is limited to intentional addition only. They were also classified into substances listed as “A” (10 substance groups), of which content volumes must be grasped, and substances listed as “B” (17 substance groups), of which content volumes need not be grasped. 7) “Fireproof ceramic fiber subject to EU WEEE Directive” is newly added as a substance subject to controlled use. 8) Others 1. Review of purposes for use and examples of use of banned substances Reflection of EU RoHS Directive exempt uses, etc. 2. An item of “homogeneous material” is added in the definition of terms. 3. Detailed list of chemical substances groups is added (Example of substances, CAS NO.)
April 2008	The 2nd edition	1) Added Infotec to Ricoh Group’s brand names 2) Changed descriptions of Banned Substances 3) Added PFOS to Banned Substances 4) Deleted threshold limit value for PCB and PCT content. 5) Changed threshold limit value for a cadmium content from 75 ppm to 100 ppm. 6) Changed wording of exempt use of lead (lead contained in alloys) 7) Removed “button battery” from exempt use of mercury. 8) Reclassified medium and long chain chlorinated paraffins from Controlled Use Substances to Controlled Use Substances B. 9) Reclassified some azo dyes and pigments that form certain amines from Controlled Use Substances A to Controlled Use Substances. 10) Changed descriptions of the method of analysis of Banned Substances and added the method of analysis of PFOS. 11) Changed Appendices Table 2: Detailed List of Environmentally Sensitive Chemical Substances 12) Changed telephone number of contact.
March 2009	The 3rd edition	1. Background of the revision Revision was performed to comply with EU REACH regulations, and in accordance with the revision of substances whose inclusion is banned by Ricoh Groups 2. Main details of the revision 2.1 Title and related items (1) Deleted the phrase, “For Imaging system equipment products” from the title of this volume, and revised the title of this volume to Ricoh Criteria for Environmentally Sensitive Chemical Substances. In addition, deleted the word, “imaging system” from the entire text. (2) Replaced the terms, “banned substances, substances subject to regulated use, and substances subject to regulated use”, by the terms, “substances whose inclusion if banned, substances whose inclusion is regulated (restricted), and substances subject to controlled use,” respectively in the entire text. 2.2 Section 2.1 Scope of application to products (1) Added RICOH｜IBM brand logos in (3) in this section. 2.3 Section 2.2 Scope of application to parts and materials (1) Deleted the Note in (2) in this section, “Excluding packaging materials and material handlings used for delivery,” because they are within the scope of application with respect to substances whose inclusion is banned. (2) Regarding (6) in this section, deleted the specific items in the product group, and the Note, “as provided in separate regulations”, for the same reason as mentioned in the

		above section. 2.4 Section 3 Definition of terms (1) Added definitions of Section 3.2 and 3.3, and revised the definitions from Section 3.4 to 3.7. (2) Added [Figure 1] in Section 3.4, and clarified the interpretation of the definition of substances whose inclusion is banned. (3) Replaced the term “parts/materials” from Section 3.4 to 3.6 by the term “articles”. 2.5 Section 4.1 Substances whose inclusion is banned (1) Transferred the substance listed as No.16 in the “List of substances whose inclusion is restricted (Table 4-2-1) to Table 4-1-1: List of substances whose inclusion is banned, and Table 4-1-2: Ricoh criteria for substances whose inclusion is banned, respectively (revised from restricted substance to banned substance) 2.6 Section 4.3 Substances whose inclusion is subject to management (1) In accordance with the expansion of substances whose inclusion is subject to management, added the description on new establishment/disclosure of the list of chemical substances whose inclusion is subject to management, and the collection of information on contained chemical substances. (2) Added the scope of application of products whose information is to be collected in Section 4.3.1, and left the statement in Section 4.3.2. that the current survey on environmental impact information would be conducted. (3) Added a statement on the new establishment/issuance of Operation Manual of chemical substances information collection system, and AIS Preparation Guidance. (4) Revised the structure of Appendices Tables 1 to 4, to make them conform to the management levels of above-mentioned substances whose inclusion is banned, subject to restriction, and subject to management, respectively.
March 2010	Version 4.0	1. Background of revision In accordance with added substances in REACH Annex □□ Restriction and SVHC, the revision was implemented to add Ricoh Group’s banned substances and substances subject to management. 2. Main content of revision 2.1 Section 2. Scope of Application (1) The brand logo of “IKON” was added to the Ricoh Group brand. 2.2 Section 3. Definition of Terms (1) In the definition of Article in Section 3.2, the wording “that are intentionally attached to the products or the packaging materials” was added with respect to consumable supplies which remains with the final products. (2) In Section 3.4, a qualifying statement was added to ban intentional addition of heavy metals to packaging materials as well. The Model Toxics in Packaging Legislation (GONEG) prohibits intentional addition of these heavy metals and requires that their total mass not exceed the defined value. In compliance with this requirement, this standard banned intentional addition up to the Version 2.0. However, in the revised Version 3.0 in which “intentional addition was abolished,” this measure was omitted. Thus, in this version, the ban on intentional addition was revived as regards packaging materials. Similarly, a note was added in the management standards of packaging materials, stating “the total concentration in each packaging material must not be more than the threshold.” 2.3 Section 4. Ricoh criteria for managing environmentally sensitive chemical substances (1) In accordance with revised REACH Annex □□ Restriction, 3 additional substances (No. 15-17) were included in Table 4-1-1. Because TBTO, TBTs and TPTs (former Version 7 and 8) are types of Tri-substituted organostannic compounds in No. 15, they were included as such. (2) The coverage of JIG list in the same table was deleted because we decided to eliminate this list as a consideration item. Similarly, it was deleted from Tables 4-2-1, 4-3-1 and 4-3-2. (3) No.8 (Ozone depleting substances) in Table 4-1-2 may be contained as traces of byproduct in polycarbonate resin and polycarbonate compound resin manufactured by interfacial polycondensation. Because complete elimination of the byproduct is impossible by current industrial technology, and also because the level of content does not have any personal or environmental impact, it was added as exempt. (4) The banned purposes and uses of No. 11 (Lead and lead compounds) and No. 13 (PFOS) were updated based on the Ricoh Standards. (5) The wording, “EU RoHS directive exempt uses and purposes”, was deleted completely, because they are not necessarily in conformity with exempt uses and purposes of Ricoh. (6) The exempt uses and purposes specified by Ricoh in No. 11 (Lead and lead compounds) were deleted. (7) The same table, control level and exempt uses and purposes for substances from No. 15 to 17, which were newly added in this revision, were clearly stated. (8) Table 4-1-4 was newly added, which is Ozone depleting substances banned from inclusion in products, transferred from the text of Green Procurement Standards.

		(9) By adding Section 4.4, the ozone depleting substances and the list of chloric organic solvent banned from use in manufacturing process were transferred (added) here from the text of Green Procurement Standards. 2.4 Appendices Table (1) 3 additional substances were entered in the Appendices Table 1, and the laws and regulations were updated to the latest version. (2) In the same table, "(2) Industrial standard" was changed from JIG to JAMP, and the column" (3) Environmental label, etc." was deleted, because it is not established as a consideration item. (3) Exemplary substances of additional 3 substances (No. 15-17) were included in Appendices Table 2.
March 2011	5th Edition	1. Background of revision In response to the revision of EU RoHS Directive, we newly added substances banned from inclusion and reviewed exempt uses. 2. Main content of revision (1) Updated Ricoh Group Brand in the applicable range of products in section 2.1 to the latest one. (2) Added DMF (No.18) to substances banned from inclusion in Table 4-1-1. Also added DMF to the following Table 4-1-2 and the separate Tables 1 and 2, and clarified threshold and banned period of delivery, etc. (3) Delited No. 9 exempt purposes of use of Cadminium in Table 4-1-2 (There is no exempt use). (4) Rflected the evision details of EU RoHS in the exempt use of No. 11: lead and No.12: mercury (Please see the said section for the details). (5) Added high-pressure mercury lamp as the light source of projector as an independent exempt use of Ricoh Group. (6) Added "□ In case of use to meet the requirement of safety standard of Ricoh Group" to exempt use in Table 4-2-2 regarding substance of which inclusion is included in Section 4.2. (7) Clearly mentioned that "Ricoh Group Lisf of substances subject to management that are contained in Articles" in Section 4.3 was the list of substances subject to management of JAMP, and indicated its URL at the end of this article. (8) Updated the name of contact department for inquiries, and the name of organization responsible for the publishing, which is written in the back.

*This standard is subject to review annually based on legal trend, our company direction, etc.
When a revision is made as a result of reviews, it will be posted in the bulletin board of Green Procurement DB of RaVenderNET website, and the latest edition will be published in Green Procurement DB and Ricoh official website (Ricoh Environmental Management website).
《URL Address》
*RaVenderNET : https://nit.notes.ricoh.co.jp/rvn/greenpro.nsf
*RICOH homepage
Japanese HP : http://www.ricoh.co.jp/ecology/guideline/index.html
English HP : http://www.ricoh.com/environment/guideline/index.html
*JAMP URL : http://www.jamp-info.com/list

Appendices Table 1: Major laws and regulations / voluntary criteria concerning environmentally sensitive chemical substances

Substances whose inclusion is banned

No.	Substances	Legal regulation	Industry standard
1	Polychlorinated Biphenyls (PCBs)	EU REACH (Annex 17 Restriction)	JAMP(*)
2	Polychlorinated Terphenyls (PCTs)	EU REACH (Annex 17 Restriction)	JAMP
3	Polychloronaphthalenes (Cl=>3)	—	JAMP
4	Polybrominated Biphenyls (PBBs)	EU 2002/95/EC(RoHS) EU REACH (Annex 17 Restriction)	JAMP
5	Polybrominated Diphenyl ethers (PBDEs)	EU 2002/95/EC(RoHS) EU REACH (Annex 17 Restriction)	JAMP
6	Short chain Chlorinated Paraffins	EU REACH (Annex 17 Restriction)	JAMP
7	Asbestos	EU REACH (Annex 17 Restriction)	JAMP
8	Ozone Depleting Substances	EU REACH (Annex 17 Restriction) US: ODS labeling restriction(Section 611 on the Clean Air Act Amendments of 1990) Montreal Protocol	JAMP
9	Cadmium and Cadmium Compounds	Japan: Law on Promoting Green Purchasing EU 2002/95/EC(RoHS) EU REACH (Annex 17 Restriction) EU2006/66/EC(Battery directive) EU 94/62/EEC(Packaging directive) US: the Model Toxics in Packaging Legislation	JAMP
10	Hexavalent Chromium Compounds	EU 2002/95/EC(RoHS) EU 94/62/EEC(Packaging directive) US: the Model Toxics in Packaging Legislation	JAMP
11	Lead and Lead Compounds	Japan: Law on Promoting Green Purchasing EU 2002/95/EC(RoHS) EU REACH (Annex 17 Restriction) EU2006/66/EC(Battery directive) EU 94/62/EEC(Packaging directive) US: the Model Toxics in Packaging Legislation	JAMP
12	Mercury and Mercury Compounds	Japan: Law on Promoting Green Purchasing EU 2002/95/EC(RoHS) EU REACH (Annex 17 Restriction) EU 2006/66/EC(Battery directive) EU 94/62/EEC(Packaging directive) US: the Model Toxics in Packaging Legislation	JAMP
13	Perfluorooctane sulfonates and its salts (PFOS)	EU REACH (Annex 17 Restriction)	JAMP
14	Certain azocolourants and azodyes that form certain amines by decomposition	EU REACH (Annex 17 Restriction)	JAMP
15	Trisubstituted organotin compound	EU REACH (Annex 17 Restriction)	JAMP
16	Dibutyltin compounds	EU REACH (Annex 17 Restriction)	JAMP
17	Dioctyltin compounds	EU REACH (Annex 17 Restriction)	JAMP
18	Dimetylfumarate (dimethyl fumarate（DMF）)	EU 2001/95/EC EU REACH (Annex 17 restrictions) *Expected to be added in fall of 2011	—

* JAMP(Japan Article management Promotion-consortium)

Substances whose inclusion is subject to restriction

No.	Substances	Legal regulation	Industry standard
1	Polyvinyl Chloride Polymer (PVC)	—	JAMP

Substances A, whose inclusion is subject to management

No.	Substances	Legal regulation	Industry standard
A1	Brominated Flame Retardants	—	JAMP
A2	Antimony and Antimony Compounds	US: Proposition65	JAMP
A3	Arsenic and Arsenic Compounds	EU 76/769/EEC Germany: Chem Verbots US:Proposition65	JAMP
A4	Beryllium and Beryllium Compounds	US:Proposition65	JAMP
A5	Bismuth and Bismuth Compounds	—	JAMP
A6	Nickel and Nickel Compounds	EU 76/769/EEC US:Proposition65	JAMP
A7	Selenium and Selenium Compounds	US:Proposition65	JAMP
A8	Radioactive Subustances	—	JAMP
A9	Phthalates	US:Proposition65	JAMP

Substances B, whose inclusion is subject to management

No.	Substances	Legal regulation	Industry standard
B1	Pentachloropheno and its salts and esters	—	JAMP
B2	Chlorine and Chlorine Compounds	—	JAMP
B3	Bromine and Bromine Compound	—	JAMP
B4	Fluorine and Fluorine Compounds	—	JAMP
B5	Antimony trioxide	—	JAMP
B6	Cobalt and Cobalt Compounds	US:Proposition65	JAMP
B7	Lithium and Lithium Compound	US:Proposition65	JAMP
B8	Vanadium and Vanadium Compounds	US:Proposition65	JAMP
B9	HFCs, PFCs, SF (subscript: 6)	Denmark: Statutory Order no. 552 of 2 July 2002 Regulating Certain Industrial Greenhouse Gases Kyoto Protocol	JAMP
B10	Refractory ceramic Fibres subject to EU WEEE directive	EU 2002/96/EC(WEEE)	JAMP
B11	Cyanogen Compounds	—	JAMP
B12	Organophosphoru Compounds	—	JAMP
B13	Organotin Compounds	—	JAMP
B14	Benzene	—	JAMP
B15	Bisphenol A	—	JAMP
B16	Nonylphenol	—	JAMP
B17	4-octylphenol	—	JAMP
B18	Medium and long chain chlorinated paraffin Long chain chlorinated paraffin	—	JAMP

Appendices Table 2: Detailed List of Environmentally Sensitive Chemical Substances

(Note) Substances listed in this table are some of the specific examples. This list does not include all of the environmentally sensitive chemical substances.

Banned Substances

No.	Substances	Legal regulation	Industry standard
1	Polychlorinated biphenyls (PCBs) [*1]	Polychlorinated biphenyls	1336-36-3
		Aroclor 1254	11097-69-1
		Monomethyl-tetrachloro-diphenyl methane Note (Ugilec 141)	76253-60-6
		Monomethyl-dichloro-diphenyl methane Note (Ugilec 121, 21)	-
		Monomethyl-dibromo-diphenyl methane Note (DBBT)	99688-47-8
2	Polychlorinated terphenyls (PCTs)	Polychlorinated terphenyl	61788-33-8
		Aroclor 5442	12642-23-8
3	Polychloronaphthalenes (with 3 or more 3 chlorine atoms)	Polychloronaphthalens	70776-03-3
		Pentachloronaphthalene	1321-64-8
4	Polybrominated biphenyls (PBBs)	Tetrabromobiphenyl	40088-45-7
		Hexabromobiphenyl	59080-40-9
		Octabromobiphenyl	61288-13-9
		Decabromobiphenyl	13654-09-6
5	Polybrominated diphenyl ethers (PBDEs)	Hexabromodiphenyl ether	36483-60-0
		Heptabromodiphenyl ether	36483-60-0
		Octabromodiphenyl ether	68928-80-3
		Nonabromodiphenyl ether	32536-52-0
		Decabromobiphenyl ether	63936-56-1
6	Short chain chlorinated paraffins	Chlorinated paraffins (with 10-13 carbon atoms)	85535-84-8
7	Asb	Asbestos	7440-43-9
		Actinolite	1306-19-0
		Amosite (Grunerite)	1306-23-6
		Anthophyllite	10108-64-2
		Chrysotile	10124-36-4
		Crocidolite	7440-43-9
		Tremolite	1306-19-0
8	Ozone depleting substances	For Ozone depleting substances, see Appendices 3	—
9	Cadmium and its compounds	Cadmiumestos	7440-43-9
		Cadmium oxide	1306-19-0
		Cadmium sulfide	1306-23-6
		Cadmium chloride	10108-64-2
		Cadmium sulfate	10124-36-4
10	Hexavalent chromium compounds	Barium chromate	10294-40-3
		Calcium chromate	13765-19-0
		Chromium trioxide	1333-82-0
		Lead(ll)chromate	7758-97-6
		Sodiumchromate	7775-11-3
		Sodium bichromate	10588-01-9
		Strontium chromate	7789-06-2
		Potassium dichromate	7778-50-9
		Potassium chromate	7789-00-6
		Zinc chromate	13530-65-9

*1.To be precise, these substances are alternate PCBs, however, they were described as exemplified substances of PCBs

No.	Substances	Legal regulation	Industry standard
11	Lead and its compounds	Lead	7439-92-1
		Lead (II) sulfate	7446-14-2
		Lead(ll)carbonate	598-63-0
		Lead hydrocarbonate	1319-46-6
		Lead acetate	301-04-2
		Lead (II) acetate, trihydrate	6080-56-4
		Lead phosphate	7446-27-7
		Lead selenide	12069-00-0
		Lead(lV)oxide	1309-60-0
		Lead (II, IV) oxide	1314-41-6
		Lead(ll)sulfide	1314-87-0
		Lead (II) oxide	1317-36-8
		Lead (II) carbonate basic	1319-46-6
		Lead hydroxidcarbonate	1344-36-1
		Lead (II) chromate	7758-97-6
		Lead (II) titanate	12060-00-3
		Lead sulfate	15739-80-7
		Lead sulphate	12202-17-4
		Lead stearate	1072-35-1
12	Mercury and its compounds	Mercury	7439-97-6
		Mercuric chloride	33631-63-9
		Mercury (II) chloride	7487-94-7
		Mercuric sulfate	7783-35-9
		Mercuric nitrate	10045-94-0
		Mercuric(ll)oxide	21908-53-2
		Mercuric sulfide	1344-48-5
13	Perfluorooctanesulfonic acid and its salts (PFOS)	Perfluorooctanesulfonic acid	1763-23-1
		Perfluorooctanesulfonic acid (ammonium salt)	29081-56-9
		Perfluorooctanesulfonic acid (diethanol amine salt)	70225-14-8
		Perfluorooctanesulfonic acid (potassium salt)	2795-39-3
		Perfluorooctanesulfonic acid (lithium salt)	29457-72-5
14	Certain Azocolourants and Azodyes that form certain amines	Information on specific examples of substances is not available	—
15	Trisubstituted organotin compound (Continued to the next page)	Bis tributyltin oxide	56-35-9
		Triphenyltin N,N-dimethyldithiocarbamate	1803-12-9
		Triphenyltin fluoride	379-52-2
		Triphenyltin acetate	900-95-8
		Triphenyltin chloride	639-58-7
		Triphenyltin hydroxide	76-87-9
		Triphenyltin fatty acid salts (C=9-11)	18380-71-7 18380-72-8 47672-31-1 94850-90-5
		Triphenyltin chloroacetate	7094-94-2
		Tributyltin methacrylate	2155-70-6
		Bis (tributyltin) fumarate	6454-35-9
		Tributyltin fluoride	1983-10-4
		Bis(tributyltin)=2,3-dibromosuccinate	31732-71-5
		Tributyltin acetate	56-36-0
		Tributyltin laurate	3090-36-6
		Bis (tributyltin) phthalate	4782-29-0
		Copolymer of alkyl acrylate, methyl methacrylate and tributyltin methacrylate (alkyl; C=8)	67772-01-4
		Tributyltin sulfamate	6517-25-5
		Bis(tributyltin)maleate	14275-57-1

No.	Substances	Legal regulation	Industry standard
15	Trisubstituted organotin compound（Continued from the previous page）	Mixture of tributyltin cyclopentanecarboxylate and its analogs (Tributyltin naphthenate)	5409-17-2
		Tributyltin-1,2,3,4,4A,4B,5,6,10,10A-decahydro-7-isoplopyl-1,4A-dimethyl phenanthrencarboxylatemix	26239-64-5
		Trimethyltin chloride	1066-45-1
		Trimethyltinsulphate	63869-87-4
		Trimethyltin (IV) hydroxide	56-24-6
		Triethyltin(IV) chloride	994-31-0
		Triethyltin hydroxide	994-32-1
		Tripropyltin chloride	2279-76-7
		Tripropyltin iodoacetate	73927-92-1
16	Dibutyltin compounds	Dibutyltin	1002-53-5
		Dibutyltin maleate	10192-92-4
		Bis[[(Z)-4-methoxy-1,4-dioxo-2-butenyl]oxy]dibutylstannane	15546-11-9
		Bis(2-ethylhexanoic acid)dibutyltin	2781-10-4
		Dibutyltin dichloride; (DBTC)	683-18-1
		Dibutyltin oxide	818-08-6
17	Dioctyltin compounds	Dialkyl(C＝1∽8)tin bis｛alkyl (or alkenyl, C=6～18) thioglycollate)	15571-58-1
		Dioctyltin maleate	16091-18-2
		Dioctyltin	26401-97-8
		Dioctyltinbis (Maleic acid monoalkyl(C＝6∽224) ester) salt	33568-99-9
		Dibutyltin dichloride	3542-36-7
18	Dimetylfumarate (dimethyl fumarate（DMF）)	Dimetylfumarate (dimethyl fumarate（DMF）)	624-49-7

Substances whose inclusion is subject to restricted

No.	Substance name	Substance name	CAS No.
1	Polyvinyl chloride (PVC)	Polyvinyl chloride(PVC)	9002-86-2

Substances A, whose inclusion is subject to management

No.	Substance name	Substance name	CAS No.
A1	Brominated flame retardant	Tetra-decabromo-diphenoxy-benzene	58965-66-5
		2,4,6-tribomo-phenol	118-79-6
		Bis (methyl) tetrabromo-phtalate	55481-60-2
		Tribromo-styrene	61368-34-1
		Decabromo-diphenyl-ethane	84852-53-9
		Tetrabromo-bisphenol A	79-94-7
		1,1,2,2-Tetrabromoethane	79-27-6
A2	Antimony and its compounds	Antimony	7440-36-0
		Antimony pentoxide	1314-60-9
		Antimony trichloride	10025-91-9
		Sodium Antimonate	15432-85-6
A3	Arsenic and its compounds	Arsenic	7440-38-2
		Gallium arsenide	1303-00-0
		Calcium arsenate	7778-44-1
		Arsenic pentoxide	1303-28-2
		Potassium arsenite	10124-50-2
A4	Beryllium and its compounds	Beryllium	7440-41-7
		Beryllium chloride	7787-47-5
		Beryllium fluoride	7787-49-7
		Beryllium hydroxide	13327-32-7
		Beryllium sulfate	13510-49-1
A5	Bismuth and its compounds	Bismuth	7440-69-9
		Bismuth trioxide	1304-76-3
		Bismuth nitrate	10361-44-1
A6	Nickel and its compounds	Nickel	7440-02-0
		Nickel sulfate	7786-81-4
		Nickel carbonate	3333-67-3
A7	Selenium and its compounds	Selenium	7782-49-2
		Hydrogen selenide	7783-07-5
		Sodium selenide	1313-85-5
		Selenium dioxide	7446-08-4
A8	Radioactive substances	Uranium	-
		Thorium	-
		Cesium	-
		Strontium	-
A9	Phthalic acid esters	Bis(2-ethylhexyl)phthalate(DEHP)	117-81-7
		Dibutyl phthalate (DBP)	84-74-2
		Diisononyl phthalate (DNP)	28553-12-0
		Diisodecyl phthalate (DIDP)	26761-40-0
		Butylbenzil phthalate (BBP)	85-68-7
		Di-n-octyl phthalate (DNOP)	117-84-0

Substances B, whose inclusion is subject to management

No.	Substance name	Substance name	CAS No.
B1	Pentachlorophenol and its salts and esters	Pentachlorophenol	87-86-5
		Sodium Pentachlorophenoxide	131-52-2
B2	Chlorine and its compounds	Antimony pentachloride	7647-18-9
		Arsenic trichloride	7784-34-1
		Aluminum chloride	7446-70-0
		Antimony trichloride	10025-91-9
B3	Bromine and its compounds	Ethyl bromoacetate	105-36-2
		Bromophyenols	-
		Tris (2, 3-dibromopropyl) phosphate	126-72-7
B4	Fluorine and its compounds	Methyl fluoroacetate	453-18-9
		Vinyl fluoride	75-02-5
		Phosphoramidic bromidefluoride	758-71-4
B5	Antimony trioxide	Antimony trioxide	1309-64-4
B6	Cobalt and its compounds	Cobalt	7440-48-4
		Cobalt (II) nitrate	10141-05-6
		Cobalt carbonyl	10210-68-1
B7	Lithium and its compounds	Lithium	7439-93-2
		Lithium nitrate	7790-69-4
		Lithium hydride	7580-67-8
		2-Bis (1-methylethyl) aminoethanollitium salt	116120-29-7
B8	Vanadium and its compounds	Vanadium	7440-62-2
		Vanadium (III) chloride	7718-98-1
		Vanadium pentoxide	1314-62-1
		Vanadium (IV) chloride	7632-51-1
B9	HFCs, PFCs, SF6	HFC-32	75-10-5
		HFC-134a	811-97-2
		CF4	75-73-0
		C3F8	76-19-7
		SF6	2551-62-4
B10	Fire-resistant ceramic fiber covered by the EU Directive on Waste from Electrical and Electronic Equipment (WEEE)	For exemplified substances of this class of chemical substances, there is no information on specific examples. See *5 in Table 4-3-2 List of Substance B, whose Inclusion is Subject to Management	—
B11	Cyanide compounds	Ethylene cyanohydrin	109-78-4
		Copper (II) cyanide	14763-77-0
		Phenyl isocyanate	103-71-9
		Barium cyanide	542-62-1
		Zinc cyanide	557-21-1
B12	Organophosphorus compounds	Triphenyl phosphate	115-86-6
		Triphenyl Phosphine	603-35-0
B13	Organotin compounds	Dibutyltin diacetate	1067-33-0
		Acetoxy trimethyl stannane	1118-14-5
		Dibutyl tin dilaurate	77-58-7
		Diphenyl thioxostannane	20332-10-9
B14	Benzene	Benzene	71-43-2
B15	Bisphenol A	Bisphenol A	80-05-7
B16	Nonylphenol	Nonylphenol	84852-15-3
B17	4-octylphenol	4-octylphenol	1806-26-4
B18	Medium and long chain chlorinated paraffins	Paraffin chloride (with 23 carbon atoms and 43% chlorination)	108171-27-3
		Alkanes chlorro (with 14-17 carbon atoms)	85535-85-9

Appendices Table 3: Detailed list of ozone depleting substances

No.	Substance name	Montreal Protocol Annex Group	Substance name	Chemical formula
1	Chlorofluorocarbons (CFC)	Annex A Group I	CFC-11	$CFCl_3$
			CFC-12	CF_2Cl_2
			CFC-113	$C_2F_3Cl_3$
			CFC-114	$C_2F_4Cl_2$
			CFC-115	C_2F_5Cl
2	Halons	Annex A Group II	Halons -1211	CF_2BrCl
			Halons -1301	CF_3Br
			Halons -2402	$C_2F_4Br_2$
3	Other chlorofluorocarbons (CFC)	Annex B Group I	CFC-13	CF_3Cl
			CFC-111	C_2FCl_5
			CFC-112	$C_2F_2Cl_4$
			CFC-211	C_3FCl_7
			CFC-212	$C_3F_2Cl_6$
			CFC-213	$C_3F_3Cl_5$
			CFC-214	$C_3F_4Cl_4$
			CFC-215	$C_3F_5Cl_3$
			CFC-216	$C_3F_6Cl_2$
			CFC-217	C_3F_7Cl
4	Carbon tetrachloride	Annex B Group II	Carbon tetrachloride	CCl_4
5	1,1,1-Trichloroethane (Methyl chloroform)	Annex B Group III	1,1,1-Trichloroethane (Methyl chloroform)	$C_2H_3Cl_3$
6	HBFC	Annex C Group II	Dibromofluoromethane	$CHFBr_2$
			Bromodifluoromethane	CHF_2Br
			Bromofluoromethane	CH_2FBr
			Tetrabromofluoroethane	C_2HFBr_4
			Tribromodifluoroethane	$C_2HF_2Br_3$
			Dibromotrifluoroethane	$C_2HF_3Br_2$
			Bromotetrafluoroethane	C_2HF_4Br
			Tribromofluoroethane	$C_2H_2FBr_3$
			Dibromodifluoroethane	$C_2H_2F_2Br_2$
			Bromotrifluoroethane	$C_2H_2F_3Br$
			Dibromofluoroethane	$C_2H_3FBr_2$
			Bromodifluoroethane	$C_2H_3F_2Br$
			Bromofluoroethane	C_2H_4FBr
			Hexabromofluoropropane	C_3HFBr_6
			Pentabromodifluoropropane	$C_3HF_2Br_5$
			Tetrabromotrifluoropropane	$C_3HF_3Br_4$
			Tribromotetrafluoropropane	$C_3HF_4Br_3$
			Dibromopentafluoropropane	$C_3HF_5Br_2$
			Bromohexafluoropropane	C_3HF_6Br
			Pentabromofluoropropane	$C_3H_2FBr_5$
			Tetrabromodifluoropropane	$C_3H_2F_2Br_4$
			Tribromotrifluopropane	$C_3H_2F_3Br_3$
			Dibromotetrafluoropropane	$C_3H_2F_4Br_2$
			Bromotetrafluoropropane	$C_3H_2F_5Br$
			Tetrabromofluoropropane	$C_3H_3FBr_4$
			Tribromodifluoropropane	$C_3H_3F_2Br_3$
			Dibromotrifluopropane	$C_3H_3F_3Br_2$
			Bromotetrafluoropropane	$C_3H_3F_4Br$
			Tribromofluoropropane	$C_3H_4FBr_3$
			Dibromodifluoroprapane	$C_3H_4F_2Br_2$
			Bromotrifluopropane	$C_3H_4F_3Br$
			Dibromofluoropropane	$C_3H_5FBr_2$
			Bromodifluoropropane	$C_3H_5F_2Br$
			Bromofluoropropane	C_3H_6FBr

No.	Substance name	Montreal Protocol Annex Group	Substance name	Chemical formula
7	Bromochloromethane	Annex C Group III	Bromochloromethane	CH_2BrCl
8	Methyl bromide	Annex E Group I	Methyl bromide	CH_3Br
9	Hydrochlorofluorocarbons (HCFC)	Annex C Group I	HCFC-21	$CHFCl_2$
			HCFC-22	CHF_2Cl
			HCFC-31	CH_2FCl
			HCFC-121	C_2HFCl_4
			HCFC-122	$C_2HF_2Cl_3$
			HCFC-123	$C_2HF_3Cl_2$
			HCFC-123*	$CHCl_2CF_3$
			HCFC-124	C_2HF_4Cl
			HCFC-124*	$CHFClCF_3$
			HCFC-131	$C_2H_2FCl_3$
			HCFC-132	$C_2H_2F_2Cl_2$
			HCFC-133	$C_2H_2F_3Cl$
			HCFC-141	$C_2H_3FCl_2$
			HCFC-141b*	CH_3CFCl_2
			HCFC-142	$C_2H_3F_2Cl$
			HCFC-142b*	CH_3CF_2Cl
			HCFC-151	C_2H_4FCl
			HCFC-221	C_3HFCl_6
			HCFC-222	$C_3HF_2Cl_5$
			HCFC-223	$C_3HF_3Cl_4$
			HCFC-224	$C_3HF_4Cl_3$
			HCFC-225	$C_3HF_5Cl_2$
			HCFC-225ca*	$CF_3CF_2CHCl_2$
			HCFC-225cb*	CF_2ClCF_2CHClF
			HCFC-226	C_3HF_6Cl
			HCFC-231	$C_3H_2FCl_5$
			HCFC-232	$C_3H_2F_2Cl_4$
			HCFC-233	$C_3H_2F_3Cl_3$
			HCFC-234	$C_3H_2F_4Cl_2$
			HCFC-235	$C_3H_2F_5Cl$
			HCFC-241	C_3H_3FCl4
			HCFC-242	$C_3H_3F_2Cl_3$
			HCFC-243	$C_3H_3F_3Cl_2$
			HCFC-244	$C_3H_3F_4Cl$
			HCFC-251	$C_3H_4FCl_3$
			HCFC-252	$C_3H_4F_2Cl_2$
			HCFC-253	$C_3H_4F_3Cl$
			HCFC-261	$C_3H_5FCl_2$
			HCFC-262	$C_3H_5F_2Cl$
			HCFC-271	C_3H_6FCl

*Indicates substances that are most likely to be used commercially, including their isomers.

Appendices Table 4: Detailed list of certain amines

No.	Name of substance	Chemical formula	CAS №
1	4- aminoazobenzene	$C_{12}H_{11}N_3$	60-09-3
2	o- anisidine	C_7H_9NO	90-04-0
3	2- naphthylamine	$C_{10}H_9N$	91-59-8
4	3,3'- dichlorobenzidine	$C_{12}H_{10}Cl_2N_2$	91-94-1
5	4- Biphenyl-4-ylamine	$C_{12}H_{11}N$	92-67-1
6	benzidine	$C_{12}H_{12}N_2$	92-87-5
7	o- toluidine	C_7H_9N	95-53-4
8	4- chloro-2-methylamine	C_7H_8ClN	95-69-2
9	2,4- toluenediamine	$C_7H_{10}N_2$	95-80-7
10	o- aminoazotoluene	$C_{14}H_{15}N_3$	97-56-3
11	5- nitro-o-toluidine	$C_7H_8N_2O_2$	99-55-8
12	3,3'- Dichloro-4,4'-diaminodiphenylmethane	$C_{13}H_{12}Cl_2N_2$	101-14-4
13	4,4'- methylenedianiline	$C_{13}H_{14}N_2$	101-77-9
14	4,4'- diaminodiphenylether	$C_{12}H_{12}N_2O$	101-80-4
15	p- chloraniline	C_6H_6ClN	106-47-8
16	3,3'- dimethoxybenzidine	$C_{14}H_{16}N_2O_2$	119-90-4
17	3,3'- dimethylbenzidine	$C_{14}H_{16}N_2$	119-93-7
18	2- methoxy-5-methylamiline	$C_8H_{11}NO$	120-71-8
19	2,4,5- trimethylaniline	$C_9H_{13}N$	137-17-7
20	4,4'- thiodianiline	$C_{12}H_{12}N_2S$	139-65-1
21	2,4- methoxy-m-phenylenediamine	$C_7H_{10}N_2O$	615-05-4
22	4,4'-dimethyl-3,3'-diaminodiphenylmethane	$C_{15}H_{18}N_2$	838-88-0

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