

Toppan Group  
Standards for the Management of  
Chemical Components of Raw  
Materials

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Toppan Printing Co., Ltd.

## Standards for the Management of Chemical Components of Raw Materials

### 1. Purpose

Toppan Printing positions the Toppan Group Declaration on the Global Environment as the foundation of its approach to environmental conservation activities. In order to fulfill its corporate social responsibilities (CSR), it consistently implements appropriate companywide measures to address global environmental issues.

Toppan Printing believes that the management of chemical substances requires the management of each process in the supply chain, starting with raw materials. Therefore, as part of CSR activities, in addition to chemical substances in raw materials procured by Toppan Printing being managed comprehensively within the Toppan Group, these Standards for the Management of Chemical Components of Raw Materials have been devised to be observed by Toppan's suppliers.

### 2. Scope of application

These standards are applicable to all raw materials procured by Toppan Group bases in Japan (including the raw materials of products and materials used for manufacturing) as well as materials shipped with products, and products shipped without processing, but in cases in which divisions or business fields have their own procurement standards, individual specifications, or requirements, such standards, specifications, or requirements take precedence.

The following procured items are excluded from the scope of application.

\* 1: Raw materials stipulated by customers and chemical substances used only inside Toppan for research and development.

(These standards are applicable to raw materials if they are provided to outside parties, even if they are used for research and development)

\*2: Molds, jigs, tools, machinery, and other equipment that never come into direct contact with products.

\*3: Chemicals and other substances used in processes that do not remain in products.

### 3. Requirements for suppliers

I: Establishment of environmental management system and chemical substance management system

II: Observance of Standards for the Management of Chemical Components of Raw Materials

#### (1) Classification

Toppan Printing stipulates chemical substances to be managed by the Toppan Group based on chemSHERPA<sup>\*1</sup> reference lists on substances to be managed (including RoHS directive<sup>\*2</sup>, REACH regulations<sup>\*3</sup>, IEC 62474<sup>\*4</sup>, USA TSCA<sup>\*5</sup>, laws related to chemical substance audits and manufacturing regulations), Japanese labor health and safety laws, and laws on the control of poisonous and deleterious substances, laws and regulations related to nuclear reactors, food hygiene laws, and other legislation.

These substances are divided into the following two types and shown in tables 1 and 2.

Prohibited substances: Substances that must not be present in raw materials procured.

Table 1 (For substances for which a threshold is set, the amount of such substances present must be below the threshold value. In addition,

when such substances are present in amounts below the threshold value, they must not have been added intentionally).

However, if alternative substances are not available or if the law permits use, use may be permitted following discussions on such factors as conditions and the location in which they are present, but efforts must be made to reduce use and/or find alternative substances.

In addition to the substances shown in table 1, substances whose manufacture or use is prohibited by domestic law are treated as prohibited substances.

Managed substances: Substances present in raw materials procured for which  
Table 2 concentration present and location must be known. Use is permitted but reduction of amount and replacement with alternatives are recommended.

Under these standards, amount present must be disclosed if the concentration of a chemical substance present in raw materials exceeds the threshold value.

\*1 chemSHERPA: Common scheme for conveying information about chemical substances present in products (Chemical Information Sharing and Exchange under Reporting Partnership in Supply Chain)

chemSHERPA reference list on substances to be managed: Available for download via the link below:

<https://chemsherpa.net/tool#declarable>

\*2 RoHS: Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical Equipment

\*3 REACH: Registration, Evaluation, Authorization and restriction of Chemicals

\*4 IEC: International Electrotechnical Commission

\*5 TSCA: Toxic Substance Control Act

Table 1: Prohibited substances

Class	No. P-	Substance name *14	Table or CAS RN*15	Application	Threshold level	Identification method**
Prohibited Substances (D)	1	Polychlorinated biphenyl (PCBs) and specific substitutes *7	Table A	all	—	①
	2	Polychlorinated naphthalenes (PCNs) (Cl <sub>≥</sub> 2) *7	Table B	all	—	①
	3	Tributyltin compounds (TBTs) *7	Table C	all	—	①
	4	triphenyltin compounds (TPTs) *7	Table D	all	—	①
	5	Asbestos *7	Table E	all	—	①
	6	Short-chain Chlorinated paraffins (C=10-13) *7	Table F	all	—	①
	7	Ozone depleting substances *7	Table G	all	—	①
	8	Radioactive substances *7	Table H	all	—	②
	9	Fluorinated Greenhouse Gases (PFC, SF6, HFC) *7	Table I	all	—	①
	10	Perfluorooctane sulfonic acid (PFOS) and its salts and derivatives *7	Table J	all	—	①
	11	2-(2H-1,2,3-Benzotriazole-2-yl)-4,6-di-tert-butylphenol (UV-320)	3846-71-7	all	—	①
	12	Polychlorinated Terphenyls (PCTs) *7	Table K	all	—	①
	13	Dimethyl fumarate	624-49-7	all	0.1 ppm	①
	14	Formaldehyde	50-00-0	composite wood products (plywood, particleboard, MDF, etc.) or parts	Indoor concentration : 100µg/m <sup>3</sup> (0.08ppm) or 0.3mg/l	③
				textile articles	75 ppm	⑨
	15	Cadmium and its compounds *7, *8, *9	Table L	batteries	10 ppm	④
				Other than batteries	100 ppm	
	16	Azocolourants and azodyes which form certain aromatic amines *7, *10	Table M	textile articles, leathers	30 ppm	⑤
	17	Perchlorates *7	Table N	all	0.006 ppm	①
	18	Lead and its compounds *7, *8, *9	Table O	all	1,000 ppm	④
	19	Mercury and its compounds *7, *8	Table P	all	1,000 ppm	④
	20	Chromium(VI) compounds *7, *8	Table Q	all	1,000 ppm	④
	21	Polybrominated biphenyls (PBBs) *7	Table R	all	1,000 ppm	④
	22	Polybrominated biphenyl ethers (PBBEs) *7	Table S	all	1,000 ppm	④
	23	Certain Phthalates [category A] *7, *17 [category B] *7	Table T	all	1,000 ppm	⑩
				toys, childcare articles		
	24	Vinyl chloride	75-01-4	food packaging	Dissolution test 1 ppm	⑥
	25	Dichloromethane	75-09-2	all	1,000 ppm	⑦
26	1,2-Dichloropropane	78-87-5	all	1,000 ppm	⑦	
27	Hexabromocyclododecane (HBCDD) *7	Table U	all	—	①	
28	Pentachlorophenol and its salts and esters *7	Table V	all	—	①	

Table 2: Managed substances

Class	No. M-	Substance name *14	Table or CAS RN *15	Application	Threshold level	Identification method **
Managed Substances (M)	1	Nickel and its compounds *7	Table W	articles intended to come into direct and prolonged contact with the skin	—	⑦
	2	Arsenic and its compounds *7	Table X	all	1,000 ppm	⑦
	3	Beryllium oxide	1304-56-9	all	1,000 ppm	⑦
	4	Brominated flame retardant (other than PBBs, PBDEs, or HBCDD) *7	Table Y	all	1,000 ppm	⑦
	5	Phthalates (excluding certain Phthalates) *7	Table Z	all	1,000 ppm	⑩
	6	Tris(2-chloroethyl) phosphate (TCEP)	115-96-8	all	1,000 ppm	⑦
	7	Anthracene and anthracene oil *7	Table AA	all	1,000 ppm	⑦
	8	4,4'-Diaminodiphenylmethane	101-77-9	all	1,000 ppm	⑦
	9	5-tert-Butyl-2,4,6-trinitro-m-Xylene (Musk xylene)	81-15-2	all	1,000 ppm	⑦
	10	Cobalt compounds *7	Table AB	all	1,000 ppm	⑦
	11	Antimony and its compounds *7	Table AC	food packaging, toys, childcare articles	Dissolution test 0.025 ppm	⑧
	12	Boric acid and its salts *7	Table AD	all	1,000 ppm	⑦
	13	2,4-Dinitrotoluene	121-14-2	all	1,000 ppm	⑦
	14	Acrylamide	79-06-1	all	1,000 ppm	⑦
	15	Trichloroethylene	79-01-6	all	1,000 ppm	⑦
	16	Tetrachloroethylene	127-18-4	all	1,000 ppm	⑦
	17	2-Methoxyethanol	109-86-4	all	1,000 ppm	⑦
	18	2-Ethoxyethanol	110-80-5	all	1,000 ppm	⑦
	19	2-Ethoxyethyl acetate (Ethylene glycol monoethyl ether acetate)	111-15-9	all	1,000 ppm	⑦
	20	Hydrazine and Hydrazine monohydrate	302-01-2, 7803-57-8	all	1,000 ppm	⑦
	21	1-Methyl-2-pyrrolidone (N-Methylpyrrolidone)	872-50-4	all	1,000 ppm	⑦
	22	1,2,3-Trichloropropane	96-18-4	all	1,000 ppm	⑦
	23	Aluminosilicate refractory ceramic fibres *16	—	all	1,000 ppm	⑦
	24	Pitch, coal tar, high-temp.	65996-93-2	all	1,000 ppm	⑦
	25	Zirconia aluminosilicate refractory ceramic fibres *16	—	all	1,000 ppm	⑦
	26	4-[4,4'-bis(dimethylamino)benzhydrylidene] cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride (C.I. Basic Violet 3) *13	548-62-9	all	1,000 ppm	⑦
	27	1,3,5-Tris[(2S and 2R)-2,3-epoxypropyl]-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione (β-TGIC)	59653-74-6	all	1,000 ppm	⑦
	28	1,2-Bis(2-methoxyethoxy)ethane (TEGDME ; Triglyme)	112-49-2	all	1,000 ppm	⑦
	29	4,4'-Bis(dimethylamino)-4''-(methylamino)trityl alcohol *13	561-41-1	all	1,000 ppm	⑦
	30	1,2-Dimethoxyethane (Ethylene glycol dimethyl ether ; EGDME)	110-71-4	all	1,000 ppm	⑦
	31	α,α-Bis[4-(dimethylamino)phenyl]-4-(phenylamino)naphthalene-1-methanol (C.I. Solvent Blue 4) *13	6786-83-0	all	1,000 ppm	⑦
	32	1,3,5-Tris(oxiran-2-ylmethyl)-1,3,5-triazinane-2,4,6-trione (TGIC)	2451-62-9	all	1,000 ppm	⑦
	34	N,N,N',N'-Tetramethyl-4,4'-methylenedianiline (Michler's base)	101-61-1	all	1,000 ppm	⑦
	35	[4-[[4-Anilino-1-naphthyl][4-(dimethylamino)phenyl]methylene]cyclohexa-2,5-dien-1-ylidene] dimethylammonium chloride (C.I. Basic Blue 26) *13	2580-56-5	all	1,000 ppm	⑦

Table 2 continued

Class	No. M-	Substance name * 14	Table or CAS RN* 15	Application	Threshold level	Identification method**
Managed Substances (M)	36	Formamide	75-12-7	all	1,000 ppm	⑦
	37	4-(1,1,3,3-Tetramethylbutyl)phenol	140-66-9	all	1,000 ppm	⑦
	38	N,N-Dimethylacetamide	127-19-5	all	1,000 ppm	⑦
	39	Phenolphthalein	77-09-8	all	1,000 ppm	⑦
	40	1,2-Dichloroethane	107-06-2	all	1,000 ppm	⑦
	41	Formaldehyde, oligomeric reaction products with aniline	25214-70-4	all	1,000 ppm	⑦
	42	Bis(2-methoxyethyl) ether	111-96-6	all	1,000 ppm	⑦
	43	2,2'-Dichloro-4,4'-methylenedianiline	101-14-4	all	1,000 ppm	⑦
	44	Dibutyl tin compounds (DBTs) * 7	Table AE	all	1,000 ppm* 11	⑦
	45	Diocetyl tin compounds (DOTs) * 7	Table AF	articles intended to come into contact with the skin, wall and floor coverings, toys, childcare articles	1,000 ppm* 11	⑦
	46	4-Nonylphenol, branched and linear, ethoxylated	—	all	1,000 ppm	⑦
	47	o-Anisidine	90-04-0	all	1,000 ppm	⑦
	48	Perfluorocarboxylic acid and its salts and derivatives * 7	Table AG	all	1,000 ppm	⑦
	49	Diazene-1,2-dicarboxamide (C,C'-azodi(formamide) ; ADCA)	123-77-3	all	1,000 ppm	⑦
	50	Cyclohexane-1,2-dicarboxylic anhydride	85-42-7 13149-00-3 14166-21-3	all	1,000 ppm	⑦
	51	Hexahydromethylphthalic anhydride	25550-51-0 19438-60-9 48122-14-1 57110-29-9	all	1,000 ppm	⑦
	52	4-(1,1,3,3-Tetramethylbutyl)phenol, ethoxylated	—	all	1,000 ppm	⑦
	53	Methoxy acetic acid	625-45-6	all	1,000 ppm	⑦
	54	N,N-Dimethylformamide	68-12-2	all	1,000 ppm	⑦
	55	Methyloxirane (Propylene oxide)	75-56-9	all	1,000 ppm	⑦
	56	1,2-Diethoxyethane	629-14-1	all	1,000 ppm	⑦
	57	Furan	110-00-9	all	1,000 ppm	⑦
	58	Diethyl sulphate	64-67-5	all	1,000 ppm	⑦
	59	Dimethyl sulphate	77-78-1	all	1,000 ppm	⑦
	60	3-Ethyl-2-methyl-2-(3-methylbutyl)-1,3-oxazolidine	143860-04-2	all	1,000 ppm	⑦
	61	Dinoseb (6-sec-butyl-2,4-dinitrophenol)	88-85-7	all	1,000 ppm	⑦
	62	4,4'-Methylenedi-o-toluidine	838-88-0	all	1,000 ppm	⑦
	63	4,4'-Oxydianiline and its salts	Table AH	all	1,000 ppm	⑦
	64	4-Aminoazobenzene	60-09-3	all	1,000 ppm	⑦
	65	4-Methyl-m-phenylenediamine (2,4-toluene-diamine)	95-80-7	all	1,000 ppm	⑦
	66	6-Methoxy-m-toluidine (p-cresidine)	120-71-8	all	1,000 ppm	⑦
	67	Biphenyl-4-ylamine	92-67-1	all	1,000 ppm	⑦
	68	o-Aminoazotoluene	97-56-3	all	1,000 ppm	⑦
	69	o-Toluidine (2-Aminotoluene)	95-53-4	all	1,000 ppm	⑦
	70	N-Methylacetamide	79-16-3	all	1,000 ppm	⑦
	71	Disodium 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis(4-aminonaphthalene-1-sulphonate) (C.I. Direct Red 28)	573-58-0	all	1,000 ppm	⑦

Table 2 continued

Class	No. M-	Substance name * 14	Table or CAS RN * 15	Application	Threshold level	Identification method * 6
Managed Substances (M)	72	Disodium 4-amino-3-[[4'-(2,4-diaminophenyl)azo][1,1'-biphenyl]-4-yl]azo] -5-hydroxy-6-(phenylazo)naphthalene-2,7-disulphonate (C.I. Direct Black 38)	1937-37-7	all	1,000 ppm	⑦
	73	Imidazolidine-2-thione (2-imidazoline-2-thiol)	96-45-7	all	1,000 ppm	⑦
	74	Trixylyl phosphate	25155-23-1	all	1,000 ppm	⑦
	75	2-Ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE)	15571-58-1	all	1,000 ppm	⑦
	76	Reaction mass of 2-Ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate and 2-Ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (Reaction mass of DOTE and MOTE)	—	all	1,000 ppm	⑦
	77	5-sec-Butyl-2-(2,4-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [1], 5-sec-Butyl-2-(4,6-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [2] covering any of the individual isomers of [1] and [2] or any combination thereof	—	all	1,000 ppm	⑦
	78	Nitrobenzene	98-95-3	all	1,000 ppm	⑦
	79	1,3-Propanesultone	1120-71-4	all	1,000 ppm	⑦
	80	Benzotriazole compounds * 7	Table AI	all	1,000 ppm	⑦
	81	4,4'-Isopropylidenediphenol (Bisphenol A)	80-05-7	all	1,000 ppm	⑦
	82	p-(1,1-Dimethylpropyl)phenol	80-46-6	all	1,000 ppm	⑦
	83	4-Heptylphenol, branched and linear	—	all	1,000 ppm	⑦
	84	Perfluorohexanesulfonic acid and its salts	—	all	1,000 ppm	⑦
	85	Tris(aziridiny)phosphin oxide	545-55-1	textile articles	—	⑦
	86	Trichlorobenzene	120-82-1	all	1,000 ppm	⑦
	87	Dechlorane Plus (TM)	13560-89-9	all	1,000 ppm	⑦
	88	reaction products of 1,3,4-Thiadiazolidine-2,5-dithione, Formaldehyde and 4-Heptylphenol, branched and linear (RP-HP) [with ≥0.1% w/w 4-Heptylphenol, branched and linear]	—	all	1,000 ppm	⑦
	89	Polycyclic aromatic hydrocarbons [category A] * 7	Table AJ	articles intended to come into direct and prolonged contact with the skin	1 ppm	⑩
		[category B] * 7		Other than those above	1,000 ppm	
		[category C] * 7		articles intended to come into direct and prolonged contact with the skin	1 ppm	
				all	1,000 ppm	
	90	Cyclic siloxanes	Table AK	all	1,000 ppm	⑦
	91	Terphenyl hydrogenated	61788-32-7	all	1,000 ppm	⑦
	92	Ethylenediamine (EDA)	107-15-3	all	1,000 ppm	⑦
	93	Benzene-1,2,4-tricarboxylic acid 1,2 anhydride (Trimellitic anhydride) (TMA)	552-30-7	all	1,000 ppm	⑦
	94	2,2-Bis(4'-hydroxyphenyl)-4-methylpentane	6807-17-6	all	1,000 ppm	⑦
	95	1,7,7-Trimethyl-3-(phenylmethylene)bicyclo[2.2.1]heptan-2-one	15087-24-8	all	1,000ppm	⑦
	96	2-Methoxymethyl acetate	110-49-6	all	1,000ppm	⑦
97	Tris(4-nonylphenyl, branched and linear) phosphite (TNPP) with ≥ 0.1% w/w of 4-nonylphenol, branched and linear (4-2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy)propionic acid, its salts and its acyl halides (covering any of their individual isomers and combinations thereof)	-	all	1,000ppm	⑦	
98	4-tert-Butylphenol	98-54-4	all	1,000ppm	⑦	

Class	No. M-	Substance name * 14	Table or CAS RN * 15	Application	Threshold level	Identification method* 6
Substances (M)	100	2-benzyl-2-dimethylamino-4'-morpholinobutyrophenone	119313-12-1	all	1,000ppm	⑦
	101	2-methyl-1-(4-methylthiophenyl)-2-morpholinopropan-1-one	71868-10-5	all	1,000ppm	⑦
	102	1-vinylimidazole	1072-63-5	all	1,000ppm	⑦
	103	2-methylimidazole	693-98-1	all	1,000ppm	⑦
	104	Butyl 4-hydroxybenzoate (Butylparaben)	94-26-8	all	1,000ppm	⑦

\*6: Identification methods are provided in section 3-(4) below.

\*7: Applicable chemical substances are shown by group. Please see Appendix 1 (Tables A to AI) for details.

\*8: For packaging, the total concentration of cadmium, lead, mercury, and hexavalent chrome present must be less than 100 ppm, in accordance with the Directive 94/62/EC on Packaging and Packaging Waste.

\*9: See Appendix 2 for exempted items.

\*10: One or more of 24 types of specific amines must not be detected in amounts exceeding the threshold.

\*11: The threshold by weight of tin is used.

\*12: Set at 0.5 ppm for toys and childcare articles.

\*13: Applicable to substances containing 0.1% or more of Michler's ketone (EC No. 202-027-5) or Michler's base (EC No. 202-959-2).

\*14: Typical alternative names are shown in brackets () but there may be other names used for some of the substances (the same applies to Appendix 1).

\*15: Some substances have different numbers (the same applies to Appendix 1).

\*16: Fibers included under index number 650-017-00-8 in Annex VI, Part 3, Table 3.2 of EC No 1272/2008 that fulfill the following three conditions.

a) The substance concerned is the main component.

b) The value of the length weighted geometric mean diameter of the fiber minus double its standard error is no more than 6µm.

c) The content ratio by weight of alkaline oxides and oxides of alkaline-earth metals (Na<sub>2</sub>O+K<sub>2</sub>O+CaO+MgO+BaO) is no more than 18%.

\*17: Individually or in any combination, the total concentration must be less than 0.1 %.

## (2) Definitions of terminology

Terminology used in these standards is defined as follows.

### • **Threshold**

The maximum allowable value for the concentration of substances present in raw materials.

### • **Present/contained/included**

The presence of a chemical substances as constituent or content in a raw material. Even if a substance has not been intentionally added, it is treated as present when it is known that it is present as a chemical substance (impurity) that naturally occurs in the raw material or if it remains as residue during a general industrial refining stage (impurities, residual solvent, unreacted monomers, and other residual matter).

### • **Impurity**

Substance that is present in a natural material and cannot be completely removed technically during the refining process as an industrial material, or substance that occurs during a synthesis reaction process and cannot be completely removed technically.

### • **Intentional addition**

This refers to the intentional use during the formulation of a raw material or component



when continuous inclusion of a substance is desirable to give rise to a specific characteristic, appearance, or quality.

• **Packing materials**

Packaging materials that come into direct contact with raw materials delivered to the Toppan Group.

(3) Concentration present

Concentrations present should be reported in units of homogenous material.

Homogenous material is material that cannot be mechanically separated into other materials and has an even overall composition. For example, this includes plastics, ceramics, glass, metals, alloys, paper, board, resins, and coatings. If it is difficult to separate multiple layers and identify the respective concentrations present in each layer, the homogenous unit is deemed to be the smallest unit that is separable.

(4) Identification methods

The following methods are used to identify the concentrations present in units of homogenous material.

No.①: Check that there is no intentional addition.

No.②: Measure using Geiger counter, etc.

No.③: Based on EN 717-1:2004, EN 120:1992, JIS A 5905:2003, JIS A 5908:2003, and JIS A 1460:2001.

No.④: Based on standards (IEC 62321 Ed.1) for testing methods in line with RoHS Directive. Precise analysis methods are shown in Table 2. (When using older analysis methods or other methods for measurement, please confirm with Toppan first.)

No.⑤: Measurement by analysis methods based on ISO 24362:2014, ISO 17234-1:2010, ISO 17234-2:2011, EN 14362:2012, JIS L 1940-1:2014, JIS L 1940-3:2014 or LMBG82.02 (German official method)

No.⑥: Analysis method compliant with the Specifications and Standards for Foods and Food Additives, etc. in Ministry of Health and Welfare Notification No. 370 and the standards for plastic containers/packages stipulated in the Ministerial Ordinance on Milk and Milk products Concerning Compositional Standards, etc. (Ministry of Health and Welfare ordinance No. 52).

No.⑦: Calculated from raw material of supplier using Safety Data Sheet (SDS), etc. Identify maximum value.

No.⑧: Analysis method for food packaging compliant with the Specifications and Standards for Foods and Food Additives, etc. in Ministry of Health and Welfare Notification No. 370 and the standards for plastic containers/packages stipulated in the Ministerial Ordinance on Milk and Milk products Concerning Compositional Standards, etc. (Ministry of Health and Welfare ordinance No. 52). Analysis method for toys and products for babies and infants compliant with European standard EN 71-3 specifying safety requirements for toys. Threshold values for the above should be based on respective specifications and standards stipulated in related regulations.

No.⑨: Refer to JIS L 1041 :2011

No.⑩: In the case of toys and products for babies and infants, refer to the appendix of Ministry of Health and Welfare Notification on food safety 0906 vol. 4. For other items refer to IEC 62321 part 8

No.⑪: Measured using analysis method compliant with GS2014:01PAK (German official method)

Table 3 Precise analysis methods for 10 substances subject to RoHS Directive

Substance name	Sample form	Precision analysis		IEC 62321
		Pretreatment	Analysis method	
Cadmium and its compounds Lead and its compounds	Polymer	Ashing Acid degradation (Cd)	ICP-OES ICP-MS AAS	Part 5
	Metal	Acid degradation		
	Electronic parts	Acid degradation Microwave degradation		
Mercury and its compounds	Polymer	Microwave degradation	ICP-OES ICP-MS CV-AAS CV-AFS	Part 4
	Metal	Microwave degradation		
	Electronic parts	Mechanical or freeze grinding Wet decomposition		
Chromium (VI) compounds	Metal	Surface extraction	Diphenylcarbazide absorption method	Part 7
	Polymer Electronic parts	Alkaline degradation		
PBBs and PBDEs	Polymer	Dissolution-extraction	GC/MS	Part 6
BBP DBP DEHP DIBP	Polymer	Dissolution-extraction	GC/MS	Part 8

(5) Handling in light of Japanese laws/regulations and EU SVHC additions.

Until the revision of these standards, if a substance is newly designated as one whose manufacture or use is prohibited under amendments of Japanese laws and regulations, it shall be treated as a prohibited substance.

If a substance of very high concern (SVHC; substance on Candidate list<sup>\*18</sup>) in the EU's REACH regulation is added, it shall be treated as a "managed substance" (as a basic rule the threshold value will be 1,000 ppm, and the identification method used will be ⑦ above).

\*18: Refer to <https://echa.europa.eu/candidate-list-table>.

## Appendix 1

Table A Polychlorinated biphenyl (PCBs) and specific substitutes

<b>Polychlorinated biphenyl (PCBs) and specific substitutes</b>	<b>CAS RN</b>
Polychlorinated Biphenyls (all isomers and congeners)	1336-36-3
Monomethyltetrachlorodiphenylmethane (Ugilec 141)	76253-60-6
Monomethyldichlorodiphenylmethane (Ugilec 121, Ugilec 21)	81161-70-8
Monomethyldibromodiphenylmethane (DBBT)	99688-47-8
Aroclor	12767-79-2
Clorphena 60 (Aroclor 1260)	11096-82-5
Kanechlor 500	27323-18-8
Aroclor 1254	11097-69-1
Terphenyl	26140-60-3

Table B Polychlorinated naphthalenes (PCNs) ( $Cl \geq 2$ )

<b>Polychlorinated naphthalenes</b>	<b>CAS RN</b>
Polychlorinated naphthalenes	70776-03-3
Dichloronaphthalene	28699-88-9
Trichloronaphthalene	1321-65-9
Tetrachloronaphthalene	1335-88-2
Pentachloronaphthalene	1321-64-8
Hexachloronaphthalene	1335-87-1
Heptachloronaphthalene	32241-08-0
Octachloronaphthalene	2234-13-1
Other Polychlorinated naphthalenes	-

Table C Tributyltin compounds (TBTs)

<b>Tributyltin compounds (TBTs)</b>	<b>CAS RN</b>
Bis(tri-n-butyltin) oxide (TBTO)	56-35-9
Tributyltin methacrylate	2155-70-6
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 (C8), Methyl methacrylate, and Tributyltin methacrylate	67772-01-4
Tributyltin sulfamate	6517-25-5
Bis(Tributyltin) maleate	14275-57-1
Tributyltin chloride	1461-22-9
Mixture of Tributyltin cyclopentanecarboxylate and its derivatives (Tributyltin naphthenate)	85409-17-2
Mixture of Tributyltin 1,2,3,4,4a,4b,5,6,10,10a-decahydro-7-isopropyl-1,4a-dimethyl-1-phenanthrene carboxylate and its derivatives (Tributyltin rosin salts)	26239-64-5
Other Tributyltin compounds	-

Table D Triphenyltin compounds (TPTs)

<b>Triphenyltin compounds (TPTs)</b>	<b>CAS RN</b>
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 carboxylic acid salts (C9-11)	18380-71-7 18380-72-8 47672-31-1 94850-90-5
Triphenyltin chloroacetate	7094-94-2
Other Triphenyltin compounds	-

Table E Asbestos

<b>Asbestos</b>	<b>CAS RN</b>
Asbestos	1332-21-4
Actinolite	77536-66-4
Amosite	12172-73-5
Anthrophyllite	77536-67-5
Chrysotile	12001-29-5
Crocidolite	12001-28-4
Tremolite	77536-68-6

Table F Short-chain Chlorinated paraffins

<b>Short-chain Chlorinated paraffins</b>	<b>CAS RN</b>
Chlorinated paraffin (C10-13)	85535-84-8
Chlorinated paraffin (C10-12)	108171-26-2
Chlorinated paraffin (C12-13)	71011-12-6
Chlorinated paraffin	61788-76-9

Table G Ozone depleting substances

<b>Ozone depleting substances</b>	<b>CAS RN</b>
Trichlorofluoromethane (CFC-11)	75-69-4
Dichlorodifluoromethane (CFC-12)	75-71-8
Chlorotrifluoromethane (CFC-13)	75-72-9
Pentachlorofluoroethane (CFC-111)	354-56-3
Tetrachlorodifluoroethane (CFC-112)	76-12-0
1,1,1,2-Tetrachloro-2,2-Difluoroethane (CFC-112a)	76-11-9
Trichlorotrifluoroethane (CFC-113)	76-13-1
1,1,1-Trichloro-2,2,2-trifluoroethane (CFC-113a)	354-58-5
Dichlorotetrafluoroethane (CFC-114)	76-14-2
Chloropentafluoroethane (CFC-115)	76-15-3
Heptachlorofluoropropane (CFC-211)	422-78-6 135401-87-5
1,1,1,2,3,3,3-Heptachloro-2-fluoropropane (CFC-211ba)	422-81-1
Hexachlorordifluoropropane (CFC-212)	3182-26-1
Pentachlorotrifluoropropane (CFC-213)	2354-06-5 134237-31-3
Tetrachlorotetrafluoropropane (CFC-214)	29255-31-0
1,2,2,3-Tetrachloro-1,1,3,3-tetrafluoropropane (CFC-214aa)	2268-46-4
1,1,1,3-Tetrachloro-2,2,3,3-tetrafluoropropane (CFC-214cb)	-
Trichloropentafluoropropane (CFC-215)	1599-41-3
1,1,1-Trichloropentafluoropropane (CFC-215cb)	4259-43-2
1,2,3-Trichloropentafluoropropane (CFC-215ba)	76-17-5
1,1,2-Trichloropentafluoropropane (CFC-215bb)	-
1,1,3-Trichloropentafluoropropane (CFC-215ca)	-

Dichlorohexafluoropropane (CFC-216)	661-97-2
Chloroheptafluoropropane (CFC-217)	422-86-6
Dibromodifluoromethane (Halon 1202)	75-61-6
Bromochlorodifluoromethane (Halon 1211)	353-59-3
Bromotrifluoromethane (Halon 1301)	75-63-8
Dibromotetrafluoroethane (Halon 2402)	124-73-2
Carbon tetrachloride	56-23-5
1,1,1-Trichloroethane	71-55-6
Bromomethane	74-83-9
Bromoethane	74-96-4
1-Bromopropane	106-94-5
Teifluoroiodomethane	2314-97-8
Chloromethane	74-87-3
Dibromofluoromethane	1868-53-7
Bromodifluoromethane	1511-62-2
Bromofluoromethane	373-52-4
Tetrabromofluoroethane	306-80-9
Tribromodifluoroethane	-
Dibromotrifluoroethane	354-04-1
Bromotetrafluoroethane	124-72-1
Tribromofluoroethane	-
Dibromodifluoroethane	75-82-1
Bromotrifluoroethane	421-06-7
Dibromofluoroethane	358-97-4
Bromodifluoroethane	420-47-3
Bromofluoroethane	762-49-2
Hexabromofluoropropane	-
Pentabromodifluoropropane	-
Tetrabromotrifluoropropane	-
Tribromotetrafluoropropane	-
Dibromopentafluoropropane	431-78-7
Bromohexafluoropropane	2252-78-0
Pentabromofluoropropane	-
Tetrabromodifluoropropane	-
Tribromotrifluoropropane	-
Dibromotetrafluoropropane	-
Bromopentafluoropropane	460-88-8
Tetrabromofluoropropane	-
Tribromodifluoropropane	70192-80-2
Dibromotrifluoropropane	431-21-0
Bromotetrafluoropropane	679-84-5
Tribromofluoropropane	75372-14-4
Dibromodifluoropropane	460-25-3
Bromotrifluoropropane	421-46-5
Dibromofluoropropane	51584-26-0
Bromodifluoropropane	-
Bromofluoropropane	1871-72-3
Bromochloromethane	74-97-5
Dichlorofluoromethane (HCFC-21)	75-43-4
Chlorodifluoromethane (HCFC-22)	75-45-6
Chlorofluoromethane (HCFC-31)	593-70-4
Tetrachlorofluoroethane (HCFC-121)	134237-32-4 354-14-3
1,1,1,2-Tetrachloro-2-fluoroethane (HCFC-121a)	354-11-0

Trichlorodifluoroethane (HCFC-122)	41834-16-6 354-21-2
1,1,2-Trichloro-1,2-difluoroethane (HCFC-122a)	354-15-4
1,1,1-Trichloro-2,2-difluoroethane (HCFC-122b)	354-12-1
Dichlorotrifluoroethane (HCFC-123)	34077-87-7 306-83-2
1,2-Dichloro-1,1,2-trifluoroethane (HCFC-123a)	354-23-4 90454-18-5
1,1-Dichloro-1,2,2-trifluoroethane (HCFC-123b)	812-04-4
Chlorotetrafluoroethane (HCFC-124)	63938-10-3 2837-89-0
1-Chloro-1,1,2,2-tetrafluoroethane (HCFC-124a)	354-25-6
Trichlorofluoroethane (HCFC-131)	27154-33-2 134237-34-6 359-28-4
1,1,2-Trichloro-1-fluoroethane (HCFC-131a)	811-95-0
1,1,1-Trichloro-2-fluoroethane (HCFC-131b)	2366-36-1
Dichlorodifluoroethane (HCFC-132)	25915-78-0 431-06-1
1,1-Dichloro-2,2-difluoroethane (HCFC-132a)	471-43-2
1,2-Dichloro-1,1-difluoroethane (HCFC-132b)	1649-08-7
1,1-Dichloro-1,2-difluoroethane (HCFC-132c)	1842-05-3
Chlorotrifluoroethane (HCFC-133)	1330-45-6 431-07-2
2-Chloro-1,1,1-trifluoroethane (HCFC-133a)	75-88-7
1-Chloro-1,1,2-trifluoroethane (HCFC-133b)	421-04-5
Dichlorofluoroethane (HCFC-141)	1717-00-6 25167-88-8 430-57-9
1,1-Dichloro-2-fluoroethane (HCFC-141a)	430-53-5
1,1-Dichloro-1-fluoroethane (HCFC-141b)	1717-00-6
Chlorodifluoroethane (HCFC-142)	25497-29-4 338-65-8
1-Chloro-1,1-difluoroethane (HCFC-142b)	75-68-3
1-Chloro-1,2-difluoroethane (HCFC-142a)	338-64-7
Chlorofluoroethane (HCFC-151)	110587-14-9 762-50-5
1-Chloro-1-fluoroethane (HCFC-151a)	1615-75-4
Hexachlorofluoropropane (HCFC-221)	134237-35-7 29470-94-8
1,1,1,2,2,3-Hexachloro-3-fluoropropane (HCFC-221ab)	422-26-4
Pentachlorodifluoropropane (HCFC-222)	134237-36-8
1,1,1,3,3-Pentachloro-2,2-difluoropropane (HCFC-222ca)	422-49-1
1,2,2,3,3-Pentachloro-1,1-difluoropropane (HCFC-222aa)	422-30-0
Tetrachlorotrifluoropropane (HCFC-223)	134237-37-9
1,1,3,3-Tetrachloro-1,2,2-trifluoropropane (HCFC-223ca)	422-52-6
1,1,1,3-Tetrachloro-2,2,3-trifluoropropane (HCFC-223cb)	422-50-4
Trichlorotetrafluoropropane (HCFC-224)	134237-38-0
1,3,3-Trichloro-1,1,2,2-tetrafluoropropane (HCFC-224ca)	422-54-8
1,1,3-Trichloro-1,2,2,3-tetrafluoropropane (HCFC-224cb)	422-53-7
1,1,1-Trichloro-2,2,3,3-tetrafluoropropane (HCFC-224cc)	422-51-5
Dichloropentafluoropropane (HCFC-225)	127564-92-5
2,2-Dichloro-1,1,1,3,3-pentafluoropropane (HCFC-225aa)	128903-21-9
2,3-Dichloro-1,1,1,2,3-pentafluoropropane (HCFC-225ba)	422-48-0

1,2-Dichloro-1,1,2,3,3- pentafluoropropane (HCFC-225bb)	422-44-6
3,3-Dichloro-1,1,1,2,2- pentafluoropropane (HCFC-225ca)	422-56-0
1,3-Dichloro-1,1,2,2,3- pentafluoropropane (HCFC-225cb)	507-55-1
1,1-Dichloro-1,2,2,3,3- pentafluoropropane (HCFC-225cc)	13474-88-9
1,2-Dichloro-1,1,3,3,3- pentafluoropropane (HCFC-225da)	431-86-7
1,3-Dichloro-1,1,2,3,3- pentafluoropropane (HCFC-225ea)	136013-79-1
1,1-Dichloro-1,2,3,3,3- pentafluoropropane (HCFC-225eb)	111512-56-2
Chlorohexafluoropropane (HCFC-226)	134308-72-8
2-Chloro-1,1,1,3,3,3-hexafluoropropane (HCFC-226da)	431-87-8
Pentachlorofluoropropane (HCFC-231)	134190-48-0
1,1,1,2,3-Pentachloro-2-fluoropropane (HCFC-231bb)	421-94-3
Tetrachlorodifluoropropane (HCFC-232)	134237-39-1
1,1,1,3-Tetrachloro-3,3-difluoropropane (HCFC-232fc)	460-89-9
Trichlorotrifluoropropane (HCFC-233)	134237-40-4
1,1,1-Trichloro-3,3,3-trifluoropropane (HCFC-233fb)	7125-83-9
Dichlorotetrafluoropropane (HCFC-234)	127564-83-4
1,2-Dichloro-1,2,3,3-tetrafluoropropane (HCFC-234db)	425-94-5
Chloropentafluoropropane (HCFC-235)	134237-41-5
1-Chloro-1,1,3,3,3-pentafluoropropane (HCFC-235fa)	460-92-4
Tetrachlorofluoropropane (HCFC-241)	134190-49-1
1,1,2,3-Tetrachloro-1-fluoropropane (HCFC-241db)	666-27-3
Trichlorodifluoropropane (HCFC-242)	134237-42-6
1,3,3-trichloro-1,1-difluoropropane (HCFC-242fa)	460-63-9
Dichlorotrifluoropropane (HCFC-243)	134237-43-7
1,1-Dichloro-1,2,2-trifluoropropane (HCFC-243cc)	7125-99-7
2,3-Dichloro-1,1,1-trifluoropropane (HCFC-243db)	338-75-0
3,3-Dichloro-1,1,1-trifluoropropane (HCFC-243fa)	460-69-5
Chlorotetrafluoropropane (HCFC-244)	134190-50-4
3-Chloro-1,1,2,2-tetrafluoropropane (HCFC-244ca)	679-85-6
1-Chloro-1,1,2,2-tetrafluoropropane (HCFC-244cc)	421-75-0
Trichlorofluoropropane (HCFC-251)	134190-51-5
1,1,3-Trichloro-1-fluoropropane (HCFC-251fb)	818-99-5
1,1,2-Trichloro-1-fluoropropane (HCFC-251dc)	421-41-0
Dichlorodifluoropropane (HCFC-252)	134190-52-6
1,3-Dichloro-1,1-difluoropropane (HCFC-252fb)	819-00-1
Chlorotrifluoropropane (HCFC-253)	134237-44-8
3-Chloro-1,1,1-trifluoropropane (HCFC-253fb)	460-35-5
Dichlorofluoropropane (HCFC-261)	134237-45-9
1,1-Dichloro-1-fluoropropane (HCFC-261fc)	7799-56-6
1,2-Dichloro-2-fluoropropane (HCFC-261ba)	420-97-3
Chlorodifluoropropane (HCFC-262)	134190-53-7
1-Chloro-2,2-difluoropropane (HCFC-262ca)	420-99-5
2-Chloro-1,3-difluoropropane (HCFC-262da)	102738-79-4
1-Chloro-1,1-difluoropropane (HCFC-262fc)	421-02-3
Chlorofluoropropane (HCFC-271)	134190-54-8
2-Chloro-2-fluoropropane (HCFC-271ba)	420-44-0
1-Chloro-1-fluoropropane (HCFC-271fb)	430-55-7

\*: For substances not explicitly stating the substitution position of halogen elements, isomers with different substituent positions are also included.

Table H Radioactive substances

Radioactive substances	CAS RN
Uranium-238	7440-61-1
Plutonium	-

Radon	10043-92-2
Americium-241	14596-10-2
Thorium-232	7440-29-1
Cesium (only radioisotope)	(Cs-137:10045-97-3)
Strontium (only radioisotope)	(Sr-90:10098-97-2)
Other radioactive substances	-

\*: excluding natural origin.

Table I Fluorinated Greenhouse Gases (PFC, SF6, HFC)

Fluorinated Greenhouse Gases	CAS RN
Tetrafluoromethane (Perfluoromethane)	75-73-0
Perfluoroethane (Hexafluoroethane)	76-16-4
Perfluoropropane (Octafluoropropane)	76-19-7
Perfluorobutane (Decafluorobutane)	355-25-9
Perfluoropentane (Dodecafluoropentane)	678-26-2
Perfluorohexane (Tetradecafluorohexane)	355-42-0
Perfluorocyclobutane (Octafluorocyclobutane)	115-25-3
Sulfur hexafluoride (SF6)	2551-62-4
Trifluoromethane (HFC-23)	75-46-7
Difluoromethane (HFC-32)	75-10-5
Fluoromethane (HFC-41)	593-53-3
2H,3H-Decafluoropentane (HFC-43-10mee)	138495-42-8
Pentafluoroethane (HFC-125)	354-33-6
1,1,2,2-Tetrafluoroethane (HFC-134)	359-35-3
1,1,1,2-Tetrafluoroethane (HFC-134a)	811-97-2
1,2-Difluoroethane (HFC-152)	624-72-6
1,1-Difluoroethane (HFC-152a)	75-37-6
1,1,2-Trifluoroethane (HFC-143)	430-66-0
1,1,1-Trifluoroethane (HFC-143a)	420-46-2
2H-Heptafluoropropane (HFC-227ea)	431-89-0
1,1,1,2,2,3-Hexafluoropropane (HFC-236cb)	677-56-5
1,1,1,2,3,3-Hexafluoropropane (HFC-236ea)	431-63-0
1,1,1,3,3,3-Hexafluoropropane (HFC-236fa)	690-39-1
1,1,2,2,3-Pentafluoropropane (HFC-245ca)	679-86-7
1,1,1,3,3-Pentafluoropropane (HFC-245fa)	460-73-1
1,1,1,3,3-Pentafluorobutane (HFC-365mfc)	406-58-6

Table J Perfluorooctane sulfonic acid (PFOS) and its salts and derivatives

Perfluorooctane sulfonic acid (PFOS) and its salts and derivatives	CAS RN
Perfluorooctanesulfonic acid (Heptadecafluorooctanesulfonic acid ; PFOS)	1763-23-1
Perfluorooctanesulfonate (PFOS), derivatives C <sub>8</sub> F <sub>17</sub> SO <sub>2</sub> X, X : O·NH <sub>4</sub> , O·K, O·Na or other groups	-

Table K Polychlorinated Terphenyls (PCTs)

Polychlorinated Terphenyls (PCTs)	CAS RN
Polychlorinated Terphenyls (PCTs) (All isomers and similar compounds)	61788-33-8

Table L Cadmium and its compounds

Cadmium and its compounds	CAS RN
Cadmium	7440-43-9
Cadmium oxide	1306-19-0



Cadmium sulfide	1306-23-6
Cadmium chloride	10108-64-2
Cadmium sulfate	10124-36-4 31119-53-6
Cadmium nitrate	10325-94-7
Cadmium hydroxide	21041-95-2
Cadmium carbonate	513-78-0
Cadmium fluoride	7790-79-6
Other cadmium compounds	-

Table M Azocolourants and azodyes which form certain aromatic amines

certain aromatic amines	CAS RN
4-Aminobiphenyl	92-67-1
Benzidine	92-87-5
4-Chloro-2-methylaniline	95-69-2
2-Naphthylamine	91-59-8
o-Aminoazotoluene	97-56-3
5-Nitro-o-toluidine	99-55-8
p- Chloroaniline	106-47-8
2,4-Diaminoanisole	615-05-4
4,4'-Methylenedianiline	101-77-9
3,3'-Dichlorobenzidine	91-94-1
3,3'-Dimethoxybenzidine	119-90-4
3,3'-Dimethylbenzidine	119-93-7
4,4'-Methylenedi-o- toluidine (4,4'-Diamino-3,3'-dimethyldiphenylmethane)	838-88-0
6-Methoxy-m- toluidine	120-71-8
4,4'-Methylenebis(2-chloroaniline)	101-14-4
4,4'-Oxydianiline	101-80-4
4,4'- Diaminodiphenylsulfide	139-65-1
o-Toluidine	95-53-4
4-Methyl-m-phenylenediamine	95-80-7
2,4,5-Trimethylaniline	137-17-7
o-Anisidine	90-04-0
4-Aminoazobenzene	60-09-3
2,4-Dimethylaniline	95-68-1
2,6-Dimethylaniline	87-62-7

\*: Applicable only to specific azocolourants and azodyes in which one or more of the above 24 aromatic amines are produced by reductive cleavage of the azo group.

Table N Perchlorates

Perchlorates	CAS RN
Lithium perchlorate	7791-03-9
Other perchlorate	-

Table O Lead and its compounds

Lead and its compounds	CAS RN
Lead	7439-92-1
Lead (II) sulfate	7446-14-2
Lead (II) carbonate	598-63-0
Lead (II) acetate	301-04-2
Lead (II) acetate, trihydrate	6080-56-4
Lead phosphate	7446-27-7

Lead selenide	12069-00-0
Lead (IV) oxide	1309-60-0
Lead (II, IV) oxide	1314-41-6
Lead (II) sulfide	1314-87-0
Lead (II) oxide	1317-36-8
Lead (II) carbonate basic	1319-46-6
Lead hydroxidcarbonate	1344-36-1
Lead (II) phosphate	7446-27-7
Lead (II) chromate	7758-97-6
Lead (II) titanate	12060-00-3
Lead sulfate	15739-80-7
Lead sulfate, monobasic	12036-76-9
Lead sulfate, tribasic	12202-17-4
Lead sulfate, tetrabasic	12065-90-6
Lead stearate	1072-35-1
Lead (II) arsenate	3687-31-8
Lead (II) nitrate	10099-74-8
Lead (II) hydrogenarsenate	7784-40-9
Lead (II) dimethanesulfonate	17570-76-2
Lead azide	13424-46-9
Lead dipicrate	6477-64-1
Lead (II) 2,4,6-trinitrobenzene-1,3-diolate	15245-44-0
Lead (II) tetrafluoroborate	13814-96-5
Lead zirconium titanium oxide	12626-81-2
Lead silicate	11120-22-2
Barium silicate (composition 1 : 1, lead-doped)	68784-75-8
Lead acetate, basic	51404-69-4
Dibasic lead phthalate	69011-06-9
Dioxobis(stearato) trilead	12578-12-0
Carboxylic acid lead salts (C16-18)	91031-62-8
lead cyanamide	20837-86-9
Pyrochlore (Antimony lead yellow)	8012-00-8
Sulfurous acid lead salt, dibasic	62229-08-7
Tetraethyllead	78-00-2
Lead phosphite, dibasic	12141-20-7
Molybdenred (Cl. Pigment Red 104)	12656-85-8
Cl. Pigment Yellow 34	1344-37-2
Other lead compounds	-

Table P Mercury and its compounds

<b>Mercury and its compounds</b>	<b>CAS RN</b>
Mercury	7439-97-6
Mercury (II) chloride (Cyclohexylmethylmercury (II) chloride)	33631-63-9
Mercury (II) chloride	7487-94-7
Mercury sulfate	7783-35-9
Mercury (II) nitrate	10045-94-0
Mercury (II) oxide	21908-53-2
Mercury (II) sulfide	1344-48-5
Other mercury compounds	-

Table Q Chromium (VI) compounds

<b>Chromium (VI) compounds</b>	<b>CAS RN</b>
Chromium (VI) oxide	1333-82-0
Barium chromate	10294-40-3
Calcium chromate	13765-19-0
Sodium chromate	7775-11-3
Sodium dichromate	10588-01-9
Sodium dichromate, dihydrate	7789-12-0
Strontium chromate	7789-06-2
Potassium dichromate	7778-50-9
Ammonium dichromate	7789-09-5
Potassium chromate	7789-00-6
Zinc chromate	13530-65-9
Chromic acid	7738-94-5
Dichromic acid	13530-68-2
Pentazinc chromate octahydroxide	49663-84-5
Potassium hydroxyoctaoxodizincate dichromate	11103-86-9
Chromium chromate	24613-89-6
Olygomer of chromic acid and/or dichromic acid	-
Other chromium compounds	-

Table R Polybrominated biphenyls (PBBs)

<b>Polybrominated biphenyls (PBBs)</b>	<b>CAS RN</b>
Polybrominated biphenyls (PBBs)	59536-65-1
dibromobiphenyl	92-86-4
2-Bromobiphenyl	2052-07-5
3-Bromobiphenyl	2113-57-7
4-Bromobiphenyl	92-66-0
Tribromobiphenyl	59080-34-1
Tetrabromobiphenyl	40088-45-7
Pentabromobiphenyl	56307-79-0
Hexabromobiphenyl	59080-40-9
Firemaster FF-1	67774-32-7
Heptabromobiphenyl	35194-78-6
Octabromobiphenyl	61288-13-9
Nonabromobiphenyl	27753-52-2
Decabromobiphenyl	13654-09-6

\*: According to the definition of EU Directive.

Table S Polybromodiphenyl ethers (PBDEs)

<b>Polybromodiphenyl ethers (PBDEs)</b>	<b>CAS RN</b>
Bromodiphenyl ether	101-55-3
Dibromodiphenyl ether	2050-47-7
Tribromodiphenyl ether	49690-94-0
Decabromodiphenyl ether	1163-19-5
Tetrabromodiphenyl ether	40088-47-9
Pentabromodiphenyl ether (Note: Commercially available products are complex reaction mixtures containing various brominated diphenyl oxides)	32534-81-9 (for commercial brands)
Hexabromodiphenyl ether	36483-60-0
Heptabromodiphenyl ether	68928-80-3

Octabromodiphenyl ether	32536-52-0
Nonabromodiphenyl ether	63936-56-1

\*: According to the definition of EU Directive.

Table T Certain phthalates

<b>Certain phthalates [category A]</b>	<b>CAS RN</b>
Butyl benzyl phthalate (BBP)	85-68-7
Dibutyl phthalate (DBP)	84-74-2
Bis(2-ethylhexyl) phthalate (DEHP)	117-81-7
Diisobutyl phthalate (DIBP)	84-69-5
<b>Certain phthalates [category B]</b>	<b>CAS RN</b>
Diisodenyl phthalate (DIDP)	26761-40-0 68515-49-1
Diisononyl phthalate (DINP)	28553-12-0 68515-48-0
Di-n-octyl phthalate (DNOP)	117-84-0

Table U Hexabromocyclododecane (HBCDD)

<b>Hexabromocyclododecane (HBCDD)</b>	<b>CAS RN</b>
Hexabromocyclododecane (HBCDD)	25637-99-4 3194-55-6
$\alpha$ -Hexabromocyclododecane	134237-50-6
$\beta$ -Hexabromocyclododecane	134237-51-7
$\gamma$ -Hexabromocyclododecane	134237-52-8
Other HBCDD isomers	-

Table V Pentachlorophenol and its salts and esters

<b>Pentachlorophenol and its salts and esters</b>	<b>CAS RN</b>
2,3,4,5,6-Pentachlorophenol	87-86-5
Sodium pentachlorophenol	131-52-2
Pentachlorophenol Sodium salt	27735-64-4
Pentachlorophenyl laurate	3772-94-9
Other Pentachlorophenol isomers, its salts, esters	-

Table W Nickel and its compounds

<b>Nickel and its compounds</b>	<b>CAS RN</b>
Nickel	7440-02-0
Nickel (II) oxide	1313-99-1
Nickel (II) chloride	7718-54-9
Nickel (II) chloride hexahydrate	7791-20-0
Nickel (II) sulfate	7786-81-4
Nickel (II) sulfate hexahydrate	10101-97-0
Nickel (II) sulfate heptahydrate	10101-98-1
Other nickel compounds	-

Table X Arsenic and its compounds

<b>Arsenic and its compounds</b>	<b>CAS RN</b>
Arsenic	7440-38-2
Gallium arsenide	1303-00-0
Calcium arsenate	7778-44-1
Calcium arsenite	27152-57-4
Arsenic pentaoxide	1303-28-2
Arsenic trioxide	1327-53-3

Potassium arsenite	10124-50-2
Potassium arsenate	7784-41-0
Triethyl arsenate	15606-95-8
Arsenic acid	7778-39-4
Other arsenic compounds	-

Table Y Brominated flame retardants (Other than PBBs, PBDEs, HBCDD)

<b>Brominated flame retardants (Other than PBBs, PBDEs, HBCDD)</b>	<b>CAS RN</b>
Brominated flame retardants corresponding to ISO 1043-4 FR(14) [aliphatic/alicyclic brominated compounds]	-
Brominated flame retardants corresponding to ISO 1043-4 FR(15) [aliphatic/alicyclic brominated compounds in combination with antimony compounds]	-
Brominated flame retardants corresponding to ISO 1043-4 FR(16) [aromatic brominated compounds (excluding brominated diphenyl ether and biphenyls)]	-
Brominated flame retardants corresponding to ISO 1043-4 FR(17) [aromatic brominated compounds (excluding brominated diphenyl ether and biphenyls) in combination with antimony compounds]	-
Brominated flame retardants corresponding to ISO 1043-4 FR(22) [aliphatic/alicyclic chlorinated and brominated compounds]	-
Brominated flame retardants corresponding to ISO 1043-4 FR(42) [brominated organic phosphorus compounds]	-
Poly(2,6-dibromophenylene oxide)	69882-11-7
Tetradecabromo-p-diphenoxybenzene	58965-66-5
1,2-Bis(2,4,6-tribromophenoxy)ethane	37853-59-1
3,5,3',5'-Tetrabromobisphenol A (TBBA)	79-94-7
TBBA, unspecified	30496-13-0
TBBA epichlorhydrin oligomer	40039-93-8
TBBA diglycidyl ether oligomer	70682-74-5
TBBA carbonate oligomer	28906-13-0
TBBA carbonate oligomer, phenoxy end capped	94334-64-2
TBBA carbonate oligomer, 2,4,6-tribromo-phenol terminated	71342-77-3
TBBA-bisphenol A-phosgene polymer	32844-27-2
Brominated epoxy resin end-capped with tribromophenol	139638-58-7
Brominated epoxy resin end-capped with tribromophenol	135229-48-0
TBBA- bis(2,3-dibromo propyl ether)	21850-44-2
TBBA-bis(2-hydroxy ethyl ether)	4162-45-2
TBBA-bis(allyl ether)	25327-89-3
TBBA-dimethyl ether	37853-61-5
Tetrabromobisphenol S (TBBS)	39635-79-5
TBBS-bis(2,3-dibromopropyl ether)	42757-55-1
2,4-Dibromophenol	615-58-7
2,4,6-Tribromophenol	118-79-6
Pentabromophenol	608-71-9
2,4,6-Tribromophenyl allyl ether	3278-89-5
Tribromophenyl allyl ether, unspecified	26762-91-4
Dimethyl tetrabromo phthalate	55481-60-2
Bis(2-ethylhexyl) tetrabromo phthalate	26040-51-7
2-(2-Hydroxyethoxy)ethyl 2-hydroxypropyl tetrabromo phthalate	20566-35-2
Tetrabromo phthalic acid, glycol and propylene oxide esters	75790-69-1

N,N'-Ethylenebis(tetrabromophthalimide)	32588-76-4
Ethylenebis(5,6-dibromonorbornane-2,3-dicarboximide)	52907-07-0
2,3-Dibromo-2-butene-1,4-diol	3234-02-4
Dibromoneopentyl glycol	3296-90-0
2,3-Dibromopropanol	96-13-9
Tribromoneopentyl alcohol	36483-57-5
Poly(tribromostyrene)	57137-10-7
Tribromostyrene	61368-34-1
Dibromostyrene grafted PP	171091-06-8
Poly(dibromostyrene)	31780-26-4
Bromo/chloro paraffins	68955-41-9
Bromo/Chloro $\alpha$ -olefin	82600-56-4
Vinylbromide	593-60-2
Tris(2,3-dibromopropyl) isocyanurate	52434-90-9
Tris(2,4-Dibromophenyl) phosphate	49690-63-3
Tris(tribromoneopentyl) phosphate	19186-97-1
Tris(2,3-dibromopropyl) phosphate	126-72-7
Chlorinated and brominated phosphate ester	125997-20-8
Pentabromotoluene	87-83-2
Pentabromobenzyl bromide	38521-51-6
1,3-Butadiene homopolymer, brominated	68441-46-3
Pentabromobenzyl acrylate, monomer	59447-55-1
Pentabromobenzyl acrylate, polymer	59447-57-3
Decabromodiphenylethane	84852-53-9
N-(2,4,6-Tribromophenyl) maleinimide	59789-51-4
Octabromo-1,1,3-trimethyl-1-phenylindane (FR-1808)	155613-93-7
1,2-Dibromo-4-(1,2-dibromoethyl)cyclohexane	3322-93-8
Tetrabromocyclooctane	31454-48-5
Tetrabromophthalic acid sodium salt	25357-79-3
Tetrabromophthalic anhydride	632-79-1
Other brominated flame retardants	-

Table Z Phthalates (excluding certain phthalates)

<b>Phthalates (excluding certain phthalates)</b>	<b>CAS RN</b>
Bis(2-methoxyethyl) phthalate	117-82-8
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	68515-42-4
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	71888-89-6
1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0
Dipentyl phthalate (DPP)	131-18-0
Diisopentyl phthalate (DIPP)	605-50-5
n-Pentyl isopentyl phthalate	776297-69-9
Di-n-hexyl phthalate	84-75-3
Dihexyl phthalate, branched and linear	68515-50-4
Diisohexyl phthalate	71850-09-4
1,2-Benzenedicarboxylic acid, di-C6-10-alkyl esters;	68515-51-5
1,2-Benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters	68648-93-1
Other phthalates	-

Table AA Anthracene and Anthracene oils

<b>Anthracene and Anthracene oils</b>	<b>CAS RN</b>
Anthracene	120-12-7
Anthracene oil	90640-80-5
Anthracene oil, anthracene-low	90640-82-7

Anthracene oil, anthracene paste	90640-81-6
Anthracene oil, anthracene paste, anthracene fraction	91995-15-2
Anthracene oil, anthracene paste, distn. lights	91995-17-4

Table AB Cobalt compounds

<b>Cobalt compounds</b>	<b>CAS RN</b>
Cobalt (II) chloride	7646-79-9
Cobalt (II) sulfate	10124-43-3
Cobalt (II) nitrate	10141-05-6
Cobalt (II) carbonate	513-79-1
Cobalt (II) acetate	71-48-7

Table AC Antimony and its compounds

<b>Antimony and its compounds</b>	<b>CAS RN</b>
Antimony	7440-36-0
Diantimony trioxide	1309-64-4
Stibine (Antimonous hydride)	7803-52-3
Other Antimony compounds	-

Table AD Boric acid and its salts

<b>Boric acid and its salts</b>	<b>CAS RN</b>
Boric acid	10043-35-3 11113-50-1
Disodium tetraborate	1303-96-4 1330-43-4 12179-04-3
Tetraboron disodium heptaoxide, hydrate	12267-73-1
Diboron trioxide	1303-86-2
Sodium peroxometaborate	7632-04-4
Sodium perborate (Perboric acid, sodium salt)	-
Disodium octaborate	12008-41-2
Di- $\mu$ -oxo-di-n-butylstanniohydroxyborane (Dibutyltin hydrogen borate; DBB)	75113-37-0
Other Borate	-

Table AE Dibutyltin compounds (DBTs)

<b>Dibutyltin compounds (DBTs)</b>	<b>CAS RN</b>
Dibutyltin oxide	818-08-6
Dibutyltin diacetate	1067-33-0
Dibutyltin dilaurate	77-58-7
Dibutyltin maleate	78-04-6
Dibutyltin dichloride (DBTC)	683-18-1
Dibutylbis(pentane-2,4-dionato-O,O')tin	22673-19-4
Other Dibutyltin compounds	-

Table AF Dioctyltin compounds (DOTs)

<b>Dioctyltin compounds (DOTs)</b>	<b>CAS RN</b>
Dioctyltin oxide	870-08-6
Dioctyltin dilaurate	3648-18-8
Other Dioctyltin compounds	-

Table AG Perfluorocarboxylic acid and its salts and derivatives

<b>Perfluorocarboxylic acid and its salts and derivatives</b>	<b>CAS RN</b>
Perfluorooctanoic acid (Pentadecafluorooctanoic acid; PFOA)	335-67-1
PFOA salts and derivatives C <sub>7</sub> F <sub>15</sub> COX, X : O·NH <sub>4</sub> , O·K, O·Na or other groups	- (NH <sub>4</sub> salt (APFO): 3825-26-1)
Perfluorobutanoic acid (Nonafluorobutanoic acid; PFBS)	375-73-5
PFBS salts	-
Heptadecafluorononanoic acid	375-95-1
Heptadecafluorononanoic acid sodium salt	21049-39-8
Heptadecafluorononanoic acid ammonium salt	4149-60-4
Nonadecafluorodecanoic acid	335-76-2
Nonadecafluorodecanoic acid sodium salt	3830-45-3
Nonadecafluorodecanoic acid ammonium salt	3108-42-7
Heneicosafleuroundecanoic acid	2058-94-8
Tricosafleurododecanoic acid	307-55-1
Pentacosafleurotridecanoic acid	72629-94-8
Heptacosafleurotetradecanoic acid	376-06-7

Table AH 4,4'-Oxydianiline and its salts

<b>4,4'-Oxydianiline and its salts</b>	<b>CAS RN</b>
4,4'-Oxydianiline	101-80-4
4,4'-Oxydianiline salts	-

Table AI Benzotriazole compounds

<b>Benzotriazole compounds</b>	<b>CAS RN</b>
2,4-Di-tert-butyl-6-(5-chlorobenzotriazol-2-yl)phenol (UV-327)	3864-99-1
2-(2H-Benzotriazol-2-yl)-4,6-di-tert-pentylphenol (UV328)	25973-55-1
2-(2H-Benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350)	36437-37-3

Table AJ Polycyclic aromatic hydrocarbones

<b>Polycyclic aromatic hydrocarbones [category A]</b>	<b>CAS RN</b>
Chrycene	218-01-9
Benz[a]anthracene	56-55-3
Benzo[ghi]perylene	191-24-2
Benzo[k]fluoranthene	207-08-9
<b>Polycyclic aromatic hydrocarbones [category B]</b>	<b>CAS RN</b>
Benzo[a]pyrene	50-32-8
Benzo[e]pyrene	192-97-2
Benzo[b]fluoranthene	205-99-2
Benzo[j]fluoranthene	205-82-3
Dibenz[a,h]anthracene	53-70-3
<b>Polycyclic aromatic hydrocarbones [category C]</b>	<b>CAS RN</b>
Fluoranthene	206-44-0
Phenanthrene	85-01-8
Pyrene	129-00-0



Table AK Cyclic siloxanes

<b>Cyclic siloxanes</b>	<b>CAS RN</b>
Octamethylcyclotetrasiloxane (D4)	556-67-2
Decamethylcyclopentasiloxane (D5)	541-02-6
Dodecamethylcyclohexasiloxane (D6)	540-97-6

Appendix 2 Typical exemption items

No.	Substance names	Exemption items
16	Cadmium and its compounds	<ul style="list-style-type: none"> <li>• filter glasses and glasses used for reflectance standards</li> <li>• electrical contacts</li> </ul>
19	Lead and its compounds	<ul style="list-style-type: none"> <li>• steel for machining purposes and in galvanized steel containing up to 0.35 % lead by weight</li> <li>• aluminium containing up to 0.4 % lead by weight</li> <li>• Copper alloy containing up to 4 % lead by weight</li> <li>• high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead)</li> <li>• white glasses used for optical applications</li> <li>• filter glasses and glasses used for reflectance standards</li> <li>• solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit flip chip packages</li> </ul>

\* In addition to Appendix 2, uses exempt from 2011/65/EU (Annex III, IV) are also exempt.