

Green Procurement Management Standard for Chemical Substances

For Suppliers

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1. Introduction

With the growing international concern for the global environment, the company's activities have been affected by strict rules on environmental issues in many countries. For example, the European Union has enacted laws and regulations restricting the use of certain chemical substances in products (CiP) like ELV directive^{*1-1} and RoHS directive^{*1-2}. It is urgent for companies to manage CiP across their supply chains, including Green Procurement Survey to parts/materials delivered by suppliers. This management would be successful only if all CiP are managed properly from the suppliers' side. They could use guidelines to establish the CiP management system such as "*Management of chemical substances in products - Principles and guidelines*"^{*1-3} issued as JIS or "*Guidelines for the management of chemical substances in products*"^{*1-4} issued by JAMP.

We, Hamamatsu Photonics K.K. (HPK), also adopt the CiP management system based on the above mentioned guidelines, and, as described in our "*Green Procurement Guideline*", encourage our suppliers to introduce such a system on their side because the CiP management system could only achieve its aim if the CiP is managed properly across the supply chains. This document, "*Green Procurement Management Standard for Chemical Substances*", covers parts/materials delivered from our suppliers to HPK and indicates the chemical substances to be managed on their side, including the criteria for the CiP content ratio as well as the criteria for chemicals used in the production process. Our suppliers are expected to comply with our requirements described in those two documents. We would establish strong partnerships with the suppliers who support our engagement and contribute to our Green Procurement in fulfilling our social responsibility.

(Notes)

- *1-1 ELV: DIRECTIVE 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles.
<http://ec.europa.eu/environment/waste/elv/index.htm>
- *1-2 RoHS: DIRECTIVE 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast)
http://ec.europa.eu/environment/waste/rohs_eee/index_en.htm
- *1-3 *Management of chemicals in products - Principles and guidelines*(JIS Z7201:2017)
<http://www.jisc.go.jp/eng/index.html>
- *1-4 *Guidelines for the management of chemical substances in products(CiP)*, Edition 4.0
<https://chemsherpa.net/english/docs/guidelines>

2. The Body

2.1. Purpose

This document which is needed for our suppliers to comply in terms of Chemical Substances in Products (CiP) and in the production process specifies our management criteria for chemical substances. It aims to improve the quality of our products with regard to environmental aspects. Our suppliers are expected to fully understand our requirements.

2.2. Scope

This document covers CiP¹ consisting of all parts/materials delivered from our suppliers to HPK, such as parts/materials (including accessories), subsidiary materials (such as solder, glue, filler, cleaner, etc.), and packaging materials. And it also covers chemical substances used in the production process of parts/materials delivered to HPK.

Example of parts and materials covered under the scope:

parts, materials, devices, modules, assemblies, units, accessories, packaging materials, instruction manuals, recording mediums, buffer materials, corrugated cardboards, sticks, labels, and subsidiary materials(solder, glue, calking, mold release agent, cleaner, band, tape, ink)

2.3. Terms and Definitions

1) Environmentally managed substances

Among “CiP consisting of parts/materials delivered to HPK” and “Chemical Substances in the production process of these items,” we designate the specific chemical substances to be managed using our criteria based on laws/regulations and/or our customer’s requests. In accordance with our management, these environmentally managed substances are divided into three classifications: “Banned Substances,” “Restricted Substances,” and “Controlled Substances.”

2) Banned Substances

Among the environmentally managed substances, certain chemicals are designated to be banned without any further consideration, for some laws/regulations ban these substances from being used or contained in products in any manner whatsoever.

3) Restricted Substances

Among the environmentally managed substances, certain chemicals are designated to be restricted under specific conditions: the applications and/or the time, for some laws/regulations restrict these substances from being used or contained in products in certain manners. These substances are further classified into three levels. Please refer to the item 2.4.

4) Controlled Substances

Among the environmentally managed substances, certain chemicals are designated to be controlled. These are not banned or restricted but needed to report, because we are required to collect information about their implications on recycling, environmental impact, occupational safety, and

¹ Including Chemical Substances in OEM or Original Equipment Manufacturing

proper waste disposal.

5) Contained

“Contained” means a condition of having a chemical substance as a component of a part/material through addition, adhesion, filling, or blending regardless whether it was intentionally or unintentionally done. This concept covers the case of a chemical substance being a residue in a part/material because of unintentional addition or blending in production process.

6) Intentionally-added

“Intentionally-added” means having a chemical substance added or blended in a part/material on purpose in order to give it a particular characteristic. Generally, a chemical substance would be regarded as “intentionally-added,” if its amount goes above its allowed threshold level.

7) Threshold level (Reporting Level)

“Threshold level” means the maximum allowed amount used to indicate a criterion for reporting. It is represented either as a concentration ratio like “above 1,000 ppm” or as an amount regarded. A chemical substance contained in a part/material that exceeds its threshold level would be considered as “intentionally added,” and therefore should be treated in accordance with this document.

8) Homogeneous material

“Homogeneous material” means a material that cannot be mechanically disjointed into different materials. And “homogeneous” has meaning of “uniform composition throughout.”

Examples of this concept are individual types of plastics, ceramics, glass, metals, alloys, paper, board, resins, coatings, and so on.

2.4. The Management Classification

The summary of our management classification is shown in Table A., and the details are shown in Table 1. and Table 3.

Table A. The summary of Management Classification

Management Classification		Meaning	
Banned Substances		Substances that should not be used and substances that should not be contained in parts/materials.	
Restricted Substances ²	Level 1	Each restricted substance is divided into three levels according to its specific application. Regardless whether it falls under Level 1, Level 2, or Level 3, our suppliers are required to provide information ³ on its threshold level and are recommended to find alternative technologies to eliminate the use of restricted substances.	Substances that should not be used and substances that should not be contained in parts/materials.
	Level 2		Substances that would be banned from being contained in parts/materials once required. (An individual timeline for raising each Level 2 substance to Level 1 will be implemented after the update.)
	Level 3		Substances that are not banned to be used or to be contained in parts/materials.
Controlled Substances		Substances that are not banned to be used or to be contained in parts/materials, but are required to be reported for monitoring purposes ³ .	

2.5. Revision

This Green procurement Management Standard could be revised and updated on an as-needed basis. Our suppliers can check the latest one on our WEB-site⁴.

² Chemical substances restricted from being used are designated in Table 2-1:Ozone Depleting Substances and Table 2-2:Chlorinated Organic Solvent. This requirement applies not only to our production processes but also to suppliers' production processes of the parts/materials delivered to HPK.

³ Information on the content (amount), the application (area), etc.

⁴ <https://www.hamamatsu.com/us/en/our-company/csr/procurement/green-procurement/index.html>

3. Cooperation Requests to Our Suppliers

3.1. Requests

1) Establishing the management system of chemical substances in products (CiP)

In our Green Procurement Guideline, we ask our suppliers to establish a CiP management system according to JAMP⁵; “*Guidelines for the management of chemicals in products (CiP)*”. We may ask them to perform a self-confirmation on their system, or request for us to do an additional on-site confirmation if necessary.

2) Request for our green procurement survey

We request our suppliers to cooperate in our green procurement survey. They are expected to respond to the surveys only when they have received our email request containing detailed instructions on how to accomplish them. There are several types of surveys and formats depending on the parts and materials as follows (some of them are available in our website);

I. The survey for chemical substances contained in parts or materials delivered to HPK

“Survey Sheet regarding Environment-related Substances to be Controlled in Parts and Materials”, “Non-inclusion Warranty for Banned and Restricted Substances”, “chemSHERPA⁶”, “IEC62474⁷”, “RMI (Responsible Minerals Sourcing)” and others.

II. The survey for chemical substances used in those production processes

“Non-use Certificate for Ozone-Depleting Substances in process (ODS)”, “Non-use Certificate for Chlorinated Organic Solvent in process”, and others.

Our suppliers are expected to comply with our criteria regardless of being asked to accomplish Green Procurement Survey requests or not. If their products delivered to HPK do not comply with our criteria, they should deliver the conformity products using alternative technology. They should also ensure that they get approval from our relevant divisions in advance if they change their production conditions such as their production process or parts/materials used in their products.

3.2. Supplement as of CiP

There are several criteria for our Green Procurement Survey of CiP. We intend to ensure that all parts or materials delivered to HPK comply with our criteria prior to their initial delivery through our survey. In the case that we find the concerned items do not meet our criteria, we would not purchase them in principle. Optionally, we request them further to investigate CiP by using specific industrial association survey formats, if necessary. We may do with other formats depending on our customers’ request.

3.3. Supplement as of the survey for chemical substances used in production processes

As for “the survey for chemical substances used in production processes,” we identified the banned chemical substances in production process as follows;

⁵ JAMP or Joint Article Management Promotion-consortium

⁶ <https://chemsherpa.net/chemSHERPA/english/>

⁷ <http://std.iec.ch/iec62474/iec62474.nsf/MainFrameset>

Table 2-1: Ozone Depleting Substances,

Table 2-2: Chlorinated Organic Solvent.

To respond to this survey, our suppliers are expected to declare non-use of those designated chemicals in the declaration format available on our web site⁸. They can declare in the said format either by limiting the particular product or by not limiting any (blanket coverage). If the latter method is selected, we would consider that any products delivered to HPK in future are also covered by the filled declaration with blanket coverage.

⁸ <https://www.hamamatsu.com/jp/en/our-company/sustainability-and-csr/environment/green-procurement-activities.html>

Table 1. Environmentally Managed Substances

HPK designates the management criteria for Environmentally Managed Substances which are contained in Parts and Materials. These substances are divided into three classifications: "Banned substances," "Restricted substances," and "Controlled substances" according to Joint industry guideline (JIG-101 Ed 4.1), IEC62474 (VT62474), and certain customer's Green procurement management standard and voluntary regulation by HPK.

1. Banned Substances (15 groups)

No.	IEC62474 ID	Substance Group Name	Legal Limits	Applicable Laws and Regulations
1	00054	Tributyl Tin Oxide (TBTO)	Please see the margin note	EU: REACH Regulation, Japan: Law concerning the evaluation of chemical substances (CAS No.56-35-9)
2	00044	Polybrominated Biphenyls (PBBs)	0.1% by weight (1000 ppm) of homogeneous materials	EU: RoHS Directive, China: MII Methods, Korea: RoHS, Japan: J-MOSS
3	00045	Polybrominated Diphenyl ethers (PBDEs)	Intentionally added or 0.1% by weight (1000 ppm) of homogeneous materials	EU: RoHS Directive, China: MII Methods, Korea: RoHS, Japan: J-MOSS, Law concerning the evaluation of chemical substances
4	00046	Polychlorinated Biphenyls (PCBs) and specific substitutes	Please see the margin note	EU: REACH Regulation, USA: TSCA, Japan: Law concerning the evaluation of chemical substances
5	00047	Polychlorinated Terphenyls (PCTs)	Please see the margin note	EU: REACH Regulation, Japan: Law concerning the evaluation of chemical substances
6	00048	Polychlorinated Naphthalenes (more than 1 chlorine atoms)	Please see the margin note	EU: PoPs Regulation Japan: Law concerning the evaluation of chemical substances
7	00003	Asbestos	Intentionally added	EU: REACH Regulation, USA: TSCA, Japan: Industrial Safety and Health Law, PRTR
8	00055	Tri-substituted organostannic compounds	0.1% by weight (1000 ppm) of tin in a material	EU: REACH Regulation, 276/2010, Japan: Law concerning the evaluation of chemical substances
9	00035	Phenol,2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)	Please see the margin note	Japan: Law concerning the evaluation of chemical substances
10	00016	Dimethyl Fumarate (DMF)	0.00001% by weight (0.1 ppm) in a material	EU: 2009/251/EC
11	00052	Shortchain Chlorinated Paraffins (C10 – C13)	Intentionally added	EU: POPs Regulation, Norway Product Regulations FOR-2004-06-01-922,
12	00020	Hexabromocyclododecane (HBCDD) and all major diastereoisomers	Please see the margin note	EU: REACH Regulation, PoPs Regulation Japan: Law concerning the evaluation of chemical substances (CAS No.25637-99-4, 3194-55-6,134237-50-6, 134237-51-7,4736-49-6, 65701-47-5,138257-17-7, 138257-18-8,138257-19-9,169102-57-2,678970-15-5,678970-16-6,678970-17-7)
13	00064	Bis(pentabromophenyl) ether (decabromodiphenyl ether) (DecaBDE)	Please see the margin note	EU: REACH Regulation, USA: TSCA, Japan: Law concerning the evaluation of chemical substances (CAS No.1163-19-5)
14	-	2,4,6-tris(tert-butyl)phenol (2,4,6-TTBP)	Please see the margin note	USA: TSCA, Japan: Law concerning the evaluation of chemical substances (CAS No.732-26-3)

15	-	Hexachlorobutadiene (HCBD)	Please see the margin note	EU: POPs Regulation, USA: TSCA, Japan: Law concerning the evaluation of chemical substances (CAS No.87-68-3)
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Note) Authorization systems, prohibition of manufacturing, import, use in the law concerning the examination and regulation of manufacture etc. of chemical substances

2. Restricted Substances (21 groups)

No.	IEC62474 ID	Substance Group Name	Reportable Application(s)	HPK's Threshold Level	Applicable Laws and Regulations
1	00010 00011	Cadmium/ Cadmium Compounds* ^{table1-1}	All, except batteries	0.01% by weight (100 ppm) of homogeneous materials	EU: REACH Regulation, RoHS Directive, Battery Directive, China: MII Methods, Korea: RoHS, Japan: J-MOSS, USA/CA: SB-20/50
			Batteries	0.001% by weight (10 ppm) of battery	
2	00012	Hexavalent Chromium Compounds* ^{table1-1}	All	0.1% by weight (1000 ppm) of homogeneous materials	EU: REACH Regulation, RoHS Directive, China: MII Methods, Korea: RoHS, Japan: J-MOSS, USA/CA: SB-20/50
3	00021 00022 00023 00024 00025	Lead/ Lead Compounds* ^{table1-1}	All, except as noted below	0.1% by weight (1000 ppm) of homogeneous materials	EU: REACH Regulation, RoHS Directive, Battery Directive, China: MII Methods, Korea: RoHS, Japan: J-MOSS, USA: U.S. Consumer Product Safety Improvement Act, USA/CA: SB-20/50, Proposition 65 Case law
			Cables/cords with thermoset or thermoplastic coatings	0.03% by weight (300 ppm) of surface coating	
			Batteries	0.004% by weight (40 ppm) of battery	
4	00029 00030 00132	Mercury/ Mercury Compounds* ^{table1-1}	All, except batteries	0.1% by weight (1000 ppm) of homogeneous materials	EU: REACH Regulation, RoHS Directive, Battery Directive, China: MII Methods, Korea: RoHS, Japan: J-MOSS, USA/CA: SB-20/50, other states Laws
			Batteries	Intentionally added or 0.0001% by weight (1 ppm) of battery	
5	-	Polyvinyl Chloride (PVC) and PVC blends	Plastic materials except printed wiring board laminates	Intentionally use	IEEE1680, JS709
6	00004	Azocolourants and azodyes which form certain aromatic amines	Textiles and leather	0.003% by weight (30 ppm) of the finished textile/leather product	EU: REACH Regulation
7	00032	Ozone Depleting Substances	All	Intentionally added	Montreal Protocol, EU: EC No. 2037/2000, EC 1005/2009, USA: Clean Air Act
			Use in process	Refer to Table 2-1 and 3 (7)	
8	00019	Formaldehyde	Textiles	0.0075% by weight (75 ppm) of textile product	EU: Austria - BGB I 1990/194: Formaldehydverordnung, §2, 12/2/1990; Lithuanian Hygiene Norm HN 96:2000 (Hygiene standards and regulations) USA/CA: CARB Rule. US Federal Law 111-199/TSCA Section 601, JAPAN: The Building Standard Law
			Composite wood (plywood, particle board, MDF) products or Components	Intentionally added	

No.	IEC62474 ID	Substance Group Name	Reportable Application(s)	HPK's Threshold Level	Applicable Laws and Regulations
9	00124 00125	Perfluorooctane sulfonates (PFOS)	All	Intentionally added or 0.1% by weight (1000 ppm) in material	EU: REACH Regulation, 552/2009; Canada: Environmental Protection Act SOR/ 2008-178, Japan: Law concerning the evaluation of chemical substances
10	00018	Fluorinated greenhouse gases (PFC, SF6, HFC)	All	Intentionally added	EU: 842/2006, Others
11	00013	Cobalt dichloride (CoCl ₂)	All	0.1% by weight (1000 ppm) of the product	EU: REACH Regulation (SVHC)
12	-	Chlorinated Organic Solvent	All	Intentionally added	EU: REACH Regulation, 276/2010 Japan: Industrial Safety and Health Law, The Water Pollution Prevention Act
			Use in process	Refer to Table 2-2 and 3 (12)	
13	00014	Dibutyltin (DBT) compounds	All	0.1% by weight (1000 ppm) of tin in a material	EU: REACH Regulation, 276/2010
14	00015	Diocetyl tin (DOT) compounds	(a) textile and leather articles intended to come into contact with the skin, (b) childcare articles (c) two-component room temperature vulcanisation moulding kits (RTV-2 moulding kits)	0.1% by weight (1000 ppm) of tin in a material	EU: REACH Regulation, 276/2010
15	-	Polycyclic aromatic hydrocarbons (PAH)	Rubber or plastic components that come into direct as well as prolonged or short-term repetitive contact with the human skin or the oral cavity, under normal or reasonably foreseeable conditions of use	0.0001% by weight (1ppm) of the material	EU: REACH Regulation (CAS No. 50-32-8, 192-97-2, 218-01-9, 205-82-3, 53-70-3, 56-55-3, 205-99-2, 207-08-9)
16	00038 00039 00040 00041	Di(2-ethylhexyl) phthalate (DEHP) Dibutyl phthalate (DBP) Butylbenzyl phthalate (BBP) Diisobutyl phthalate (DIBP)	All	0.1% by weight (1000 ppm) of homogeneous materials	EU: REACH Regulation, RoHS Directive (CAS No. 117-81-7, 84-74-2, 85-68-7, 84-69-5)
17	00096 00103 00104 00160 00161	Perfluorooctanoic acid (PFOA), its salts and PFOA related substances	All	25 ppb of PFOA including its salts or 1000 ppb (1 ppm) of one or a combination of PFOA-related substances	EU: REACH Regulation, (CAS No. 335-67-1, 3825-26-1, 335-95-5, 2395-00-8, 335-93-3, 335-66-0, 376-27-2, 3108-24-5, 678-39-7)
18	-	Perfluorohexane-1-sulphonic acid (PFHxS) and its salts	All	Intentionally added	Stockholm Convention on Persistent Organic Pollutants (POPs), EU: REACH Regulation, USA: TSCA

No.	IEC62474 ID	Substance Group Name	Reportable Application(s)	HPK's Threshold Level	Applicable Laws and Regulations
19	00174	Phenol, isopropylated phosphate(3:1) (PIP (3:1))	All	Intentionally added	USA: TSCA (CAS No.68937-41-7)
20	-	Pentachlorothiophenol (PCTP)	All	Intentionally added	USA: TSCA (CAS No.133-49-3)
21	00182 00183	Perfluorocarboxylic acids containing 9 to 14 carbon atoms in the chain (C9-C14 PFCAs), their salts and C9-C14PFCA-related substances	All	25 ppb for the sum of C9-C14 PFCAs and their salts, or 260 ppb for the sum of C9-C14 PFCA-related substances in Article or Mixture	EU: REACH Regulation

*table1-1: The substances containing in packaging materials, for example corrugated cardboard, paint, ink, tape, a unity band, a buffer material, a bag, a wooden frame, a label, a lap, a seat, a tray, a stick, etc, are defined under 100ppm on total mass of 4 substances. (c.f. EU Directive 94/62/EC on packaging and packaging waste)

3. Controlled Substances (11 groups)

No.	IEC62474 ID	Substance Group Name	Reportable Application(s)	HPK's Threshold Level	Applicable Laws and Regulations
1	00031	Nickel	All, where prolonged skin contact is expected	Intentionally added	EU: REACH Regulation
2	00008 00009	Brominated flame retardants (other than PBBs, PBDEs, or HBCDD)	Plastic materials except printed wiring board laminates	0.1% total bromine content by weight (1000 ppm) in the plastic material	JS709, IPC-4101 and IEC 61249-2-21
			Printed wiring board laminates	0.09% total bromine content by weight (900 ppm) in the laminate	
3	00049	Radioactive substances	All	Intentionally added	EU: 96/29/Euratom, Japan: Japan Law for the Regulation of Nuclear Source Material, Nuclear Fuel Material, and Reactors(1986), Japan Law Concerning Prevention from Radiation Hazards, USA: NRC
4	00005	Beryllium Oxide (BeO)	All	0.1 % by weight (1,000 ppm) of the product	DIGITALEUROPE/CECED /AeA/EERA guidance (CAS No. 1304-56-9)
5	00033	Perchlorates	All	0.0000006 % by weight (0.006 ppm) of the product	US/CA DTSC Rulemaking
6	00062 00063	Chlorinated flame retardants	Plastic materials except printed wiring board laminates	0.1% total chlorine content by weight (1000 ppm) in the plastic material	JS709, IPC-4101 and IEC 61249-2-2
			Printed wiring board laminates	0.09% total chlorine content by weight (900 ppm) in the laminate	

No.	IEC62474 ID	Substance Group Name	Reportable Application(s)	HPK's Threshold Level	Applicable Laws and Regulations
7	00037	Selected Phthalates Group 2 (DIDP, DINP, DNOP)	Children's toy or child care article that can be placed in a child's mouth	0.1 % by weight (1,000 ppm) of plasticized material	EU: REACH Regulation, USA: U.S. Consumer Product Safety Improvement Act
8	00090	Di-isodecyl phthalate (DIDP)	All	Intentionally added	USA/CA: Proposition 65
9	00091	Di-n-hexyl Phthalate (DnHP)	All	Intentionally added	USA/CA: Proposition 65
10	00107	Diisononyl phthalate (DINP)	All	Intentionally added	USA/CA: Proposition 65 (CAS No.28553-12-0; 68515-48-0)
11	-	EU REACH regulation (SVHC) group ^{*table1-2}	All	0.1 % by weight (1,000 ppm) of the product	EU: REACH Regulation

*table1-2 All SVHC that will be added in the future shall be managed. A postscript is not added.

Table 2-1. Restricted Substances form being Used : Ozone Depleting Substances(ODS)

No.	Substance Name	CAS No.	Management Level	The date on or after which HPK won't accept the target
1	Trichlorofluoromethane	75-69-4	Level 1	Immediate ban since Oct. 1, 2006
2	Dichlorodifluoromethane (CFC12)	75-71-8		
3	Chlorotrifluoromethane (CFC 13)	75-72-9		
4	Pentachlorofluoroethane (CFC 111)	354-56-3		
5	Tetrachlorodifluoroethane (CFC 112)	76-12-0		
6	Trichlorotrifluoroethane (CFC 113) 1,1,2 Trichloro-1,2,2 trifluoroethane	354-58-5 76-13-1		
7	Dichlorotetrafluoroethane (CFC 114)	76-14-2		
8	Monochloropentafluoroethane (CFC 115)	76-15-3		
9	Heptachlorofluoropropane (CFC 211)	422-78-6 135401-87-5		
10	Heptachlorofluoropropane (CFC 212)	3182-26-1		
11	Pentachlorotrifluoropropane (CFC 213)	2354-06-5 134237-31-3		
12	Tetrachlorotetrafluoropropane (CFC 214) 1,1,1,3-Tetrachlorotetrafluoropropane	29255-31-0 2268-46-4		
13	Trichloropentafluoropropane (CFC 215) 1,1,1-Trichloropentafluoropropane 1,2,3-Trichloropentafluoropropane	1599-41-3 4259-43-2 76-17-5		
14	Dichlorohexafluoropropane (CFC 216)	661-97-2		
15	Monochloroheptafluoropropane (CFC 217)	422-86-6		
16	Bromochlorodifluoromethane (Halon 1211)	353-59-3		
17	Bromotrifluoromethane (Halon 1301)	75-63-8		
18	Dibromotetrafluoroethane (Halon 2402)	124-73-2		
19	Carbon Tetrachloride (Tetrachloromethane)	56-23-5		
20	1,1,1, - Trichloroethane (methyl chloroform) and its isomers except 1,1,2-trichloroethane	71-55-6		
21	Bromomethane (Methyl Bromide)	74-83-9		
22	Dibromofluoromethane	1868-53-7		
23	Bromodifluoromethane	1511-62-2		
24	Bromofluoromethane	373-52-4		
25	Tetrabromofluoroethane	306-80-9		
26	Tribromodifluoroethane	-		
27	Dibromotrifluoroethane	354-04-1		
28	Bromotetrafluoroethane	124-72-1		
29	Tribromofluoroethane	-		
30	Dibromodifluoroethane	75-82-1		
31	Bromotrifluoroethane	421-06-7		
32	Dibromofluoroethane	358-97-4		
33	Bromodifluoroethane	420-47-3		
34	Bromofluoroethane	762-49-2		
35	Hexabromofluoropropane	-		
36	Pentabromodifluoropropane	-		
37	Tetrabromotrifluoropropane	-		
38	Tribromotetrafluoropropane	-		
39	Dibromopentafluoropropane	431-78-7		
40	Bromohexafluoropropane	2252-78-0		
41	Pentabromofluoropropane	-		
42	Tetrabromodifluoropropane	-		
43	Tribromotrifluoropropane	-		
44	Dibromotetrafluoropropane	-		
45	Bromopentafluoropropane	460-88-8		
46	Tetrabromofluoropropane	-		
47	Tribromodifluoropropane	70192-80-2		
48	Dibromotrifluoropropane	431-21-0		
49	Bromotetrafluoropropane	679-84-5		
50	Tribromofluoropropane	75372-14-4		
51	Dibromodifluoropropane	460-25-3		
52	Bromotrifluoropropane	421-46-5		
53	Dibromofluoropropane	51584-26-0		
54	Bromodifluoropropane	-		
55	Bromofluoropropane	1871-72-3		
56	Bromochloromethane	74-97-5		
57	Dichlorofluoromethane (HCFC 21)	75-43-4		
58	Chlorodifluoromethane (HCFC 22)	75-45-6		
59	Chlorofluoromethane (HCFC 31)	593-70-4		
60	Tetrachlorofluoroethane (HCFC 121) 1,1,1,2-tetrachloro-2-fluoroethane (HCFC 121a) 1,1,2,2-tetracloro-1-fluoroethane	134237-32-4 354-11-0 354-14-3		
61	Trichlorodifluoroethane (HCFC 122) 1,2,2-trichloro-1,1-difluoroethane	41834-16-6 354-21-2		
62	Dichlorotrifluoroethane (HCFC 123) Dichloro-1,1,2-trifluoroethane 1,1-dichloro-2,2,2-trifluoroethane 1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a) 1,1-dichloro-1,2,2-trifluoroethane (HCFC-123b)	34077-87-7 90454-18-5 306-83-2 354-23-4 812-04-4		

No.	Substance Name	CAS No.	Management Level	The date on or after which HPK won't accept the target
63	Chlorotetrafluoroethane (HCFC 124) 2-chloro-1,1,1,2-tetrafluoroethane 1-chloro-1,1,2,2-tetrafluoroethane (HCFC 124a)	63938-10-3 2837-89-0 354-25-6		
64	Trichlorofluoroethane (HCFC 131) 1-Fluoro-1,2,2-trichloroethane 1,1,1-trichloro-2-fluoroethane (HCFC131b)	27154-33-2;(134237-34-6) 359-28-4 811-95-0		
65	1-Chloro-1-fluoroethane (HCFC-151)	1615-75-4		
66	Dichlorodifluoroethane (HCFC 132) 1,2-dichloro-1,1-difluoroethane (HCFC 132b) 1,1-dichloro-1,2-difluoroethane (HCFC 132c) 1,1-dichloro-2,2-difluoroethane 1,2-dichloro-1,2-difluoroethane	25915-78-0 1649-08-7 1842-05-3 471-43-2 431-06-1		
67	Chlorotrifluoroethane (HCFC 133) 1-chloro-1,2,2-trifluoroethane 2-chloro-1,1,1-trifluoroethane (HCFC-133a)	1330-45-6 1330-45-6 75-88-7		
68	Dichlorofluoroethane (HCFC 141) 1,1-dichloro-1-fluoroethane (HCFC-141b) 1,2-dichloro-1-fluoroethane	1717-00-6;(25167-88-8) 1717-00-6 430-57-9		
69	Chlorodifluoroethane (HCFC 142) 1-chloro-1,1-difluoroethane (HCFC142b) 1-chloro-1,2-difluoroethane (HCFC142a)	25497-29-4 75-68-3 25497-29-4		
70	Hexachlorofluoropropane (HCFC 221)	134237-35-7		
71	Pentachlorodifluoropropane (HCFC 222)	134237-36-8		
72	Tetrachlorotrifluoropropane (HCFC 223)	134237-37-9		
73	Trichlorotetrafluoropropane (HCFC 224)	134237-38-0		
74	Dichloropentafluoropropane, (Ethyne, fluoro-) (HCFC 225) 2,2-Dichloro-1,1,1,3,3-pentafluoropropane (HCFC 225aa)	127564-92-5; (2713-09-9) 128903-21-9		
75	2,3-Dichloro-1,1,1,2,3-pentafluoropropane(HCFC 225ba) 1,2-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC 225bb) 3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC 225ca) 1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC 225cb) 1,1-Dichloro-1,2,2,3,3-pentafluoropropane (HCFC 225cc) 1,2-Dichloro-1,1,3,3,3-pentafluoropropane (HCFC 225da) 1,3-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC 225ea) 1,1-Dichloro-1,2,3,3,3-pentafluoropropane (HCFC 225eb)	422-48-0 422-44-6 422-56-0 507-55-1 13474-88-9 431-86-7 136013-79-1 111512-56-2	Level 1 *table2-1-1	Immediate ban since Oct. 1, 2006
76	Chlorohexafluoropropane (HCFC 226)	134308-72-8		
77	Pentachlorofluoropropane (HCFC 231)	134190-48-0		
78	Tetrachlorodifluoropropane (HCFC 232)	134237-39-1		
79	Trichlorotrifluoropropane (HCFC 233) 1,1,1-Trichloro-3,3,3-trifluoropropane	134237-40-4 7125-83-9		
80	Dichlorotetrafluoropropane (HCFC 234)	127564-83-4		
81	Chloropentafluoropropane (HCFC 235) 1-Chloro-1,1,3,3,3-pentafluoropropane	134237-41-5 460-92-4		
82	Tetrachlorofluoropropane (HCFC 241)	134190-49-1		
83	Trichlorodifluoropropane (HCFC 242)	134237-42-6		
84	Dichlorotrifluoropropane (HCFC 243) 1,1-dichloro-1,2,2-trifluoropropane 2,3-dichloro-1,1,1-trifluoropropane 3,3-Dichloro-1,1,1-trifluoropropane	134237-43-7 7125-99-7 338-75-0 460-69-5		
85	Chlorotetrafluoropropane (HCFC 244) 3-chloro-1,1,2,2-tetrafluoropropane	134190-50-4 679-85-6		
86	Trichlorofluoropropane (HCFC 251) 1,1,3-trichloro-1-fluoropropane	134190-51-5 818-99-5		
87	Dichlorodifluoropropane (HCFC 252)	134190-52-6		
88	Chlorotrifluoropropane (HCFC 253) 3-chloro-1,1,1-trifluoropropane (HCFC 253fb)	134237-44-8 460-35-5		
89	Dichlorofluoropropane (HCFC 261) 1,1-dichloro-1-fluoropropane	134237-45-9 7799-56-6		
90	Chlorodifluoropropane (HCFC 262) 2-chloro-1,3-difluoropropane	134190-53-7 102738-79-4		
91	Chlorofluoropropane (HCFC 271) 2-chloro-2-fluoropropane	134190-54-8 420-44-0		

*table2-1-1 The substances that are used in the process for the limited period under the permission given by person who involved in the relevant division shall be set as an exception to level 1.

Table 2-2. Restricted Substances form being Used : Chlorinated Organic Solvent

No.	Substances Name	CAS No.	Management Level	The date on or after which HPK won't accept the target
1	Dichloromethane (methylene chloride)	75-09-2	Level 1 ^{*table2-2-1}	Immediate ban since Oct. 1, 2006
2	Trichloroethylene	79-01-6		
3	Tetrachloroethylene	127-18-4		
4	1,1,2-Trichloroethane	79-00-5	Level 3	-
5	1,2-Dichloroethane	107-06-2		
6	1,1-Dichloroethylene; Vinylidene chloride	75-35-4		
7	cis-1,2-Dichloroethylene	156-59-2		
8	Chloroform	67-66-3		

*table2-2-1: The substances that are used in the process for the limited period under the permission given by person who involved in the relevant division shall be set as an exception to level 1.

Table 3. Management Level for Restricted Substances

1. Cadmium/ Cadmium Compounds

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	All applications except Level 3, [Examples] <ul style="list-style-type: none"> • Packaging materials (e.g. magazine sticks, trays, polyvinyl bags, polyvinyl sheets, cushions, etc) • The stabilizers, pigments, or dyes used for plastics materials (e.g. electrical wires, code, the insulators of electrical wiring, plastic resins, the outer of electrical parts, labels, etc) • Paints, inks • Surface treatment (e.g. plating, coating, etc) • Fluorescent lamps (small-sized ones, straight-tube ones) 	Immediate ban
	<ul style="list-style-type: none"> • Parts and materials made of alloys containing Zinc (e.g. brass, Zinc die-casting) 	Immediate ban since Oct. 1, 2005
Level 3 (Exemption)	<ul style="list-style-type: none"> • Applications which are met ANNEX III, IV of RoHS Directive (2011/65/EU) ^{*table3-1} 	-
	<ul style="list-style-type: none"> • Applications which are allowed to contain by HPK in following manners; <ul style="list-style-type: none"> a) those which have no alternative technologies and materials b) those which information about the inclusion is notified in documents such as specifications and/or technical drawing published by HPK. 	

*table3-1: All items that will be changed and/or added in official journals in the future shall be managed.

2. Hexavalent Chromium Compounds

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	All applications except Level 3, [Examples] <ul style="list-style-type: none"> • Packaging materials (e.g. magazine sticks, trays, polyvinyl bags, polyvinyl sheets, cushions, etc) 	Immediate ban
	<ul style="list-style-type: none"> • Preventing rust on surfaces of plating, screws, steel plates Inks and paints as components of their pigments, etc 	Immediate ban since Oct. 1, 2005
Level 3 (Exemption)	<ul style="list-style-type: none"> • Applications which are met ANNEX III, IV of RoHS Directive (2011/65/EU) ^{*table3-1} 	-
	<ul style="list-style-type: none"> • Applications which are allowed to contain by HPK in following manners; <ul style="list-style-type: none"> a) those which have no alternative technologies and materials b) those which information about the inclusion is notified in documents such as specifications and/or technical drawing published by HPK. 	

*table3-1: All items that will be changed and/or added in official journals in the future shall be managed.

3. Lead/ Lead Compounds

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	All applications except Level 3, [Examples] <ul style="list-style-type: none"> • Packaging materials (e.g. magazine sticks, trays, polyvinyl bags, polyvinyl sheets, cushions, etc) • Paints, and inks containing lead, which are used for PWBs 	Immediate ban
	<ul style="list-style-type: none"> • Leaded solder that contains less than 85 wt% of lead, Surface coatings (plating) for the external electrodes, lead wires, and other areas of parts (e.g. electrical parts, semiconductor devices, and heat sinks, etc) 	Immediate ban since Oct. 1, 2005
	<ul style="list-style-type: none"> • Lead that exceeded 1000 ppm in stabilizers used for electroless gold plating as well as electroless nickel plating and lead contained in additives 	Immediate ban since Apr. 1, 2007
	<ul style="list-style-type: none"> • Lead in dielectric ceramic in capacitors for a rated voltage of less than 125 V AC or 250 V DC 	Immediate ban since July 1, 2012
Level 3 (Exemption)	<ul style="list-style-type: none"> • Applications which are met ANNEX III, IV of RoHS Directive (2011/65/EU) ^{*table3-1} • Applications which are allowed to contain by HPK in following manners; <ul style="list-style-type: none"> a) those which have no alternative technologies and materials b) those which information about the inclusion is notified in documents such as specifications and/or technical drawing published by HPK. 	-

4. Mercury/ Mercury Compounds

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	All applications except Level 3, [Examples] <ul style="list-style-type: none"> • Packaging materials (e.g. magazine sticks, trays, polyvinyl bags, polyvinyl sheets, cushions, etc) • Paints, and inks, pigment • Mercury cells, Hour meters • The relays, switches, or sensors whose contacts contain mercury • Mercury or its compounds mixed in plastics 	Immediate ban
	<ul style="list-style-type: none"> • Small-sized fluorescent lamps whose mercury content (per lamp) is 5 mg or more • Straight-tube fluorescent lamps whose mercury content (per lamp) is 10 mg or more (following in Annex III of RoHS directive if exporting products to European Union) 	Immediate ban since Oct. 1, 2005
Level 3 (Exemption)	<ul style="list-style-type: none"> • Applications which are met ANNEX III, IV of RoHS Directive (2011/65/EU) ^{*table3-1} • Applications which are allowed to contain by HPK in following manners; <ul style="list-style-type: none"> a) those which have no alternative technologies and materials b) those which information about the inclusion is notified in documents such as specifications and/or technical drawing published by HPK. 	-

*table3-1: All items that will be changed and/or added in official journals in the future shall be managed.

5. Polyvinylchloride (PVC) and PVC blends

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	<ul style="list-style-type: none"> Vinyl ties made of PVC and PVC blends 	Immediate ban since Oct. 1, 2005
	<ul style="list-style-type: none"> Heat shrink tubes 	Immediate ban since Jan. 22, 2013
Level 3 (Exemption)	<ul style="list-style-type: none"> Applications for which needs high reliability and safety and has no alternative materials. (e.g. polyvinyl electrical wires for high voltage, multi cable, internal wiring cable, polyvinyl electrical wires, insulated tapes, insulated boards, etc) Binder for resins used for paints, inks, coating agents, adhesives etc. 	-
	<ul style="list-style-type: none"> Packaging materials that are allowed to use by HPK. 	

6. Azocolourants and azodyes which form certain aromatic amines

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1 (Refer to Table 4)	<ul style="list-style-type: none"> Azodyes that release one or more of the aromatic amines through decomposition, listed in Table 4, may not be used in the articles, which may come into direct and prolonged contact with the human skin (e.g. belts, straps, ear phones, head phones, and shoulder pads for bags) - Pigments containing the specific azo compounds used for the parts of products, which may come into direct and prolonged contact with the human skin The specific azo compounds that produce one or more amines specified in Table 4 when they are decomposed on the basis of a test method specified in Germany Law for Foods and Consumer Products 	Immediate ban since Oct. 1, 2005
Level 3 (Exemption)	<ul style="list-style-type: none"> Parts containing the specific azo compounds that do not come into continuous contact with the human skin in Level 1 (e.g. base of photomultiplier tube, socket, cushions, mice, remote controllers, and carrying bags). All applications except Level 1 (e.g. paints, inks, preservatives, and fungicides) 	-

7. Ozone-Depleting Substances

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1 (Refer to Table 2-1)	<ul style="list-style-type: none"> Level 1 restricted substances in Table 2-1, Ozone-depleting substances except those classified into Level 3, mold release agent and cleaner included in products and/or using in process 	Immediate ban
Level 3 (Exemption)	<ul style="list-style-type: none"> Coolant of air conditioner or other equipment, application for extinction Exceptional treatment for use of HCFC (No.57-96 in Table 2-1) Cleaner that persons involved in the relevant division allowed to use after setting its expiration date. 	-

8. Formaldehyde

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	<ul style="list-style-type: none"> Woodcraft products using plywood among products used indoors, adhesive, paint, resin and other applications, possibly releasing more than reference value (about 0.1 mg per 1 m³ air) specified in Building Standard Law (Article 20.7) Of interior materials, building materials, fabrication materials, accommodation, and other wooden building materials and facilities, formaldehyde releasing building material division newly used in manufacture classified as F* (class 1). 	Immediate ban
	<ul style="list-style-type: none"> Of interior materials, building materials, fabrication materials, accommodation, and other wooden building materials and facilities, formaldehyde releasing building material division newly used in manufacture classified as F*** less grade (class 2 to 3). 	Immediate ban since Oct. 1, 2005
Level 3 (Exemption)	<ul style="list-style-type: none"> All applications except Level 1 	-

9. Perfluorooctane sulfonates (PFOS)

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	<ul style="list-style-type: none"> Prohibited imports containing "class 1 specified chemical substances" that are designated in the enforcement order of "the law concerning the examination and regulation of manufacture etc. of chemical substances" Ex) Semiconductor applications (antireflection coating), etc 	Immediate ban since Apr. 1, 2010
Level 3 (Exemption)	<ul style="list-style-type: none"> Exempt applications(essential uses) of "class 1 specified chemical substances" that are designated in the enforcement order of "the law concerning the examination and regulation of manufacture etc. of chemical substances" 	-

10. Fluorinated greenhouse gases (PFC, SF6, HFC)

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	<ul style="list-style-type: none"> All applications except Level 3 	Immediate ban since Apr. 1, 2010
Level 3 (Exemption)	<ul style="list-style-type: none"> Applications that are allowed to use in processes and include in products by HPK 	-

11. Cobalt dichloride (CoCl₂)

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	<ul style="list-style-type: none"> Packaging materials used with HPK's products when shipping to customers ex) an indicator in a drying agent, etc 	Immediate ban since Apr. 1, 2010
Level 3 (Exemption)	<ul style="list-style-type: none"> All applications except Level 1 	-

12. Chlorinated Organic Solvent

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1 (Refer to Table 2-2)	<ul style="list-style-type: none"> Level 1 restricted substances in Table 2-2, Chlorinated Organic Solvent used as mold release agent and cleaner included in products and/or using in process 	Immediate ban since Apr. 1, 2006
Level 3 (Exemption)	<ul style="list-style-type: none"> Level 3 restricted substances in Table 2-2, Chlorinated Organic Solvent used as mold release agent and cleaner included in products and/or using in process 	-

13. Dibutyltin (DBT) compounds

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	<ul style="list-style-type: none"> All applications including additives of plastics (except Level 3 below) 	Immediate ban since Oct. 1, 2011
	<ul style="list-style-type: none"> One-component and two-component room temperature vulcanisation sealants (RTV-1 and RTV-2 sealants) One-component and two-component room temperature vulcanisation adhesives (RTV-1 and RTV-2 adhesives) Catalysts for paints or coating agents Stabilizers in PVC used for coating of fabrics intended for outdoor applications Additives of soft polyvinyl chloride (PVC) profiles whether by themselves or coextruded with hard PVC 	Immediate ban since July 1, 2014
Level 3 (Exemption)	<ul style="list-style-type: none"> Additives of reused packaging components and materials for parts and devices Additives of packaging components or materials for devices, semiconductors, and any other components (e.g. trays, magazine sticks, stoppers, reels, embossed carrier tapes) 	-

14. Dioctyltin (DOT) compounds

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	<ul style="list-style-type: none"> Additives of textiles 	Immediate ban since Oct. 1, 2011
Level 3 (Exemption)	<ul style="list-style-type: none"> All applications except Level 1 	-

15. Polycyclic aromatic hydrocarbons (PAH)

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	<ul style="list-style-type: none"> Rubber or plastic components that come into direct as well as prolonged or short-term repetitive contact with the human skin or the oral cavity, under normal or reasonably foreseeable conditions of use 	Immediate ban since July 1, 2015
Level 3 (Exemption)	<ul style="list-style-type: none"> All applications except Level 1 	-

16. Di(2-ethylhexyl) phthalate, Dibutyl phthalate, Butylbenzyl phthalate, Diisobutyl phthalate

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	All applications except Level 3 [Examples] <ul style="list-style-type: none"> Plasticizer for rubber, elastomer, and resin (particularly polyvinyl chloride (PVC)) 	Immediate ban since Jan. 22, 2018
Level 3 (Exemption)	<ul style="list-style-type: none"> Applications which are met ANNEX III, IV of RoHS Directive (2011/65/EU) ^{*table3-1} Applications which are allowed to contain by HPK in following manners; <ul style="list-style-type: none"> a) those which have no alternative technologies and materials b) those which information about the inclusion is notified in documents such as specifications and/or technical drawing published by HPK. 	-

*table3-1: All items that will be changed and/or added in official journals in the future shall be managed.

17. Perfluorooctanoic acid (PFOA), its salts and PFOA related substances

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	<ul style="list-style-type: none"> All applications except Level 3 	Immediate ban since Jan. 1, 2020
Level 3 (Exemption)	<ul style="list-style-type: none"> Photolithography or etch processes in semiconductor manufacturing Photographic coatings applied to films 	-

18. Perfluorohexane-1-sulphonic acid (PFHxS) and its salts

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 2	<ul style="list-style-type: none"> All applications 	Dec. 1, 2021

19. Phenol, isopropylated phosphate(3:1) (PIP (3:1))

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	<ul style="list-style-type: none"> All applications except Level 3 	Immediate ban since Dec. 1, 2021
Level 2	<ul style="list-style-type: none"> Adhesives and articles using adhesives Articles for use in adhesives and sealants (gasket, etc) 	Jan. 6, 2024

20. Pentachlorothiophenol (PCTP)

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 2	<ul style="list-style-type: none"> All applications 	Dec. 1, 2021

21. Perfluorocarboxylic acids containing 9 to 14 carbon atoms in the chain (C9-C14 PFCAs), their salts and C9-C14 PFCA-related substances

Management Level	Target (application)	The date on or after which HPK won't accept the target
Level 1	<ul style="list-style-type: none"> All applications except Level 3 	Immediate ban since Oct. 1, 2020
Level 3 (Exemption)	<ul style="list-style-type: none"> Photolithography or etch processes in semiconductor manufacturing Photographic coatings applied to films Invasive and implantable medical devices 	-

Table 4. Specified amine Compounds (formed through cleavage of one or more Azo bonds)

The table 3 of the azo dye and pigment No. 6 Level 1, the specified amines that must not be generated by reduction or decomposition are listed below.

Substances Name	Chemical Formula	CAS No.
4-aminoazobenzene	C ₁₂ H ₁₁ N ₃	60-09-3
o-anisidine	C ₇ H ₉ NO	90-04-0
2-naphthylamine	C ₁₀ H ₉ N	91-59-8
3,3'-dichlorobenzidine	C ₁₂ H ₁₀ Cl ₂ N ₂	91-94-1
Biphenyl-4-ylamine	C ₁₂ H ₁₁ N	92-67-1
Benzidine	C ₁₂ H ₁₂ N ₂	92-87-5
o-toluidine	C ₇ H ₉ N	95-53-4
4-chloro-o-toluidine	C ₇ H ₈ ClN	95-69-2
4-methyl-m-phenylenediamine	C ₇ H ₁₀ N ₂	95-80-7
o-aminoazotoluene	C ₁₄ H ₁₅ N ₃	97-56-3
5-nitro-o-toluidine	C ₇ H ₈ N ₂ O ₂	99-55-8
4,4'-methylene-bis(2-chloroaniline)	C ₁₃ H ₁₂ Cl ₂ N ₂	101-14-4
4,4'-methylenedianiline	C ₁₃ H ₁₄ N ₂	101-77-9
4,4'-oxydianiline	C ₁₂ H ₁₂ N ₂ O	101-80-4
p-chloroaniline	C ₆ H ₆ ClN	106-47-8
3,3'-dimethoxybenzidine	C ₁₄ H ₁₆ N ₂ O ₂	119-90-4
3,3'-dimethylbenzidine	C ₁₄ H ₁₆ N ₂	119-93-7
6-methoxy-m-toluidine	C ₈ H ₁₁ NO	120-71-8
2,4,5-trimethylaniline	C ₉ H ₁₃ N	137-17-7
4,4'-thiodianiline	C ₁₂ H ₁₂ N ₂ S	139-65-1
4-methoxy-m-phenylenediamine	C ₇ H ₁₀ N ₂ O	615-05-4
4,4'-methylenedi-o-toluidine	C ₁₅ H ₁₈ N ₂	838-88-0

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