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1 PURPOSE

The purposes of this Technical Standard are as follows:

- ✧ To clarify the environment-related substances included in the parts and devices constituting Delta products, or in regard to the environment-related ones used when Delta products are manufactured.
- ✧ To thoroughly notify the above-mentioned matters to both the whole Delta and parts/ devices suppliers.
- ✧ To improve the environmental quality of the products.

2 SCOPE

This Technical Standard applies to the following parts/ devices constituting Delta products: electrical parts, mechanical parts, semiconductor devices, printed wiring boards (PWBs), and packaging materials/ packaging parts.

- ✧ Including assemblies such as functional units, modules, and board assemblies.
- ✧ Including attachments such as the accessories procured as parts.
- ✧ Including composing materials such as the subsidiary parts and materials managed by parts specifications.
- ✧ Including the substances used in the production processes of parts.
- ✧ Including repair parts.

Regarding the substances or their applications whose uses are banned by regional or country laws and ordinances or customers, the laws and ordinances or standard of customers must be followed even though the substances or their purposes are not clearly regulated in this specification.

3 OPERATIONAL PROCEDURE

- ✧ Deliberations and decisions on matters regarding this Standard shall be made by the "Technical Committee for Environment-related Substances." The matters thus deliberated and decided shall be approved by the head of the division promoting the company-wide standardization of technology.
- ✧ When this Standard requires revising or abolishing, please apply to the Technical Committee for Environment-related Substances for the revisions or abolishment. The Committee shall deliberate the applied contents and decide the revisions or abolishment.

This Management Standard will be entered into enforcement 30 days after being published officially, unless elsewhere be stated its enforced date.

4 DEFINITIONS OF TERMS

In this Standard, terms are defined as follows:

- ✧ Environment-related Substances:
  Among the substances included in the parts and devices (refer to the SCOPE) or the ones used at the time of manufacturing, environment-related substances are the ones that are said to have serious environmental effects on overall global environment and that are specified by Delta.

- ✧ Management Standards:
  To manage the above-mentioned substances, the following three levels are used.
  1. Level 1
     The substances and purposes classified at this level are those whose use must be banned immediately.
  2. Level 2
     The substances and purposes classified at this level are those for which periods for phase-out are individually set.
     After the time set in each table, the substance fulfilling the above condition will be classified at Level 1 and must not be contained in parts and materials.
  3. Level 3
     No periods or targets for reduction are currently set for the substances and purposes classified at this level. However, the contents of the substances in parts and materials ought to be reduced. (Need to be reported)

- ✧ Homogeneous Materials:
  Homogeneous materials are defined as materials that cannot be mechanically disjointed into different materials and are "of uniform composition throughout." Examples are plastics, laminates, alloys, molding compounds, finishes, ceramics, plating materials, etc. that are presented in the finished parts and products.

- ✧ Contained:
  "Contained" means that a substance remains in parts, devices, or their materials because of addition, filling, blending, or adhesion, whether intended or not. When a substance is unintentionally contained in, or added to a product in a processing process, this situation is also regarded as "Contained." Dopants (Doping Agents) for production of semiconductor devices, etc. are not treated as "Intentionally added" if present in the devices in a very small amount.

- ✧ Intentionally added:
  "Intentionally added" means a situation where a substance is contained in the parts, devices, or their materials because of deliberate addition, filling, blending, or adhesion, in order to provide a specific characteristic, appearance, property, attribute or equality. (One contained in a natural material, which cannot be completely removed by in a refining process by adequate technical means (i.e. natural impurities); and one generated in a synthesis process, which cannot be completely removed by adequate technical means.)

- ✧ Banned Substances:
  Among the substances included in the parts and devices (refer to the SCOPE) or the ones used at the time of manufacturing, banned substances are those hazardous substances that are not allowed to be added intentionally and to be contaminated accidentally. The threshold limits of those banned substances are specified in any applicable test methods that are regulated in any related regulations and laws.

- ✧ The time to ban on receiving the parts and materials:
  This indicates the time when Delta must not receive the parts and/ or materials specified in this specification.

- ✧ TBD: To be defined.

- ✧ MDL: Method Detection Limit.

- ✧ N.D.: Not detected/ not detectable.

- ✧ PPM, ppm: Parts per million, unit of measurement for weight percentage.

- ✧ Threshold limit:

  The maximum concentration threshold of the regulated environment-related substance is allowed to be contained in homogenous level of the parts or materials constituting to Delta products due to technically irremovability of the regulated substance.

- ✧ Packaging:

  Materials used to protect products from damage due to storage or transportation (e.g., boxes, shipping supplies, cushioning & foam, bags, shrink wrap, tape/ adhesives), including inks and dyes used to label packages. Reusable or returnable packaging under the control of traders or suppliers is out of this scope.

✧ Mechanical Plastic Part:

Plastic parts that do not internally carry an electrical signal such as housings, brackets, bezels, latches, etc. that form the basic structure of the product and/ or have mechanical functions.

✧ Battery:

Battery means any source of electrical energy generated by direct conversion of chemical energy and consisting of one or more primary battery cells (non-rechargeable) or consisting of one or more secondary battery cell (rechargeable).

✧ Battery Pack:

Battery pack means any set of batteries that are connected together and/or encapsulated within an outer casing so as to form a complete unit that the end-user is not intended to split up or open.

✧ Coin Cell:

Coin cell means any small round portable battery whose diameter is greater than its height and which is used for special purposes such as hearing aids, watches, small portable equipment and back-up power system.

✧ Becquerel (symbol: Bq):

The Becquerel is the SI-derived unit of radioactivity. One Bq is defined as the activity of a quantity of radioactive material in which one nucleus decays per second (s^{-1}).

✧ Sievert (symbol: Sv):

The sievert (symbol: Sv) is the International System of Units (SI) SI derived unit of dose equivalent radiation. It attempts to quantitatively evaluate the biological effects of ionizing radiation as opposed to the physical aspects, which are characterized by the absorbed dose, measured in gray (symbol: Gy).

✧ Gray (symbol: Gy):

The gray (symbol: Gy) is the SI unit of absorbed radiation dose of ionizing radiation (for example, X-rays), and is defined as the absorption of one joule of ionizing radiation by one kilogram of matter (usually human tissue).

5 MANAGEMENT STANDARDS FOR ENVIRONMENT-RELATED SUBSTANCES

5-1 Environment-related Substances to be Controlled

Refer to Table 5-1 of Environment-related Substances to be Controlled regulated in this specification.

Table 5-1 List of "Environment-related Substances to be Controlled"

Section	Substances	Threshold contraction	Page
5-1-1	Cadmium and cadmium compounds		9
	-Plastics, rubbers, paints and inks.	N.D.	
	-Solders.	20 ppm	
	-Other homogeneous materials	50 ppm	
5-1-2	Lead and lead compounds		10
	-Plastics, rubbers, paints and inks.	50 ppm	
	-Other homogeneous materials	800 ppm	
5-1-3	Mercury and mercury compounds	N.D.	12
5-1-4	Hexavalent chromium compounds		14
	-Metallic parts.	N.D.	
	-Other homogeneous materials	100 ppm	
5-1-5	Polybrominated biphenyls (PBBs)	100 ppm	15
5-1-6	Polybrominated diphenyl ethers (PBDEs)	100 ppm	16
5-1-7	Phthalates	500 ppm	17
5-1-8	Polycyclic Aromatic Hydrocarbons (PAHs)	By products	19
5-1-9	PFOS and PFOA compounds (including salts and PFOA esters)	1000 ppm	21
5-1-10	Dimethylfumarate (DMF)	0.1 ppm	22
5-1-11	Polyvinyl chloride (PVC) and PVC blends	Not used	22
5-1-12	Persistent Organic Pollutants (POPs)	100 ppm	23
5-1-13	Polychlorinated terphenyls (PCTs) and polychlorinated naphthalenes (PCNs)	Not used	24
5-1-14	Halogrnated diphenyl methane compounds (DBBT, Ugilec 121, Ugilec 141)	Not used	24
5-1-15	Chlorinated paraffins (CP)	Not used	24
5-1-16	Substances depleting the ozone layer	Not used	25
5-1-17	Other chlorinated and brominated organic compounds	900 ppm	25
5-1-18	Organiostannic(organotin) compounds	1000 ppm	26
5-1-19	Asbestos	Not used	27
5-1-20	Specific azo and Benzidine-based compounds	30 ppm	27
5-1-21	Formaldehyde	75 ppm	31
5-1-22	Radioactive materials	Not present	32
5-1-23	Surfactants	Not used	33
5-1-24	Flavored aromatic compounds	Not used	33

5-1-25	Nickel and its compounds	0.5 μg/cm^2/week	33
5-1-26	Antimony and its compounds	1000 ppm	34
5-1-27	Beryllium and its compounds	1000 ppm	35
	-Beryllium oxide	100 ppm	
5-1-28	Specific benzotriazole (UV-320)	Not used	35
5-1-29	Bisphenol A	Not used	35
5-1-30	Red phosphorous and other phosphorous flame retardants		36
5-1-31	Arsenic and its compounds		37
	-Solder and metal alloy.	300 ppm	
	-Packaging material (include woods)	50 ppm	
	-Diarsenic trioxide/ Diarsenic pentaoxide	1000ppm	
	-Triethyl arsenate	Not used	
	-Other homogeneous materials	50 ppm	
5-1-32	Selenium and its compounds	Not used	38
5-1-33	Perchlorate	0.006 ppm	38
5-1-34	Benzenamine, N-phenyl-, Reaction Products with Styrene and 2,4,4-Trimethylpentene (BNST)	Not used	38

5-1-1 Cadmium and cadmium compounds

Targets		Implement date
Level 1	- Packaging materials. (Refer to 5-2 for packaging materials) - All applications except level 3.	Banned immediately
Level 3	- (8b) Cadmium and its compounds in electrical contacts. - (13b) Cadmium in filter glasses and glasses used for reflectance standards. - (21) Cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glasses. - (30) Cadmium alloys as electrical/mechanical solder joints to electrical conductors located directly on the voice coil in transducers used in high-powered loudspeakers with sound pressure levels of 100 dB (A) and more. - (38) Cadmium and cadmium oxide in thick film pastes used on aluminum bonded beryllium oxide.	TBD
Threshold limit : 1. N.D. for plastics, rubbers, paints and inks.(MDL≦5 ppm) 2. Less than 20 ppm for solders. 3. Less than 50 ppm for other homogeneous materials if not be regulated in this section.		
Test method: IEC 62321		

5-1-2 Lead and lead compounds

Targets		Implement date
Level 1	- Packaging materials. (Refer to 5-2 for packaging materials) - All applications except level 2 and level 3.	Banned immediately
Level 3	- (5a) Lead in glass of cathode ray tubes. - (5b) Lead in glass of fluorescent tubes not exceeding 0.2% by weight. - (6a) Lead as an alloying element in steel containing up to 0.35% lead by weight. - (6b) Lead as an alloying element in aluminum containing up to 0.4% lead by weight - (6c) Copper alloy containing up to 4% lead by weight. - (7a) Lead in high melting temperature type solders (i.e. lead-based alloys containing 85% by weight or more lead) - (7b) Lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signalling, transmission as well as network management for telecommunications. - (7c-I) Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g., piezoelectronic devices, or in a glass or ceramic matrix compound. - (7c-II) Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher. - (9b) Lead in bearing shells and bushes for refrigerant-containing compressors for heating, ventilation, air conditioning and refrigeration (HVACR) applications. - (13a) Lead in white glasses used for optical applications. - (13b) Lead in filter glasses and glasses used for reflectance standards. - (15) Lead in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit Flip Chip packages. - (17)Lead halide as radiant agent in High Intensity Discharge (HID) lamps used for professional reprography applications	TBD

- (18b)Lead as activator in the fluorescent powder (1% lead by weight or loss) of discharge lamps when used as sun tanning lamps containing phosphors such as BSP ($BaSi_2O_5$:Pb)
- (21) Lead in printing inks for the application of enamels on borosilicate glass.
- (24) Lead in solders for the soldering to machined through hole discoidal and planar array ceramic multilayer capacitors.
- (25) Lead oxide in surface conduction electron emitter displays (SED) used in structural elements, notably in the seal frit and frit ring.
- (31) Lead in soldering materials in mercury free flat fluorescent lamps (which e.g. are used for liquid crystal displays, design or industrial lighting).
- (32) Lead oxide in seal frit used for making window assemblies for Argon and Krypton laser tubes.
- (33) Lead in solders for the soldering of thin copper wires of 100µm diameter and less in power transformers.
- (34) Lead in cermet-based trimmer potentiometer elements.
- (37) Lead in the plating layer of high voltage diodes no the basis of a zinc borate glass body.
- Allowable concentration of lead as an additive in the following alloys:

Type of alloy	Allowable content of lead
Steel	Less than 0.35 wt%
Aluminum	Less than 0.4 wt%
Copper alloy (including brass and phosphor bronze)	Less than 4 wt%
Solder	Less than 800 ppm

Threshold limit:

1. Less than 50 ppm for plastics, rubbers, paints and inks. (MDL≦5 ppm)
2. Less than 800 ppm for other homogeneous materials if not be regulated in this section.

Test method: IEC 62321

5-1-3 Mercury and mercury compounds

Targets		Implement date
Level 1	- Packaging materials. (refer to 5-2 for packaging materials) - All applications except level 3.	Banned immediately
Level 3	- (1) Mercury in single capped fluorescent lamps not exceeding (per burner): - 1(a) For general lighting purposes < 30 W: 2.5 mg Hg. - 1(b) For general lighting purposes≧30 W and <50 W: 3.5 mg Hg. - 1(c) For general lighting purposes≧50 W and <150 W: 5 mg Hg. - 1(d) For general lighting purposes≧150 W: 15 mg Hg. - 1(e) For general lighting purposes with circular or square structural shape and tube diameter≦17 mm: 7 mg Hg. - 1(f) For special purposes: 5 mg Hg. - (2a) Mercury in double-capped linear fluorescent lamps for general purposes not exceeding (per burner): - 2(a)-1 Tri-band phosphor with normal lifetime and a tube diameter <9 mm (e.g. T2): 4 mg Hg. - 2(a)-2 Tri-band phosphor with normal lifetime and a tube diameter≧9 mm and≦17 (e,g,T5): 3 mg Hg. - 2(a)-3 Tri-band phosphor with normal lifetime and a tube diameter>17 mm and≦28 mm (e.g.T8): 3.5 mg Hg - 2(a)-4 Tri-band phosphor with normal lifetime and a tube diameter>28 mm (e.g. T12): 3.5 mg Hg - 2(a)-5 Tri-band phosphor with long lifetime (≧25,000 h): 5 mg Hg. - (2b)Mercury in other fluorescent lamps not exceeding (per burner): - 2(b)-1 Linear halophosphate lamps with tube diameter>28 mm (e.g. T10 and T12): 10 mg Hg. - 2(b)-3 Non-linear tri-band phosphor lamps with tube diameter>17 mm (e,g, T9): 15 mg Hg. - 2(b)-4 Lamps for other general lighting and special purposes (e,g. induction lamps): 15 mg Hg. - (3)Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per burner):	TBD

	- 3(a) Short length (≦500 mm): 3.5 mg Hg. - 3(b) Medium length (>500 mm and ≦1500 mm): 5 mg Hg. - 3(c) Long length (> 1500 mm): 13 mg Hg. - (4a) Mercury in other low pressure discharge lamps: 15 mg Hg. - (4b) Mercury in High Pressure Sodium (vapor) lamps for general lighting purposes not exceeding (per burner) in lamps with improved color rendering index CRI > 60: - 4(b)-I P≦155 W: 30 mg Hg. - 4(b)-II 155 <P≦405 W: 40 mg Hg. - 4(b)-III P> 405 W: 40 mg Hg. - (4c) Mercury in other High Pressure Sodium (vapor) lamps for general lighting purposes not exceeding (per burner): - 4(c)-I P≦155 W: 25 mg Hg. - 4(c)-II 155 <P≦405 W: 30 mg Hg. - 4(c)-III P>405W: 40 mg Hg. - (4e) Mercury in metal halide lamps (MH). - (4f) Mercury in other discharge lamps for special purposes not specifically mentioned in this section.	
Threshold limit: 1. N.D. for plastics, rubbers, paints and inks. (MDL≦ 5 ppm) 2. N.D. for other homogeneous materials if not be regulated in this section. (MDL: 2 ppm)		
Test method: IEC 62321		

5-1-4 Hexavalent chromium compounds

Targets		Implement date
Level 1	- Packaging materials. (refer to 5-2 for packaging materials) - All applications except level 3.	Banned immediately
Level 3	- (9) Hexavalent chromium as an anticorrosion agent of the carbon steel cooling system in absorption refrigerators up to 0.75% by weight in the cooling solution.	TBD
Threshold limit: 1. N.D. for metallic parts. (MDL≦ 0.10 μg/cm^2) 2. 100 ppm for other homogeneous material.		
Test method: 1. IEC 62321		

5-1-5 Polybrominated biphenyls (PBBs)

Targets		Implement date
Level 1	- All purposes. (e.g. ones for the flame retardants contained in plastics)	Banned immediately
Threshold limit: 1. Less than 100 ppm for plastics, rubbers, paints and inks. (MDL≦ 5 ppm)		
Test method: IEC 62321		

* Substances

Material	CAS No.	Main purposes
Bromobiphenyl Ether	101-55-3	Flame retardant
Dibromobiphenyl Ether	2050-47-7	Flame retardant
Tribromobiphenyl	64258-03-3	Flame retardant
Tetrabromobiphenyl	40088-45-7	Flame retardant
Pentabromobiphenyl	563070-79-0; 67888-97-5	Flame retardant
Hexabromobiphenyl	59080-40-9, 36355-01-8, 67774-32-7	Flame retardant
Heptabrombiphenyl	6355-01-8	Flame retardant
Octabrombiphenyl	61288-13-9	Flame retardant
Nonabromobiphenyl	27753-52-2	Flame retardant
Decabromobiphenyl	13654-09-6	Flame retardant

5-1-6 Polybrominated diphenyl ethers (PBDEs)

Targets		Implement date
Level 1	- All other purposes. (E.g. those for the flame retardants contained in plastics).	Banned immediately
Threshold limit: 1. Less than 100 ppm for plastics, rubbers, paints and inks. (MDL≦ 5 ppm)		
Test method: IEC 62321		

* Substances

Material	CAS No.	Main purposes
Bromobiphenyl Ether	101-55-3	
Dibromobiphenyl Ether	2050-47-7	Flame retardant
Tribromobiphenyl Ether	49690-94-0	Flame retardant
Tetrabromobiphenyl Ether	40088-47-9	Flame retardant
Pentabromobiphenyl Ether	32534-81-9	Flame retardant
Hexabromobiphenyl Ether	36483-60-0	Flame retardant
Heptabromobiphenyl Ether	68928-80-3	Flame retardant
Octabromobiphenyl Ether	32536-52-0	Flame retardant
Nonabromobiphenyl Ether	63936-56-1	Flame retardant
Decabromobiphenyl Ether	1163-19-5	Flame retardant

5-1-7 Phthalates

Targets		Implement date
Level 1	- Bis(2-ethylhexyl)phthalate (DEHP) for all purposes. - Butyl benzyl phthalate (BBP) for all purposes. - Dibutyl phthalate (DBP) for all purposes. - Diisobutyl phthalate (DIBP) for all purposes. - Dipentyl phthalate (DPP) for all purposes. - Di-n-octyl phthalate (DnOP) for all purposes. - Diisononyl phthalate (DINP) for all purposes. - Diisodecyl phthalate (DIDP) for all purposes. - Diethyl phthalate (DEP) for all purposes. - Di-n-hexyl phthalate (DnHP) for all purposes.	Banned immediately
Level 3	- Dinonyl phthalate (DNP) for all purposes. - Diphenyl phthalate (DHP) for all purposes. - Dimethyl phthalate (DMP) for all purposes. - Dicyclohexyl phthalate (DCHP) for all purposes. - Dinheptyl phthalate (DHP) for all purposes. - Diisooctyl phthalate (DIOP) for all purposes.	TBD

Threshold limit:

1. DEHP: 1000 ppm.
2. BBP: 1000 ppm.
3. DBP: 1000 ppm.
4. DIBP: 1000 ppm.
5. DPP: 1000 ppm.
6. DnOP: 1000 ppm.
7. DINP: 1000 ppm.
8. DIDP: 1000 ppm.
9. DEP: 1000 ppm.
10. DnHP: 1000 ppm.
11. For toy or children’ s products, sum of DEHP, DBP and BBP must less than 500 ppm。
12. For toy or children’ s products, sum of DINP, DIDP and DnOP must less than 500 ppm。

* Substances

Material	CAS No.	Main purposes
Bis (2-ethylhexyl)phthalate(DEHP) Dioctyl phthalate(DOP)	117-81-7	**Plasticizer**
Benzylbutyl Phthalate(BBP)	85-68-7	**Plasticizer**
Dibutyl Phthalate (DBP)	84-74-2	**Plasticizer**
Di-iso-butyl Phthalate (DIBP)	84-69-5	**Plasticizer**
Di-propyl Phthalate	131-16-8	**Plasticizer**
Dipentyl phthalate (DPP)	131-18-0	**Plasticizer**
Diisononyl Phthalate (DINP)	28553-12-0	**Plasticizer**
Di-n-0ctyl Phthalate (DnOP)	117-84-0	**Plasticizer**
Diisodecyl Phthalate (DIDP)	26761-40-0	**Plasticizer**
Dinonyl Phthalate (DNP)	84-76-4	**Plasticizer**
Diethyl phthalate (DEP)	84-66-2	**Plasticizer**
Diphenyl Phthalate (DHP)	84-62-8	**Plasticizer**
Dimethyl Phthalate (DMP)	131-11-3	**Plasticizer**
Dicyclohexyl Phthalate (DCHP)	84-61-7	**Plasticizer**
Dinheptyl Phthalate (DHP)	3648-21-3	**Plasticizer**
Diisooctyl Phthalate(DIOP)	27554-26-3	**Plasticizer**
Di-n-hexyl phthalate (DnHP)	84-75-3	**Plasticizer**
Bis(2-methoxyethyl) phthalate (DMEP)	117-82-8	**Plasticizer**

5-1-8 Polycyclic Aromatic Hydrocarbons (PAHs)

Targets		Implement date
Level 1	- Used for mechanical plastic and rubber parts.	Banned immediately
Level 3	- Parts that do not contact human skins continuously.	TBD

Threshold limit:

Substance	Category 1	Category 2		Category 3	
	Materials intended to be placed in the mouth or toys with intended prolonged skin contact (> 30 seconds)	Materials not falling under Category 1, with foreseeable skin contact longer than 30 seconds (long term skin or frequent contact)		Materials not falling under Category 1 or 2, with foreseeable skin contact less than 30 seconds (short-term skin contact)	
		Toys as defined in 2009/48/EC	Other products	Toys as defined in 2009/48/EC	Other products
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Benzo[a]pyrene	< 0.2	< 0.2	< 0.5	< 0.5	<1
Benzo[e]pyrene	< 0.2	< 0.2	< 0.5	< 0.5	<1
Benzo[a]anthracene	< 0.2	< 0.2	< 0.5	< 0.5	<1
Benzo[b]fluoranthene	< 0.2	< 0.2	< 0.5	< 0.5	<1
Benzo[j]fluoranthene	< 0.2	< 0.2	< 0.5	< 0.5	<1
Benzo[k]fluoranthene	< 0.2	< 0.2	< 0.5	< 0.5	<1
Chrysene	< 0.2	< 0.2	< 0.5	< 0.5	<1
Dibenzo[a,h]anthracene	< 0.2	< 0.2	< 0.5	< 0.5	<1
Benzo[hgi]perylene	< 0.2	< 0.2	< 0.5	< 0.5	<1
Indeno[1,2,3-cd]pyrene	< 0.2	< 0.2	< 0.5	< 0.5	<1
Acenaphtylene, Acenaphthene, Fluorene, Phenanthrene, Pyrene, Anthracene, Fluoranthene	<1 (sum)	<5 (sum)	<10 (sum)	<20 (sum)	<50 (sum)
Naphthalene	<1	<2		<10	
Sum 18 PAHs	< 1	< 5	< 10	< 20	< 50

Standards for measurement

1. GS-Mark (Safety Tested) method.
2. ZEK 01.4-08

*Substances

Material	CAS No.	Main purpose
Naphthalene	91-20-3	
Acenaphthylene	208-96-8	
Acenaphthene	83-32-9	
Fluorene	86-73-7	
Phenanthrene	85-1-8	
Anthracene	120-12-7	
Fluoranthene	206-44-0	
Pyrene	129-00-0	
Chrysene	218-01-9	
Benzo[a]anthracene	56-55-3	
Benzo[b]fluoranthene	205-99-2	
Benzo[j]fluoranthen	205-82-3	
Benzo[k]fluoranthene	207-08-9	
Benzo[a]pyrene	50-32-8	
Benzo[e]pyren	192-97-2	
Dibenzo[a,h]anthrancene	53-70-3	
Indeno[c,d]pyrene	193-39-5	
Benzo[g,h,i]perylene	191-24-2	

5-1-9 PFOS and PFOA compounds (including salts and PFOA esters)

Targets		Implement date
Level 1	- All applications except level 3.	Banned immediately
Level 3	- Photographic coatings applied to films, papers or plates. - For anti-fog in the electroplating system (not for decoration). - For semiconductor using. (E.g. photoresist or anti-reflective coatings for photolithography process.)	TBD
Threshold limit: 1. Less than 10 ppm for chemical substance and preparations. 2. Less than 1000 ppm for manufactured products and finished products. 3. Less than 1μg/m^2 on surface processing.		

* Substances

Material	CAS No.	Main purpose
Perfluorooctane sulfonates (PFOS)	1763-23-1	Surfactant, protective agents, anti-dust agents, surface process, photo resist.
PFOS Ion	45298-90-6	
PFOS Potassium Salt	2795-39-3	
PFOS Lithium Salt	29457-72-5	
PFOS Tetraethylammonium Salt	56773-42-3	
PFOS Triphenylsulfonium Salt	144089-15-6	
PFOS Sodium Salt	4021-47-0	
PFOS Ammonium Salt	29081-56-9	
PFOS Amide	754-91-6	
Perfluorooctanesulfonyl fluoride	307-35-7	
$C_8F_{17}SO_2X$ (X=OH, metal salt, halide, amide and other derivatives including polymers)	Various	
Compounds that contain $C_8F_{17}SO_2$, $C_8F_{17}SO_3$ or $C_8F_{17}SO_2N$ moieties	Various	
Perfluorooctanoic acid (PFOA)	335-67-1	
PFOA Ammonium Salt	3825-26-1	
PFOA Sodium Salt	335-95-5	
PFOA Potassium Salt	2395-00-8	
PFOA Silver Salt	335-93-3	
Perfluorooctanoyl fluoride	335-66-0	
Methyl PFOA	376-27-2	
Ethyl PFOA	3108-24-5	

5-1-10 Dimethylfumarate (DMF)

Targets		Implement date
Level 1	- All purposes. (E.g. leather and desiccant packs.)	Banned immediately
Threshold limit: N.D. for all homogenous materials. (MDL: 0.1 ppm)		

* Substances

Material	CAS No.	Main purposes
Dimethylfumarate	624-49-7	Mold inhibitor

5-1-11 Polyvinyl chloride (PVC) and PVC blends

Targets		Implement date
Level 1	- Vinyl ties made of PVC or PVC blends. - Packaging materials. (Expect these recycled) - Heat shrink tubes. - Connection cords for wearable equipment. (e.g. cables for ear phones, head phones, and ear microphones) - Flexible flat cables. (FFC) - Mechanical plastic parts that weight more than 25 g.	Banned immediately
Level 3	- Power cords with safety certification. - Polyvinyl electrical wires for high voltage. - Extra fine electrical wires that are AWG 36 or more.	TBD

5-1-12 Persistent Organic Pollutants (POPs)

Targets		Implement date
Level 1	- POPs listed in the annexes of Stockholm Convention are banned in all purposes.	Banned immediately
Threshold limit: 1. HBCDD: 100 ppm。		

*Substance

Material	CAS No.	Main purposes
Aldrin	309-00-2	Biocide
Chlordane	57-74-9	Biocide, adhesives
Dieldrin	60-57-1	Biocide
Endrin	72-20-8	Biocide
Heptachlor	76-44-8	Biocide
Hexachlorobenzene	118-74-1	Biocide
Mirex	2385-85-5	Biocide
Toxaphene	8001-35-2	Biocide
Polychlorinated biphenyls (PCBs)	various	Insulating oils
DDT	50-29-3	Biocide
Polychlorinateddibenzo-p-dioxins("dioxins") and polychlorinated dibenzofurans	various	
α-Hexachlorocyclohexane	319-84-6	Biocide
β-Hexachlorocyclohexane	319-85-7	Biocide
Chlordecone	143-50-0	Biocide
Hexabromobiphenyl	36355-01-8	Flame retardant
Hexabromodiphenyl ether and heptabromodiphenyl ether	various	Flame retardant
γ-hexachlorocyclohexane (Lindane)	58-89-9	Biocide
Pentachlorobenzene ((PeCB)	608-93-5	Fungicide
Tetrabromodiphenyl ether and pentabromodiphenyl ether	various	Flame retardant
Perfluorooctanesulfonic acid (PFOS), its salts and perfluorooctanesulfonyl fluoride (PFOSF)	various	
Endosulfan	115-29-7;33213-65-9;959-98-8	
Hexabromocyclododecane(HBCDD/HBCD)	25637-99-4;3194-55-6;134237-50-6;134237-51-7 134237-52-8	Flame retardant

5-1-13 Polychlorinated terphenyls (PCTs) and polychlorinated naphthalenes (PCNs)

Targets		Implement date
Level 1	- All purposes.	Banned immediately

* Substance

Substance	CAS No.	Main purposes
Trichloronaphthalene	1321-65-9	
Tetrachloronaphthalene	1335-88-2	
Pentachloronaphthalene	1321-64-8	
Octachloronaphthalene	2234-13-1	

5-1-14 Halogrnated diphenyl methane compounds (DBBT, Ugilec 121, Ugilec 141)

Targets		Implement date
Level 1	- Monomethyldibromodiphenylmethane(DBBT) in all applications. - Monomethyldichlorodiphenylmethane (Ugilec 121) in all applications. - Monomethyl-tetrachloro-diphenylmethane (Ugilec 141) in all applications.	Banned immediately

5-1-15 Chlorinated paraffins (CP)

Targets		Implement date
Level 1	- Short-chain Chlorinated paraffin $C_{10\sim13}$, Cl≧50 wt% in all applications. - Medium-chain chlorinated paraffin ($C_{14\sim17}$, Cl≧50 wt%) in all applications.	Banned immediately

5-1-16 Substances depleting the ozone layer

Targets		Implement date
Level 1	- ODSs controlled under Montreal Protocol (refer to controlled substances in Annex A, B, C, E, and JIG in the References section 8) must not be used in the manufacturing process of any parts, components, materials or products.	Banned immediately

5-1-17 Other chlorinated and brominated organic compounds

Targets		Implement date
Level 1	- Packaging material. - Chlorinated organic compound as flame retardants. - Hexabromocyclododecane(HBCDD) in all applications. - Tetrabromobisphenol A (TBBP-A) in all applications other level 3 application. - Brominated organic compounds in all applications. - Trichlorethylene and tetrachloroethylene in all applications.	Banned immediately
Level 2	- Enclosed plastic for new design adapters.	2018.12.31
	-All enclosed plastic for adaptors.	2019.12.31
Level 3	- Other brominated compounds used as flame retardants. - TBBP-A as reactive flame retardant.	TBD
Threshold limit: 1. Less than 100 ppm for HBCDD. 2. Halogen free material please refer Delta 10000-2003 for instructions.		
Standards for measurement: EN 14582.		

* Substances

Material	CAS No.	Main purposes
Trichlorethylene	79-01-6	
Tetrachloroethylene	127-18-4	
Tetrabromobisphenol A (TBBP-A)	79-94-7	
Hexabromocyclododecane	25637-99-4	
alpha- Hexabromocyclododecane	134237-51-7	
beta- Hexabromocyclododecane	134237-50-6	
gamma-Hexabromocyclododecane	134237-52-8	

5-1-18 Organiostannic (organotin) compounds

Targets		Implement date
Level 1	- Di-μ-oxo-di-n-butylstanniohydroxyborane (DBB) for all purposes. - Tributyl tin oxide (TBTO), tributyl tin (TBT) and triphenyl tin (TPT) for all purposes. - Dibutyltin Compounds (DBT) for all applications - Dioctyl Compounds (DOT) for all applications.	Banned immediately
Threshold limit: 1. Less than 1000 ppm (as total tin) for all materials.		

* Substances

Material	CAS No.	Main purpose
Tributyl tin bromide	1461-23-0	
Triphenyl tin	668-34-8	
Triphenyl tin bromide	1461-23-0	
Triphenyl tin chloride	639-58-7	
Triphenyl tin hydroxide	76-87-9	
Triphenyl tin N,N-Dimethyldithiocarbamate	1803-12-9	
Triphenyl tin fluoride(fentin fluoride)	379-52-2	
Triphenyl tin acetate (fentin acetate)	900-95-8	
Triphenyl tin fatty acid salts	18380-71-7	
Triphenyl tin chloroacetate	7094-94-2	
Triphenyl tin methacrylate	2155-70-6	
Bis(tributy tin) fumarate	6454-35-9	
Triphenyl tin fluoride	1983-10-4	
Bis(tributy tin)2,3-dibromosuccinate	31732-71-5	
Triphenyl tin acetate	56-36-0	
Triphenyl tin laurate	3090-36-6	
Trioctyltin chloride	2587-76-0	
Triethyltin hydroxide	994-32-1	
Triethyltin chloride	994-31-0	
Dioctyltin oxide	870-08-6	
Dioctyltin dichloride	3542-36-7	
Dioctyltin maleate	16091-18-2	
Dibutyltin oxide	818-08-6	
Dibutyltin dichloride;	683-18-1	
Di-μ-oxo-di-n-butylstanniohydroxyborane (DBB)	75113-37-0	
Tributyl tin bromide	1461-23-0	

5-1-19 Asbestos

Targets		Implement date
Level 1	- All purposes.	Banned immediately

5-1-20 Specific azo and Benzidine-based compounds

Targets		Implement date
Level 1	- The listed azo compoundsin all applocations. -The listed Benzidine-based compounds in all applications.	Banned immediately
Level 3	- Parts that do not contact human skins continuously (e.g. cushions, mice, carrying bags...etc.).	TBD
Threshold limit: 30 ppm for all homogeneous material.		

* Substances

Material	CAS No.
4-aminodiphenyl and its chlorides	92-67-1
4-chloro-o-toluidine	95-69-2
2-naphthylamine and its chlorides	91-59-8
o-aminoazotoluene	97-56-3
2-amino-4-nitrotoluene	99-55-8
p-chloroanifine	106-47-8
2, 4-diaminoanisole	615-05-4
4, 4'-diaminodiphenylmethane; 4,4'-methylenebisbenzeneamine	101-77-9
3, 3'-dichlorobenzidine	91-94-1
3, 3'-dimethlxybenzidion;	119-90-4
3, 3'-dimethylbenzidine;	119-93-7
3,3'-dimethyl-4,4'-diaminodiphenylmethane	838-88-0
p-cresidine	120-71-8
4, 4'-methylene-bis- (2-chloro aniline);	101-14-4
4, 4'-oxideaniline	101-80-4
4, 4'-thiodianiline	139-65-1
o-toluidine	95-53-4
2, 4-tolluylenediamine	95-80-7
2, 4, 5-trimethylaniline	137-17-7
4-aminoazobenzene	60-09-3
4-chloro-2-methylaniline	95-69-2
5-Nitro-ortho-toluidine	99-55-8

4-methoxy-m-phenylendiamine	615-05-4
o-Dianisidine	119-90-4
4,4'-Methylene-bis(2-methylaniline)	838-88-0
5-Methyl-o-Anisidine	120-71-8
4,4'-Methylenebis-(2-Chlorobenzenamine)	101-14-4
4,4'-thiobisbenzenamine	139-65-1
Toluene-2,4-Diamine	95-80-7
2,4,5-Trimethylaniline	137-17-7
o-Anisidine	90-04-0
1,3-Naphthalenedi-sulfonic acid, 7-hydroxy-8-[2-[4'-[2-(4- hydroxyphenyl) diazenyl][1,1'-biphenyl]-4-yl]diazenyl]-	117-33-9
1,3,6-Naphthalenetri-sulfonic acid, 8-hydroxy-7-[2-[4'-[2-(2- hydroxy-1-naphthalenyl)diazenyl][1,1'-biphenyl]-4- yl]diazenyl]-, lithium salt (1:3)	65150-87-0
2,7-Naphthalenedi-sulfonic acid, 5-amino-3-[2-[4'-[2-(7- amino-1-hydroxy-3-sulfo-2 -naphthalenyl)diazenyl][1,1'- biphenyl]-4-yl]diazenyl]-4-hydroxy-, sodium salt (1:2)	68214-82-4
2,7-Naphthalenedi-sulfonic acid, 4-amino-5-hydroxy-3-[2-[4'- [2-[2-hydroxy-4- [(2-methylphenyl)amino] phenyl]diazenyl][1,1'-biphenyl]-4-yl]diazenyl]-6-(2- phenyldiazenyl)-	72379-45-4
2,7-Naphthalenedi-sulfonic acid, 4-amino-5-hydroxy [[[(substituted phenylamino)] substituted phenylazo] diphenyl]azo-, phenylazo-, disodium salt.	Accession No. 21808 CAS No. CBI (NA)
4-(Substituted naphthalenyl)azo diphenylyl azo-substituted carbopolycycle azo benzene-sulfonic acid, sodium salt	Accession No. 24921 CAS No. CBI (NA)
4-(Substituted phenyl)azo biphenylyl azo-substituted carbopolycycloazo benzene-sulfonic acid, sodium salt	Accession No. 26256 CAS No. CBI (NA)
4-(Substituted phenyl)azo biphenylyl azo—substituted carbo- polycycle azo benzene-sulfonic acid, sodium salt	Accession No. 26267 CAS No. CBI (NA)
Phenylazoamino-hydroxynaphthalenylazobiphenylazo substituted benzene sodium sulfonate	Accession No. 26701 CAS No. CBI (NA)
[1,1'-Biphenyl]-4,4'-diamine	92-87-5
[1,1'-Biphenyl]-4,4'-diamine, dihydrochloride	531-85-1
1-Naphthalenesulfonic acid, 3,3'-[[1,1'-biphenyl]-4,4'- diylbis(azo)]bis[4-amino-, disodium salt (C.I. Direct Red 28)	573-58-0
2,7-Naphthalenedisulfonic acid, 4-amino-3-[[4'-[(2,4- diaminophenyl) azo] [1,1'-biphenyl]-4-yl]azo]-5-hydroxy-6- (phenylazo)-, disodium salt (C.I. Direct Black 38)	1937-37-7
1-Naphthalenesulfonic acid, 8,8'-[[1,1'-biphenyl]-4,4'- diylbis(azo)]bis[7-hydroxy-,disodium salt (C.I. Direct Red 44)	2302-97-8
2,7-Naphthalenedisulfonic acid, 5-amino-3-[[4'-[(7-amino- 1-hydroxy-3-sulfo-2-naphthalenyl)azo][1,1'-biphenyl]-4- yl]azo]-4-hydroxy-, trisodium salt (C.I. Direct Blue 2)	2429-73-4
Benzoic acid, 5-[[4'-[(1-amino-4-sulfo-2-naphthalenyl) azo][1,1'-biphenyl]-4-yl]azo]-2-hydroxy- ,disodium salt (C.I. Direct Orange 8)	2429-79-0

Benzoic acid, 5-[[4'-[[2,6-diamino-3-[[8-hydroxy-3,6-disulfo-7-[(4-sulfo-1-naphthalenyl)azo]-2-naphthalenyl]azo]-5-methylphenyl]azo][1,1'-biphenyl]-4-yl]azo] -2- hydroxy-, tetrasodium salt (C.I. Direct Brown 31)	2429-81-4
Benzoic acid, 5-[[4'-[(7-amino-1-hydroxy-3-sulfo-2- naphthalenyl) azo][1,1'-biphenyl]-4-yl]azo]-2- hydroxy-, disodium salt (C.I. Direct Brown 2)	2429-82-5
2,7-Naphthalenedisulfonic acid, 4-amino-3-[[4'-[(2,4-diamino- 5-methylphenyl)azo] [1,1'-biphenyl]-4-yl]azo]-5-hydroxy-6- (phenylazo)-, disodium salt (Direct Black 4)	2429-83-6
Benzoic acid, 5-[[4'-[(2-amino-8-hydroxy-6-sulfo-1- naphthalenyl)azo] [1,1'-biphenyl]-4-yl]azo]-2-hydroxy-, disodium salt (C.I. Direct Red 1)	2429-84-7
Benzoic acid, 5-[[4'-[[2,6-diamino-3-methyl-5-[(4- sulfophenyl)azo]phenyl]azo] [1,1'-biphenyl]-4-yl]azo]-2- hydroxy-, disodium salt (C.I. Direct Brown 1:2)	2586-58-5
2,7-Naphthalenedisulfonic acid, 3,3'-[[1,1'-biphenyl]-4,4'- diylbis(azo)]bis[5-amino-4-hydroxy-, tetrasodium salt (C.I. Direct Blue 6]	2602-46-2
Benzoic acid, 5-[[4'-[[2,4-dihydroxy-3-[(4-sulfophenyl) azo]phenyl]azo][1,1'-biphenyl]-4-yl]azo]-2-hydroxy-, disodium salt (C.I. Direct Brown 6)	2893-80-3
1,3-Naphthalenedisulfonic acid, 8-[[4'-[(4-ethoxyphenyl) azo][1,1'-biphenyl]-4-yl]azo]-7-hydroxy- ,disodium salt (C.I. Direct Red 37)	3530-19-6
1,3-Naphthalenedisulfonic acid, 7-hydroxy-8-[[4'-[[4-[[(4- methylphenyl) sulfonyl]oxy]phenyl]azo][1,1'-biphenyl]-4- yl]azo]-, disodium salt (C.I. Acid Red 85)	3567-65-5
2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy-3-[[4'-[(4- hydroxyphenyl)azo] [1,1'-biphenyl]- 4- yl]azo]-6-(phenylazo)-, disodium salt (C.I. Direct Green 1)	3626-28-6
Benzoic acid, 5-[[4'-[[2,4-diamino-5-[(4-sulfophenyl) azo]phenyl]azo][1,1'-biphenyl]-4-yl]azo]-2-hydroxy-, disodium salt (C.I. Direct Brown 1)	3811-71-0
2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy-6-[[4'-[(4- hydroxyphenyl)azo] [1,1'-biphenyl]- 4-yl] azo]-3-[(4- nitrophenyl)azo]-, disodium salt (C.I. Direct Green 6)	4335-09-5
2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy-3-[[4'-[[4-hydroxy-2-[(2-methylphenyl)amino]phenyl]azo] [1,1'-biphenyl]-4-yl]azo]-6-[(4-sulfophenyl) azo]-, trisodium salt (C.I. Acid Black 94)	6358-80-1
Benzoic acid, 5-[[4'-[[4-[(4-amino-7-sulfo-1-naphthalenyl)azo]-6-sulfo-1-naphthalenyl] azo][1,1'-biphenyl]-4-yl] azo]-2-hydroxy-, trisodium salt (C.I. Direct Brown 27)	6360-29-8
Benzoic acid, 5-[[4'-[[2,6-diamino-3-methyl-5-[(4-sulfophenyl)azo]phenyl] azo] [1,1'-biphenyl]-4- yl]azo]-2-hydroxy-3-methyl-, disodium salt (C.I. Direct Brown 154)	6360-54-9
Benzoic acid, 3,3'-[(3,7-disulfo-1,5-naphthalenediyl)bis[azo(6-hydroxy-3,1-phenylene) azo[6(or7)- sulfo-4,1-naphthalenediyl]azo[1,1'-biphenyl]-4,4'-diylazo]]bis[6-hydroxy-, hexasodium salt (C.I. Direct Brown 74)	8014-91-3
Cuprate(2-), [5-[[4'-[[2,6-dihydroxy-3-[(2-hydroxy-5-sulfophenyl)azo]phenyl] azo] [1,1'-biphenyl]- 4-yl]azo]-2-hydroxybenzoato(4-)]-, disodium salt (C.I. Direct Brown 95)	16071-86-6

5-1-21 Formaldehyde

Targets		Implement date
Level 1	- The wooden products made from chipboard or plywood, which are employed in products for import into Europe (And other than US). (E.g. speakers, racks). - Must not be used in textile materials intended for skin contact in concentrations greater than 75 ppm (0.0075%) in homogenous level.	Banned immediately
Reference value (emission content): Obtain the value by any one of the following methods. 1. Products for being imported into Europe (And other than US) 1) With a chamber method Concentration in the air: Equal to or less than 0.1 ppm (or 0.124 mg/m^3) in an air-tight test chamber whose volume is 12 m^3, 1 m^3, or 0.0225 m^3		
2) With a perforator method - Equal to or less than 6.5 mg in 100 g of a particleboard without a surface treatment (the average value during six months) - Equal to or less than 7.0 mg in 100 g of a fiberboard without a surface treatment (the average value during six months)		
- Equal to or less than 8.0 mg in 100 g of a particleboard/fiberboard without a surface treatment (the value derived from the one-time measurement based on EN120)		
3) With a desiccators method - Average content: 0.5 mg/l or less - Maximum content: 0.7 mg/l or less (Use N=2 to check the average and maximum values.)		
2. Products for being imported into California, USA must be followed the timeline and emission thresholds regulated in Table 1 and 2 in the "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products," sections 93120-93120.12, title 17, California Code of Regulations.		

Measurement methods:
1. For EU (and other than US) regulations:
- A chamber method specified in EN 717-1:2004 (Wood based panels; determination of formaldehyde release; formaldehyde emission by the chamber method).
- A perforator method specified in EN 120 (Wood based panels; determination of formaldehyde content; extraction method called perforator method; EN120:1992).
- A desiccators method specified in JIS A 5905 (Fiberboards) and JIS A 5908 (Particleboards)
2. For US regulations
- California-Legislation-Approved methods for measuring formaldehyde emission specified in ASTM E1333-96 (2002) and ASTM D6007-002.

* Substance

Material	CAS No.	Main purposes
Formaldehyde; formalin; formic aldehyde;	50-00-0	Preservatives, monomer (e.g. phenol resin and melamine resin)

5-1-22 Radioactive materials

Targets		Implement date
Level 1	- All purposes. Restricted to applications where no technically feasible alternative exists. (e.g. detectors)	Banned immediately

Threshold limit:
1. Shipping Containers, Pallets, and External Packaging Materials:
- dose equivalent rate should be less than 1 μSv/h.
- Surface contamination level of radioactive substances should be less than 0.04 Bq/cm^2 for beta and gamma emitters and lower toxicity alpha emitters.
- Surface contamination level of radioactive substances should be less than 0.4 Bq/cm^2 for other alpha emitters.
2. Components and semi-finished products:
- dose equivalent rate should be less than 1 μSv/h.
3. Raw materials:
- dose equivalent rate should be less than 0.25 μSv/h (natural radioactive background level).

5-1-23 Surfactants

Targets		Implement date
Level 1	- All purposes of DTDMAC, DODMAC/DSDMAC and DHTDMAC .	Banned immediately

*Example

Material	CAS No.	Main purpose
DTDMAC (Dimethyl ditallow ammonium chliride)	68783-78-8	
DODMAC/DSDMAC (Dioctyldimethyl ammonium chloride / Ditearyl dimethyl ammonium chloride)	107-64-2	
DHTDMAC (Dihydrogenated tallow dimethyammonium chloride)	61789-80-8	

5-1-24 Flavored aromatic compounds

Targets		Implement date
Level 1	- All purposes.	Banned immediately

*Example

Material	CAS No.	Main purposes
Musk Xylene	81-15-2	
Musk Ketone	81-14-1	
Musk lactone	3391-83-1	

5-1-25 Nickel and its compounds

Targets		Implement date
Level 1	- Nickel and its compounds used on external chassis/ case parts and the use of frequently handled by the user.	Banned immediately
Level 3	- Nickel in stainless steel. - Nickel and its compounds, usages which are not classified at Level 1	TBD
Threshold limit: Nickel and its compounds : 0.5 μg/cm^2/week		
Reference Measurement methods EN 1811: 2011 for nickel.		

5-1-26 Antimony and its compounds

Targets		Implement date
Level 1	- Antimony and its compounds used in packaging materials. (refer to 5-2 Additional rules for packaging materials) - All applications other than 3.	Banned immediately
Level 3	- Antimony trioxide used as flame retardant. - Additives in for ceramic or glass in components. - Solder used in pin attach or integrate circuits. - Cables, wires and cords.	TBD
Threshold limit: 1. Antimony: 1000 ppm. 2. Antimony trioxide: 1000 ppm. 3. Halogen free material please refers 10000-2003 for instructions.		
Reference Measurement methods 1. US EPA 3052 with ICP-AES analysis for antimony. 2. GB/T 3253.8-2009 for antimony trioxide.		

* Substance

Material	CAS No.
Antimony	7440-36-0
Antimony Trioxide	1309-64-4

5-1-27 Beryllium and its compounds

Targets		Implement date
Level 1	- Beryllium oxide in all applications. - Beryllium and its compounds in portable products. - Beryllium and its compounds in all applications except level 3.	Banned immediately
Level 3	- Ceramics in electronic components. - Beryllium-copper used for electrical contacts, such as connectors, springs, or EMI gaskets)	TBD
Threshold limit: 1. Beryllium and its compounds: 1000 ppm. 2. Beryllium oxide: 100 ppm.		

* Substances

Material	CAS No.	Main purposes
Beryllium	7440-41-7	
Beryllium oxide	1304-56-9	

5-1-28 Specific benzotriazole (UV-320)

Targets		Implement date
Level 1	- Specific benzotriazole (UV-320, CAS No. 3846-71-7) used for ultraviolet protectants and ultraviolet absorbers applied to decorative laminates, developing papers, and molded plastic parts.	Banned Immediately
Threshold limit: Not used.		

5-1-29 Bisphenol A

Targets		Implement date
Level 1	- Bisphenol A used in toys and children care articles.	Banned Immediately
Level 3	- Bisphenol A used for heat sensor paper, instruments for medical use.	TBD

*Substances

Material	CAS No.	Main purposes
Bisphenol A	80-05-7	

5-1-30 Red phosphorous and other phosphorous flame retardants

Targets		Implement date
Level 1	- Red phosphorous. - Tris(2-chloroethyl) phosphate (TCEP) used for flame retardants. - Trixylenyl phosphate (TXP) used for flame retardants. - Tris(2,3-dibromopropyl) phosphate (TDBPP) used for flame retardants. - Tri-1-aziridinylphosphine oxide (TEPA) used for flame retardants. - 1,3-Dichloro-2-propanol phosphate (TDCPP) used for flame retardants. - Tris (1-chloro-2-propyl) phosphate (TCPP) used for flame retardants.	Banned immediately
Level 3	- Triphenyl phosphate used for flame retardants.	TBD
Threshold limit: 1. Red phosphorous: N.D for all homogenous materials. (MDL: 1000 ppm) 2. Total phosphorous: 1000 ppm. (MDL: 2ppm)		

*Substances

Material	CAS No.
Red phosphorous	7723-14-0
White phosphorous (P_4)	12185-10-3
Tris(2-chloroethyl) phosphate (TCEP)	115-96-8
Trixylenyl phosphate (TXP)	25155-23-1
Tris(2,3-dibromopropyl) phosphate (TDBPP)	126-72-7
Tri-1-aziridinylphosphine oxide (TEPA)	545-55-1
1,3-Dichloro-2-propanol phosphate (TDCPP)	13674-87-8
Triphenyl phosphate (TPP)	115-86-6
Tris (1-chloro-2-propyl) phosphate (TCPP)	13674-84-5

5-1-31 Arsenic and its compounds

Targets		Implement date
Level 1	- Arsenic and its compounds on the use for those exception items which are not classified at Level 3. - Arsenic and its compounds are prohibited in wood products, paints, and packaging materials. - Arsenic and its compounds are prohibited in glasses that can be accessed by human skin. (e.g. LCD display glasses, camera lens, trackpad glass, display cover glass etc.) - Triethyl arsenate used for in pesticide and wood preservatives. - Diarsenic trioxide and diarsenic pentaoxide used as antifoam agents or fining agents for LCD panels (including cover glasses, touchscreens, and backlights).	Banned immediately
Level 3	-Arsenic and its compounds used for semiconductors, magnet filters, copper foil, and battery cells.	TBD
Threshold limit: 1. Arsenic and its compounds less than 300 ppm for solder and metal alloy. 2. Packaging material (include woods): 50 ppm. 3. Diarsenic trioxide/ Diarsenic pentaoxide: 1000 ppm. 4. Triethyl arsenate: N.D. 5. Less than 50 ppm for other homogeneous materials if not be regulated in this section.		

*Substances

Material	CAS No.	Main purposes
Arsenic	7440-38-2	
Diarsenic trioxide	1327-53-3	Antifoam agents
Diarsenic pentoxide	1303-28-2	Antifoam agents
Triethyl arsenate	15606-95-8	Pesticide or wood preservatives

5-1-32 Selenium and its compounds

Targets		Implement date
Level 1	- Selenium and its compounds in all applications.	Banned immediately
Threshold limit: N.D: All homogeneous material.		

5-1-33 Perchlorate

Targets		Implement date
Level 1	- Perchlorate in all applications.	Banned immediately
Threshold limit: 0.006 ppm in all homogeneous material.		

5-1-34 Benzenamine, N-phenyl-, Reaction Products with Styrene and 2,4,4-Trimethylpentene (BNST)

Targets		Implement date
Level 1	- BNST in in all applications.	Banned immediately

*Substances

Material	CAS No.	Main purposes
Benzenamine, N-phenyl-, Reaction Products with Styrene and 2,4,4- Trimethylpentene (BNST)	68921-45-9	Antioxidant

5-2 Additional rules for packaging materials

Heavy metals (mercury, cadmium, lead, and hexavalent chromium)		
Articles that satisfy not only the rules specified in 5-1 (Table 5.1), but also the following conditions decided by the regulations of relevant laws.		
Targets		Implement date
Level 1	- Expanded polystyrene (EPS), except for special requirement. - Antimony and its compounds. - Barium, hexavalent chromium, nickel, selenium. - Cobalt Dichloride ($CoCl_2$, CAS No. 7646-79-9) used for the indicator of dyers and other applications.	Banned immediately
Threshold limit: - Less than 80 ppm is determined as an allowable total-concentration of four heavy metals (mercury, cadmium, hexavalent chromium, and lead). Less than 5 ppm is determined as an allowable cadmium- concentration in plastic (including rubber) part. (Typical plastic parts: handles, cushions, wraps, reels, tapes, sticks, magazines, polyvinyl bags, and foil or trays). **Note: Reusable or returnable packaging under the control of traders or suppliers is exempted from additional rules for packaging materials.**		

5-3 Restrictions for batteries

Restrictions on Content of Batteries Used in Products			
Targets			Implement date
Level 1	Cadmium	- Batteries and battery packs whose cadmium content, in proportion to each unit weight, is 0.002% or more.	Banned immediately
Level 1	Lead	- Batteries and battery packs whose lead content, in proportion to each unit weight, is 0.4% or more.	Banned immediately
		- Built-in Batteries and built-in battery packs whose lead content, in proportion to each unit weight, is 0.4% or more.	
		- Zinc carbon batteries and button cell batteries whose lead content, in proportion to their weight, is 0.1% or more.	
		- Alkaline batteries whose lead content, in proportion to their weight, is 0.004% or more.	
		- Non-alkaline batteries whose lead content, in proportion to their weight, is 0.002% or more.	
Level 1	Mercury	- Coin cellbatteries mercury content in proportion to their weight, is 2% or more.	Banned immediately
		- Zinc carbon batteries alkaline and non-alkaline zinc batteries and nickel hydrogen (NiMH) rechargeable batteries whose mercury content, in proportion to their weight, is 0.0001% or more.	
		- All other battery types whose mercury content, in proportion to their weight, is 0.0005% or more.	

5-4 Chemical substances information –REACH requirement

REACH is a new European Union (EU) chemicals regulation that has entered into force on June 1, 2007, with several phased deadlines to 2018. The Article 33 of REACH regulation has regulated all article suppliers to do the communication of information about substances identified by the European Chemical Agency (ECHA) as candidates for Annex XIV of REACH, known as the list of Substance of Very High Concern (SVHC).

Moreover, the Article 67 of REACH regulation has regulated that a substance on its own, in a preparation or in an article, for which Annex XVII contains a restriction shall not be manufactured, placed on the market or used unless it complies with the conditions of that restrictions.

In order to fulfill REACH obligations for article suppliers, it' s required to communicate with Delta' s representatives if suppliers deliverie to Delta contain any regulated chemical substance that is over the report threshold of 1000 ppm (substance weight/ article weight) in weight. There are several required information for communication: a) Substance Name, b) CAS Number, c) Weight of Substance, and d) Concentration of Substance.

Please visit the website for the latest information about the SVHC substances published by ECHA.
<<https://echa.europa.eu/candidate-list-table>>

6 References

1. Directive 2011/65/EU, restriction of the use of certain hazardous substances (RoHS), amending by Directive 2014/1/EU.
2. EN 50581:2012
3. IEC 62321: 2013
4. Directive 2006/66/EC, batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC, amended by Directive 2008/12/EC, Directive 2008/103/EC, Directive 2013/56/EU.
5. Directive 94/62/EC on packaging and packaging waste, amending by Directive 2004/12/EC, Directive 2005/20/EC, Regulation (EC) No 219/2009, Directive 2013/2/EU.
6. Regulation (EC) No 1907/2006, registration, Evaluation, Authorization and Restriction of Chemicals (REACH)
7. Stockholm Convention on Persistent Organic Pollutants.
8. Montreal Protocol on Substances that Deplete the Ozone Layer.
9. REGULATION (EC) No 2037/2000 on substances that deplete the ozone layer.
10. Regulation (EU) No 528/2012, making available on the market and use of biocidal products.
11. 2009/425/EC, amending Council Directive 76/769/EEC as regards restrictions on the marketing and use of organostannic compounds for the purpose of adapting its Annex I to technical progress.
12. Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986.
13. EU Decision 2009/251/EC, requiring Member States to ensure that products containing the biocide dimethylfumarate are not placed or made available on the market.
14. REGULATION (EC) No 842/2006 on certain fluorinated greenhouse gases.
15. EN 1811:2011 European Standard specifying a reference test method for release of nickel from products intended to come into direct and prolonged contact with skin which was approved by the European Committee for Standardisation.
16. Testing and Validation of Polycyclic Aromatic Hydrocarbons (PAH) in the course of GS-Mark Certification.
17. EN 717-1:2004

7 Other design requirements

- ✧ Gluing / soldering of different material had better to be avoided.
- ✧ Plastic materials in covers / housing had better not be surface coated.
- ✧ All the thermoplastic parts≧25g or ≧200 mm^2 and packaging material, have to be marked in accordance to ISO 11469, and ISO 1043 -1, -2, -3, -4.

8 Requirements for Test Report

- ✧ Items to be Stated in Reports
  1. Pre-treatment method
  2. Measure method
  3. Name of the persons who made measurement, and the name of analysis institution.
  4. Measurement Date
  5. Measurement result (must state the detection limit)
  6. Measurement flowchart
  7. Photographs of the measured parts

- ✧ Pre-treatment in General

  Please be sure to indicate for all pre-treatment the fact that the sample has been totally digested and dissolved by entering "Totally dissolved." If this entry is not made, Delta will ask you to submit the report again.

  Delta will not accept any pre-treatment method of "In-house."

- ✧ Requirements of Laboratory

  The test must be done by 3rd party analytic test labs and have its own test lab with ISO 17025 certification.

  When customers have requirements for reports tested by specific test laboratories, Delta will ask you to resubmit the report again if the report is tested by other laboratories.

Revision history

REV.	Description	Date
20	1. Revise halogen-free compliance schedule. (Sec. 6-1-17, 6-1-18, 6-1-21, & 6-1-30) 2. Revise cadmium, lead, and mercury exemptions according to 2010/571/EU amending Directive. (6-1-1, 6-1-2, & 6-1-3) 3. Revise the threshold limits of HBCDD, DEHP, DBP, and BBP sections for special control. (Sec. 6-1-7 & 6-1-8) 4. Add DnPP, DnOP, DINP, DIDP, and DIBP into Level 2 management of the phthalates. (Sec. 6-1-8) 5. Add newly-added SVHC chemicals into the REACH section. (Sec. 6-1-12) 6. Add the TCEP into Level 2 management of the other chlorinated organic compounds. (Sec. 6-1-17) 7. Add the threshold limits for radioactive materials (Sec.6-1-26) 8. Add the beryllium and its compounds into Level 2 management of the other heavy metals. (Sec. 6-30) 9. Add diarsenic trioxide and diarsenic pentaoxide into Level 2 management of the other inorganic compoudns. (Sec. 6-1-32) 10. Revise the lead threshold limit from 0.2% to 0.1% by weights for zinc carbon batteries and alkaline batteries. (Sec. 6-3)	6/01/2011
21	1. Revise halogen-free compliance schedule. (Sec. 6-1-17, 6-1-18, 6-1-21, & 6-1-30) 2. Revise cadmium, lead, and mercury exemptions according to 2011/534/EU amending Directive. (6-1-1, 6-1-2) 3. Revise phthalate-free Level 2 compliance schedule. (Sec. 6-1-8) 4. Add DIBP into Level 1 management of the phthalates, and DIHP, DHNUP, DMEP into Level 3 management. (Sec. 6-1-8) 5. Add newly-added SVHC chemicals into the REACH section. (Sec. 6-1-12) 6. Add pentachlorobenzene into Level 1 management of the other organic compounds. (Sec. 6-1-31) 7. Add DMAC, tetramethylbutylphenol, and methoxyethyl ether into Level 3 management (Sec. 6-1-31) 8. Revise arsenic threshold limit for packaging materials. (Sec. 6-2) 9. Revise cadmium, lead, mercury threshold limit for all kind of batteries. (Sec. 6-3)	05/30/2012
22	1. Revise cadmium, lead, and mercury exemptions according to 2011/534/EU amending Directive. 2. Combined halogen requirements. 3. Revised the layout for some sections.	10/15/2013
23	1. Add banned substance BNST. 2. Add Banned POPs, integrate biocides, dioxin and furans. 3. Extend implement date of brominated organic compounds and some phthalates. 4. Update PAHs threshold limits. 5. Banned some organophosphate compounds for flame retardants. 6. Change the threshold limit for hexavalent chromium in plastic from N.D to 100 ppm.	12/26/2014
	1. Modify MDL requirement for cadmium, lead, mercury and hexavalent chromium. (MDL≦5 ppm)	1/15/2015

24	1. Adapt to meet the latest RoHS regulation. 2. Change PBBs/PBDEs threshold limit to 100 ppm. 3. Add banned phthalates. 4. Change HBCDD threshold limit to 100 ppm. 5 .Add banned halogrnated diphenyl methane compounds. 5. Add 5-1-14 Halogrnated diphenyl methane compounds	01/23/2017
25	1. Add requirement for enclosed plastic for adapters. 2. Adaption to RoHS regulation. 3. Renew requirement for formaldehyde in plywoods.	6/15/2018