

Product Environmental Technology Standards

WEB Edition

Magnescale Co., Ltd.

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1 Purposes

This technology standard is intended to observe applicable laws, protect the Earth's environment, and reduce harmful effects on the ecosystem through the prevention of the use of environmental management substances in parts, devices, and other products made up of Magnescale products.

This standard clarifies that substances whose use is prohibited, substances whose use is to be fully abolished, and items outside the scope of this standard.

In addition, Magnescale Co., Ltd. complies with customer demands of the Green purchasing program and others.

2 Scope

2.1 Scope of application for parts/materials

Parts/materials, other articles Magnescale Co., Ltd. consigned their design and fabrication to our suppliers.

The targets shall meet reference values specified in this standard.

- 1) Targeted Parts and Materials
- 2) Half-finished products (assembly parts including functional units, modules, board assemblies and optical fiber assemblies),
- 3) Parts (electric parts, mechanical parts, semiconductor devices, printed circuit boards, recording media, and packaging and materials), and screws.
- 4) Accessories (AC adapters, cable assemblies and supplied parts for using equipment)
- 5) Indirect materials used in products (including materials used in adhesive tape, solder material, unity band, labels, adhesive agents, etc.)
- 6) Printed matters (including operating manuals, warranties, and supplemental information regarding products and parts)
- 7) Maintenance and repair parts
- 8) Packaging and materials defined in 5.1 "Definition of package parts and materials," used for transportation and protection of parts by the delivery agent.

2.2 Scope of application for products

- 1) Magnescale products designed, manufactured, sold, leased or distributed by Magnescale Co., Ltd.
- 2) Magnescale products outsourced to the third parties to design and manufacture, and sold, leased or distributed under the Magnescale brand
- 3) Third parties' products outsourced to Magnescale Co., Ltd to design and manufacture

However parts/materials designated by a third party are excluded from the scope of application.

Furthermore, even if not explicitly defined in this standard, in the event that substances and associated applications prohibited and/or restricted by ordinance and regulatory requirements in each country, the ordinance and regulatory requirements shall be observed.

3 Terms and definitions

3.1 Environment-related substances to be controlled (Controlled Substances)

- 1) Accumulative/persistent/carcinogenic/reprotoxy substances that are likely to adversely affect the human body and prohibited and/or restricted by ordinance and regulatory requirements in each country
- 2) Substances that are restricted by customer's green procurement standard, and also the substances that are judged as necessary to be restricted by Magnescale Co., Ltd.
In the event that Magnescale standard is unable to satisfy an external requirement, external requirement shall have priority, and the substances shall also be controlled on a case-by-case basis.
- 3) Substances that are contained in parts and/or semiconductor devices and judged by Magnescale Co., Ltd. to have a significant impact on environment and/or human body

3.2 Management level

Terms used in these management levels are defined as given below.

- 1) Level 1
The substances and their applications classified into this level are those that are banned for the use in parts and materials.
- 2) Level 2
On the date set in each table, the substances and their applications in the respective tables shall be reclassified into Level 1.
- 3) Level 3
Considering possibility of phase-out in the future (i.e. reclassification into Level 2), technical investigations on substances and their applications are conducted.
- 4) Exception
Substances and applications not covered by the above 1) to 3) due to exceptions from laws.
Where needed, we investigate the usage of substances and their applications.

3.3 Contained

The condition that a substance remains in materials used for part and/or semiconductor device by addition, filling, mixture or adhesion, regardless of one's intention.

Even in the case a substance unintentionally got mixed in or adhered to a product in a processing process, we also consider this as "contained".

3.4 Intentional addition

The condition that a substance remains in materials used for parts and/or semiconductor devices by intentional addition, filling, mixture or adhesion to give a specific characteristic, appearance, property, attribute or quality.

- 1) With respect to the substance which is contained in a natural material and technically not possible to be completely removed by the refining process, also the substance which is generated by the synthesis reaction and technically not possible to be completely removed, those substances are judged as impurities and not considered as "intentional addition".
- 2) With respect to the substances called "impurities" which are distinguished from main material, when they are used for the purpose of changing a characteristic of the material such as alloys, it is not considered as "intentional addition".
However for dopants to produce semiconductor devices, etc., even when extremely small amount is remaining, it is not considered as "intentional addition".

3.5 Target

Elements (parts, materials, useage, processing) that require to be controled according to each "management level (described in 3.2)".

3.6 Criteria/threshold level

This criteria/threshold level means each "management level (described in 3.2)" or numerical value.

- 1) When "numerical value" is specified in "criteria/ threshold level" of "level 1", and the Controlled Substances is contained as impurities in a part or a semiconductor device, etc., its density must not reach the "numerical value".
- 2) When conditions such as "the intentional addition" and "numerical value" are shown in "the criteria/threshold level", it is necessary to meet both conditions.
- 3) When "measurement target" is set for a controlled substance, measurement shall be done according to "standard for measurement".

3.7 Effective date of the ban on the delivery

This indicates the date on or after which Magnescale Co., Ltd. won't accept the parts and/or materials specified in the corresponding columns of Table 4.1.

3.8 Plastic

Plastics refer to materials and raw materials composed of synthetic high-molecular polymers in this standard.

More specifically, "plastics" mainly mean the following articles composed of synthetic high-molecular polymers: resins, films, adhesives, adhesive tapes, molded products, products made of synthetic rubber, and plastics made from raw materials of plant origin.

3.9 RoHS directive

RoHS is the abbreviation of "Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (2011/65/EU)".

It is one of EU regulations and prohibits the sale of electricity, electronic goods containing lead, mercury, cadmium, hexivalent chrome or a bromine-based fire retardant (PBB and PBDE) in EU market after July 1, 2006.

3.10 REACH regulation

REACH is the abbreviation of "Registration, Evaluation, Authorization and Restriction of Chemicals (1907:2006)".

It is one of EU regulations effective as of June 1, 2007, and is the general regulation for registering, evaluating, authorizing, regulating chemical substances.

Manufacturers and importers who provide molded products in the EU market are obligated under certain conditions to evaluate and register substances and also to provide chemical substance information contained in molded articles.

The substances which are contained in molded articles and their contained information is required to be provided are called SVHC (substance of very high concern).

The list of SVHC is growing step by step.

3.11 POPs treaty

POPs treaty is “The Stockholm Convention on Persistent Organic Pollutants”.

POP is the abbreviation of “Persistent Organic Pollutants”.

Out of the bromine-based fire retardants which are the substances prohibited by RoHS directive, PBDE is considered as a candidate substance for POPs.

3.12 RoHS regulation for Turkey

Six Controlled Substances are lead, mercury, cadmium, hexivalent chrome, PBB (polybrominated biphenyls), and PBDE (polybrominated diphenylethers).

The threshold for cadmium is 100ppm, the threshold for other materials are 1,000ppm.

The thresholding for homogeneous materials are the same as European RoHS directive.

The target electric equipment is the same, but the exclusion rules (exclusion item) are slightly different.

Because Turkey is not an EU member state, it is not regulated by the RoHS directive.

4 Management standards for environment-related substances to be controlled

4.1 Environment-related substances to be controlled

The table below lists the Controlled Substances defined in this Standard.

Table 4.1 List of Controlled Substances

Controlled Substances
Cadmium and cadmium compounds
Lead and lead compounds
Mercury and mercury compounds
Hexavalent chromium compounds
Polychlorinated biphenyls (PCB), Polychlorinated naphthalenes (PCN), Polychlorinated terphenyls (PCT)
Short-chain chlorinated paraffins (SCCP)
Polyvinyl chloride (PVC) and PVC blends
Tris(2-chloroethyl) phosphate (TCEP), Tris(2-chloro-1-methylethyl) phosphate (TCPP), Tris(1,3-dichloro-2-propyl) phosphate (TDCPP)
Other chlorinated organic compounds
Polybrominated biphenyls (PBB)
Polybrominated diphenylethers (PBDE) including decabromodiphenyl ether (DecaBDE)
Hexabromocyclododecane (HBCDD)
Other brominated organic compounds
Trisubstituted organotin compounds (including tributyltin (TBT) compounds and triphenyltin (TPT) compounds)
Dibutyltin (DBT) compounds
Diocetyl tin (DOT) compounds
Asbestos
Specific azo compounds
Formaldehyde
Specific benzotriazole
Dimethyl fumarate (DMF)
Beryllium oxide
Beryllium copper
Cobalt dichloride
Diarsenic trioxide, Diarsenic pentaoxide
Bis (2-ethylhexyl)phthalate, Dibutyl phthalate, Benzyl butyl phthalate, Diisobutyl phthalate
Di-isononyl phthalate, Di-isodecyl phthalate, Di-n-octyl phthalate, Di-n-hexyl phthalate, "1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich", "1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters", Bis(2-methoxyethyl) phthalate, Diisopentylphthalate, "1,2-Benzenedicarboxylic acid, dipentylester, branched and linear", N-pentyl-isopentylphthalate Dipentyl phthalate
Hydrofluorocarbon (HFC), Perfluorocarbon (PFC), Sulfur hexafluoride (SF ₆)
Ozone depleting substances (ODS)
Perfluorooctane sulfonates (PFOS)
Boric acid, specific sodium borates
4-(1,1,3,3-tetramethylbutyl) phenol
Bis(2-methoxyethyl) ether
N,N-dimethylacetamide (DMAc)
Ethylene glycol dimethyl ether (EGDME)
Perchlorates
Perfluorooctanoic acid (PFOA) and individual salts and esters of PFOA
Polycyclic aromatic hydrocarbons (PAH)
Trixylyl phosphate (TXP)
Radioactive materials

4.2 Main "Targets" and "Effective date of the ban on the delivery" regarding 'Controlled Substances'

1) Cadmium and cadmium compounds

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- Plastics (including rubbers) Note: Insulation of wires, cables and cords are defined as plastics (including rubbers).	- 100 ppm or more of the cadmium in homogeneous materials. (*1)	Banned
	- Paints - Inks	- More than 20 ppm of the cadmium in solder.	
	- Solders	- 100 ppm or more of the cadmium in homogeneous materials.	
- All applications other than the above See 5 Additional rules for packaging components and materials.			
Exemption	- Plating of electrical contacts, for which high reliability is required and which has no alternative materials. - Optical glasses		
*1 Note	- Test objects: plastics (including rubbers), paints, and inks - Threshold level: less than 100 ppm		
Standards for measurement	<p>1) Sample preparation Typical sample preparation methods: e.g. IEC 62321:2013, EPA 3052:1996</p> <ul style="list-style-type: none"> - Closed system for acid decomposition method (e.g. microwave decomposition method) - Acid digestion method - Dry ashing method (to heat a sample around 500 degrees Celsius in the air, and to burn and become ash) <p>Note: Precipitates must be completely dissolved by some technical means (e.g. alkali fusion). Any extraction methods (including EN71-3:1994, ASTM F 963-96a, ASTM F 963-03, ASTM D 5517 and ISO 8124-3:1997) shall not be applied.</p> <p>2) Measurement methods Typical measurement methods: e.g. IEC 62321:2013</p> <ul style="list-style-type: none"> - Inductively Coupled Plasma-Optical (Atomic) Emission Spectroscopy (ICP-OES [ICP-AES]) - Atomic Absorption Spectroscopy (AAS) - Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS) <p>Note: If a combination of a sample preparation method and a measurement method can ensure that the limit of quantification for cadmium is less than 5 ppm, the combination is applicable.</p>		

2) Lead and lead compounds

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	<ul style="list-style-type: none"> - Plastics (including rubbers) Note: Insulation of wires, cables and cords are defined as plastics (including rubbers). - Paints - Inks 	<ul style="list-style-type: none"> - More than 100 ppm (or 0.01 wt%) of the lead in homogeneous materials (*2) 	Banned
	<ul style="list-style-type: none"> - All applications other than the above See 5 Additional rules for packaging components and materials. 	<ul style="list-style-type: none"> - 1000 ppm (or 0.1 wt%) or more of the lead in homogeneous materials 	
Exemption	<ul style="list-style-type: none"> - Lead in glass of fluorescent tubes not exceeding 0.2% by weight - Lead as an alloying element in steel for machining purposes and in galvanised steel containing up to 0.35% lead by weight - Lead as an alloying element in aluminium containing up to 0.4% lead by weight - Copper alloy containing up to 4% lead by weight - High melting temperature type solders (i.e. lead based alloys containing 85 wt% by weight or more lead) - Glass, glass matrix compound, ceramic or ceramic matrix compound, which is used in electrical and electronic components (e.g. piezoelectric devices) Note that dielectric ceramic in capacitors is excluded - Dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher - Lead in PZT based dielectric ceramic materials for capacitors which are part of integrated circuits or discrete semiconductors - Optical glass, filter glass - Solder to complete a viable electrical connection between semiconductor die and carrier within integrated circuit flip chip packages - Lead in cermet-based trimmer potentiometer elements 		
*2 Note	<ul style="list-style-type: none"> - Test objects: plastics (including rubbers), paints, and inks - Threshold level: Up to 100 ppm 		
Standards for measurement	<p>1) Sample preparation Typical sample preparation methods: e.g. IEC 62321:2013, EPA 3052:1996</p> <ul style="list-style-type: none"> - Closed system for acid decomposition method (e.g. microwave decomposition method) - Acid digestion method - Dry ashing method (to heat a sample around 500 degrees Celsius in the air, and to burn and become ash) <p>Note: Precipitates must be completely dissolved by some technical means (e.g. alkali fusion). Any extraction methods (including EN71-3:1994, ASTM F 963-96a, ASTM F 963-03, ASTM D 5517 and ISO 8124-3:1997) shall not be applied. Additionally, EN1122:2001 is not applicable for lead.</p> <p>2) Measurement methods Typical measurement methods: e.g. IEC 62321:2013</p> <ul style="list-style-type: none"> - Inductively Coupled Plasma-Optical (Atomic) Emission Spectroscopy (ICP-OES [ICP-AES]) - Atomic Absorption Spectroscopy (AAS) - Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS) <p>Note: If a combination of a sample preparation method and a measurement method can ensure that the limit of quantification for lead is less than 30 ppm, the combination is applicable.</p>		

3) Mercury and mercury compounds

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	<ul style="list-style-type: none"> - All applications (paint, inks etc.) - See 5 Additional rules for packaging components and materials 	<ul style="list-style-type: none"> - Intentionally added - 1000 ppm (or 0.1 wt%) or more of the mercury in the homogeneous materials 	Banned
Exemption	<ul style="list-style-type: none"> - Mercury in cold cathode fluorescent lamps (CCFL) and external electrode fluorescent lamps (EEFL): <ul style="list-style-type: none"> Short length (not over 500 mm): Not exceeding 3.5 mg of mercury per lamp Medium length (over 500 mm and not over 1500 mm): Not exceeding 5 mg of mercury per lamp Long length (over 1500 mm): Not exceeding 10 mg of mercury per lamp - Mercury in high-pressure gas discharge lamps (e.g. projector lamps) 		
*3 Note	<ul style="list-style-type: none"> - When "Intentionally added" and a numerical value are shown in "Criteria/threshold levels", both of them shall be satisfied. 		
Standards for measurement	<ul style="list-style-type: none"> - IEC 62321:2013, EPA 3052:1996 EPA Sealing up the acidolysis method (e.g. for a microwave elucidation) - The heating vaporization cold water atomic absorption method - Elucidation for the sulfuric acid using the resolution flask (the Kjeldahl method) with reflux condenser, wet process with the nitric acid in both methods Pay attention so that mercury does not evaporate In addition, if the sediment occurs, completely dissolves by some kind of methods, and become solution		

4) Hexavalent chromium compounds

Targets		Criteria/threshold levels (*4)	Effective date of the ban on the delivery
Level 1	<ul style="list-style-type: none"> - Surfaces of screws, steel sheets, etc. that are processed with plating or conversion coating (*4A). 	<ul style="list-style-type: none"> - Residue on the processed surface (*4B) 	Banned
	<ul style="list-style-type: none"> - All applications other than the above - See 5 Additional rules for packaging components and materials. 	<ul style="list-style-type: none"> - Intentionally added - 1000 ppm (or 0.1 wt%) or more of the hexavalent chromium in the homogeneous materials 	
*4 Note	<ul style="list-style-type: none"> - When "Intentionally added" and a numerical value are shown in "Criteria/threshold levels", both of them shall be satisfied. 		
*4A Note	<ul style="list-style-type: none"> - By the Raydent processing (to precipitate a lot of ceramic-formed chromic fine particles with less than about 1 μm dia by an electrochemical reaction), a hexavalent chrome compound may be produced by the unevenness of the film formation condition. - To confirm that residual density is less than a measurement limit in a pulling out examination. 		
*4B Note	<ul style="list-style-type: none"> - Residue on the processed surface is banned in Level 1. Not applicable to hexavalent chromium compounds for surface processing. 		

5) Polychlorinated biphenyls (PCB), Polychlorinated naphthalenes (PCN), Polychlorinated terphenyls (PCT)

5)-1 Polychlorinated biphenyls (PCB)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	<ul style="list-style-type: none"> - All uses (insulating oil for condensers, etc.) 	<ul style="list-style-type: none"> - Intentionally added - 50 ppm (or 0.005 wt%) or more of the materials 	Banned

5)-2 Polychlorinated naphthalenes (PCN)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	<ul style="list-style-type: none"> - All uses (cable insulations, etc.) 	<ul style="list-style-type: none"> - Intentionally added 	Banned

5)-3 Polychlorinated terphenyls (PCT)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	<ul style="list-style-type: none"> - All uses (insulating oil, etc.) 	<ul style="list-style-type: none"> - 50 ppm (or 0.005 wt%) or more of the materials 	Banned

6) Short-chain chlorinated paraffins (SCCP) (*6)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- All uses (flame retardants, etc.)	- Intentionally added - More than 1000 ppm (or 0.1 wt%) of the materials	Banned
*6 Note	- Short-chain chlorinated paraffins with carbon chain length;10-13 - When "Intentionally added" and a numerical value are shown in "Criteria/threshold levels", both of them shall be satisfied.		

7) Polyvinyl chloride (PVC) and PVC blends

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- Cable ties used for accessories and connecting cords - Packaging components and materials to protect, contain, or transport products or supplied accessories (e.g. bags, adhesive tapes, cartons, and blister packs) - Heat shrink tubes - Flexible flat cables (FFC) - Insulating plates, decorative panels, labels, sheets, and laminates	- Intentionally added	Banned
Level 3	- All applications other than Level 1	- Intentionally added	N/A
Exception	- Magnetic paints - Binder for resins used for paints, inks, coating agents, adhesives etc. - Dustlip for scale system		

8) Tris(2-chloroethyl) phosphate (TCEP), Tris(2-chloro-1-methylethyl) phosphate (TCPP), Tris(1,3-dichloro-2-propyl) phosphate (TDCPP) (*8)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- Flame retardants used in plastics, resins, fabrics, and textiles	- More than 1000 ppm (or 0.1 wt%) of the parts	Banned
*8 Note	- CAS No.115-96-8, 13674-84-5, 13674-87-8		

9) Other chlorinated organic compounds

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 3	- Flame retardants used for printed wiring board laminate	- More than 900 ppm (0.09 wt%) chlorine content by weight in the laminate	N/A
	- Flame retardants or plasticizers contained in plastic parts other than the above	- Intentionally added	

10) Polybrominated biphenyls (PBB) (*10)

Targets		Criteria/threshold levels (*10)	Effective date of the ban on the delivery
Level 1	- All uses (flame retardants, etc.)	- Intentionally added - 1000 ppm (or 0.1 wt%) or more in the homogeneous materials	Banned
*10 Note	- When "Intentionally added" and a numerical value are shown in "Criteria/threshold levels", both of them shall be satisfied.		

11) Polybrominated diphenylethers (PBDE) including decabromodiphenyl ether (DecaBDE) (*11)

Targets		Criteria/threshold levels (*11)	Effective date of the ban on the delivery
Level 1	- All uses (flame retardants, etc.)	- Intentionally added - 1000 ppm (or 0.1 wt%) or more in the homogeneous materials	Banned
*11 Note	- When "Intentionally added" and a numerical value are shown in "Criteria/threshold levels", both of them shall be satisfied.		

12) Hexabromocyclododecane (HBCDD) (*12)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- All uses (flame retardants, etc.)	- Intentionally added - More than 1000 ppm (or 0.1 wt%) in the parts	Banned
*12 Note	The target substances are following 14 materials. The chemical formulas are C ₁₂ H ₁₈ Br ₆ . - CAS No. 25637-99-4, 3194-55-6, 134237-50-6, 134237-51-7, 134237-52-8, 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 - When "Intentionally added" and a numerical value are shown in "Criteria/threshold levels", both of them shall be satisfied.		

13) Other brominated organic compounds

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 3	- Flame retardants used for printed wiring board laminate	- More than 900 ppm (0.09%) bromine content by weight in the laminate	N/A
	- Flame retardants or plasticizers contained in plastic parts other than the above	- Intentionally added	

14) Trisubstituted organotin compounds (including tributyltin (TBT) compounds and triphenyltin (TPT) compounds) (*14)

Targets		Criteria/threshold levels (*14A)	Effective date of the ban on the delivery
Level 1	- All uses (paints, etc.)	- Intentionally added - More than 1000 ppm (or 0.1 wt%) of the tin contained in materials (*14B)	Banned
*14 Note	- Metal tin, tin alloys, tin plating and tin inorganic compounds do not fall under this category.		
*14A Note	- When "Intentionally added" and a numerical value are shown in "Criteria/threshold levels", both of them shall be satisfied.		
*14B Note	- For materials, it is containment more than 1,000 ppm by tin conversion.		

15) Dibutyltin (DBT) compounds (*15)

Targets		Criteria/threshold levels (*15A)	Effective date of the ban on the delivery
Level 1	- All applications including additives of plastics	- More than 1000 ppm (or wt%) of the tin contained in materials	Banned
Exception	- 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)		
*15 Note	- Metal tin, tin alloys, tin plating and tin inorganic compounds do not fall under this category. - Two butyls are a tin atom and the compounds which covalently linked.		
*15A Note	- For materials, it is containment more than 1,000 ppm by tin conversion.		

16) Dioctyltin (DOT) compounds (*16)

Targets		Criteria/threshold levels (*16A)	Effective date of the ban on the delivery
Level 1	- Additives of textiles	- More than 1000 ppm (or 0.1 wt%) of the tin contained in materials	Banned
*16 Note	- Metal tin, tin alloys, tin plating and tin inorganic compounds do not fall under this category.		
*16A Note	- For materials, it is containment more than 1,000 ppm by tin conversion.		

17) Asbestos

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- All uses (insulators, heat shield material, etc.)	- Intentionally added	Banned

18) Specific azo compounds (*18)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- Additives of textiles and leathers	- More than 30 ppm (or 0.003 wt%) in materials	Banned
*18 Note	- Azodyes that form any of the amine compounds listed in Table 4.2.2 through the decomposition methods cited in REACH Regulation (EC) No. 1907/2006 / Annex XVII and amine compounds in Table 4.2.2.		
Standards for measurement	- The methods for decomposing azo compounds and then extracting amines are as follows. - EN 14362-1:2012 - EN 14362-2:2012		

Table 4.2.1 List of specific amine compounds

CAS No.	Name and Chemical formula of amine compounds
92-67-1	4-aminodiphenyl Chemical formula: C ₁₂ H ₁₁ N
92-87-5	Benzidine Chemical formula: C ₁₂ H ₁₂ N ₂
95-69-2	4-chloro-o-toluidine; 4-chloro-2-methylaniline Chemical formula: C ₇ H ₈ ClN
91-59-8	2-naphthylamine Chemical formula: C ₁₀ H ₉ N
97-56-3	o-aminoazotoluene Chemical formula: C ₁₄ H ₁₅ N ₃
99-55-8	2-amino-4-nitrotoluene; 5-nitro-o-toluidine Chemical formula: C ₇ H ₈ N ₂ O ₂
106-47-8	p-chloroaniline Chemical formula: C ₆ H ₆ ClN
615-05-4	2,4-diaminoanisole Chemical formula: C ₇ H ₁₀ N ₂ O
101-77-9	4,4'-diaminodiphenylmethane; 4,4'-methylenedianiline Chemical formula: C ₁₃ H ₁₄ N ₂
91-94-1	3,3'-dichlorobenzidine Chemical formula: C ₁₂ H ₁₀ Cl ₂ N ₂
119-90-4	3,3'-dimethoxybenzidine Chemical formula: C ₁₄ H ₁₆ N ₂ O ₂
119-93-7	3,3'-dimethylbenzidine Chemical formula: C ₁₄ H ₁₆ N ₂
838-88-0	3,3'-dimethyl-4,4'-diaminodiphenylmethane; 4,4'-diamino-3,3'-diphenylmethane Chemical formula: C ₁₅ H ₁₈ N ₂
120-71-8	p-cresidine; 6-methoxy-m-toluidine Chemical formula: C ₈ H ₁₁ NO
101-14-4	4,4'-methylene-bis-(2-chloroanilene) Chemical formula: C ₁₃ H ₁₂ Cl ₂ N
101-80-4	4,4'-oxideaniline Chemical formula: C ₁₂ H ₁₂ N ₂ O
139-65-1	4,4'-thiodianiline; 4,4'-diaminodiphenylsulfide Chemical formula: C ₁₂ H ₁₂ N ₂ S
95-53-4	o-toluidine Chemical formula: C ₇ H ₉ N
95-80-7	2,4-toluylenediamine; 4-methyl-m-phenylenediamine Chemical formula: C ₇ H ₁₀ N ₂
137-17-7	2,4,5-trimethylaniline Chemical formula: C ₉ H ₁₃ N
90-04-0	o-anisidine Chemical formula: C ₇ H ₉ NO
60-09-3	4-aminoazobenzene Chemical formula: C ₁₂ H ₁₁ N ₃

19) Formaldehyde

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- The wooden products made from fiberboard, particleboard, or plywood, which are employed in products.	- The details are as follows.	Banned
Threshold level	- Obtain the value by any one of the following methods. 1) With a chamber method(EN 717-1:2004) 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(EN 120:1992) - 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 desiccator method(JIS A 5905 Fiberboards, JIS A 5908 Particleboards) - 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.)		

20) Specific benzotriazole (*20)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- All uses (ultraviolet absorbers, etc.)	- Intentionally added	Banned
*20 Note	- The target substance is 2-(3',5'-Di-tert-butyl-2'-hydroxyphenyl)benzotriazole (CAS No.3846-71-7).		

21) Dimethyl fumarate (DMF) (*21)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- All uses (moisture indicator used for a desiccant agent (e.g. silica gel), etc)	- More than 0.1 ppm of the materials	Banned
*21 Note	- The target substance is CAS No. 624-49-7 and Chemical formula C ₆ H ₈ O ₄ . - Other usage: Materials such as adhesive, molding materials, ink, varnish, a wire rod, ferrite core, the capacitor.		

22) Beryllium oxide (*22)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- All uses (heat sinks, etc.)	- Intentionally added	Banned
*22 Note	- Oxide of beryllium expressed in chemical formula BeO.		

23) Beryllium copper (*23)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 3	- All uses (Springs, etc.)	- Intentionally added	N/A
Exception	- Use as the material for laminating the magnetic head (because a replacement does not exist)		
*23 Note	- The beryllium copper expressed in chemical formula BeCu is the alloy which added 0.5-3 % of beryllium to copper, and yet another metal may be added.		

24) Cobalt dichloride

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- Moisture indicator used for a desiccant agent (e.g. silica gel) - Humidity indicator card which is impregnated with cobalt dichloride	- Intentionally added	Banned

25) Diarsenic trioxide, Diarsenic pentaoxide (*25)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- Antifoam agents or fining agents for LCD panels (including cover glasses, touchscreens, and backlights)	- More than 1000 ppm (or 0.1 wt%) of the parts	Banned
*25 Note	- The target substances are following two materials. - Diarsenic trioxide is highly-virulent with oxide (CAS No.1327-53-3) of arsenic expressed in chemical formula As_2O_3 . - Diarsenic pentaoxide is highly-virulent with oxide (CAS No.1327-53-3) of arsenic expressed in chemical formula As_2O_5 . - A threshold level is applied each material.		

26) Bis (2-ethylhexyl) phthalate, Dibutyl phthalate, Benzyl butyl phthalate, Diisobutyl phthalate (*26)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- Parts and materials for non-electrical and electronic equipment (e.g. carrying bags, carrying cases, carrying pouches, plastic bag, shrink film) - Parts and materials that are in a constant contact with human body e.g. grip, handle	- More than 1000 ppm (or 0.1 wt%) of the materials	Banned
Level 2	- Parts and materials for electrical and electronic equipment - All packaging components and materials - All applications other than the above	- More than 1000 ppm (or 0.1 wt%) of the materials	N/A
*26 Note	- The target substances are following 4 materials. For details, refer to table 4.2.2. - Bis(2-ethylhexyl) phthalate, Di (2-ethylhexyl) phthalate (CAS No. 117-81-7) - Dibutyl phthalate, Di-n-butyl phthalate (CAS No. 84-74-2) - Benzyl butyl phthalate, Butyl benzyl phthalate (CAS No. 85-68-7) - Diisobutyl phthalate, Di-i-butyl phthalate (CAS No. 84-69-5) - A threshold level is applied every material.		

27) Di-isononyl phthalate, Di-isodecyl phthalate, Di-n-octyl phthalate, Di-n-hexyl phthalate, "1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich", "1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters", Bis(2-methoxyethyl) phthalate, Diisopentylphthalate, "1,2-Benzenedicarboxylic acid, dipentylester, branched and linear", N-pentyl-isopentylphthalate, Dipentyl phthalate (*27)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 3	- All uses (plasticizer of plastics)	- More than 1000 ppm (or 0.1 wt%) of the parts	N/A
*27 Note	- The target substances are following 11 materials. For details, refer to table 4.2.2. - Di-isononyl phthalate (CAS No. 28553-12-0, 68515-48-0) - Di-isodecyl phthalate (CAS No. 26761-40-0, 68515-49-1) - Di-n-octyl phthalate (CAS No. 117-84-0) - Di-n-hexyl phthalate (CAS No. 84-75-3) - 1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (CAS No. 71888-89-6) - 1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (CAS No. 68515-42-4) - Bis(2-methoxyethyl) phthalate (CAS No. 117-82-8) - Diisopentylphthalate - "1,2-Benzenedicarboxylic acid, dipentylester, branched and linear" - N-pentyl-isopentylphthalate - Dipentyl phthalate - A threshold levels are applied every material.		

Table 4.2.2 List of specific phthalates (phthalic esters)

Abbreviation	CAS No.	Name / Chemical formula / Use
DEHP	117-81-7	Bis (2-ethylhexyl)phthalate; Di (2-ethylhexyl) phthalate Chemical formula: $C_{24}H_{38}O_4$ Usage examples: Plasticizer of the emulsion system adhesive, diluent of the epoxy resin-based adhesive
DBP	84-74-2	Dibutyl phthalate; Di-n-butyl phthalate Chemical formula: $C_{16}H_{22}O_4$ Usage examples: Plasticizer of the emulsion system adhesive, diluent of the epoxy resin-based adhesive
BBP	85-68-7	Benzyl butyl phthalate; Butyl benzyl phthalate Chemical formula: $C_{19}H_{20}O_4$ Usage examples: Plasticizer
DIBP	84-69-5	Diisobutyl phthalate; Di-i-butyl phthalate Chemical formula: $C_{16}H_{22}O_4$ Usage examples: Plasticizer
DINP	28553-12-0 68515-48-0	Di-isononyl phthalate; Diisononyl phthalate Chemical formula: $C_{26}H_{42}O_4$ Usage examples: General-purpose plasticizer, electric wire coating, wall paper
DIDP	26761-40-0 68515-49-1	Di-isodecyl phthalate; Diisodecyl phthalate Chemical formula: $C_{28}H_{46}O_4$ Usage examples: Insulating improved additive, electric wire coating
DNOP	117-84-0	Di-n-octyl phthalate Chemical formula: $C_{24}H_{38}O_4$ Usage examples: General-purpose plasticizer, electric wire coating, film, blood bag
DNHP	84-75-3	Di-n-hexyl phthalate Chemical formula: $C_{20}H_{30}O_4$ Usage examples: Plasticizer for polyvinyl chloride
DIHP	71888-89-6	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich Chemical formula: $C_{22}H_{34}O_4$ Usage examples: Hardening agent of the epoxy resin-based adhesive
DHNUP	68515-42-4	1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters Chemical formula: $C_{20}H_{30}O_4$ Usage examples: Plasticizer for the insulators of telecommunications apparatus used at the time of plastics manufacturing.
DMEP	117-82-8	Bis(2-methoxyethyl) phthalate Chemical formula: $C_{14}H_{18}O_6$ Usage examples: The plasticizer which improves the durability of the polyurethane resin
DIPP	605-50-5	Diisopentylphthalate Chemical formula: $C_{18}H_{26}O_4$ Usage examples: Plasticizer
-	84777-06-0	1,2-Benzenedicarboxylic acid, dipentylester, branched and linear Chemical formula: $C_{18}H_{26}O_4$ Usage examples: Plasticizer
-	776297-69-9	N-pentyl-isopentylphthalate Chemical formula: $C_{18}H_{26}O_4$ Usage examples: Plasticizer
DPP	131-18-0	Dipentyl phthalate Chemical formula: $C_{18}H_{26}O_4$ Usage examples: Plasticizer

28) Hydrofluorocarbon (HFC), Perfluorocarbon (PFC), Sulfur hexafluoride (SF₆)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- Uses installed into product (e.g. refrigerant and insulation)	- Intentionally added	Banned

29) Ozone depleting substances (ODS) (*29)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- Uses installed into product (e.g. refrigerant and insulation)	- Intentionally added	Banned
	- All uses (cleaning agents, etc.)	- Treatments such as cleaning and foaming	
*29 Note	List of ozone depleting substances (ODS)		
	CAS No.	Name	
	75-69-4	CFC-11; trichlorofluoromethane	
	75-71-8	CFC-12; dichlorofluoromethane	
	76-13-1	CFC-113; trichlorofluoroethane	
	76-14-2	CFC-114; dichlorotetrafluoroethane	
	76-15-3	CFC-115; chloropentafluoroethane	
	353-59-3	Halon-1211; bromochlorodifluoromethane	
	75-63-8	Halon-1301; bromotrifluoromethane	
	124-73-2	Halon-2402; dibromotetrafluoroethane	
	76-72-9	CFC-13; chlorotrifluoromethane	
	354-56-3	CFC-111; pentachlorofluoroethane	
	76-12-0	CFC-112; tetrachlorodifluoroethane	
	422-78-6	CFC-211; heptachlorofluoropropane	
	3182-26-1	CFC-212; hexachlorodifluoropropane	
	2354-06-5	CFC-213; pentachlorotrifluoropropane	
	29255-31-0	CFC-214; tetrachlorotetrafluoropropane	
	4259-43-2	CFC-215; trichloropentafluoropropane	
	661-97-2	CFC-216; dichlorohexafluoropropane	
	422-86-6	CFC-217; chloroheptafluoropropane	
	56-23-58	Carbon tetrachloride; tetrachloromethane	
	71-55-6	1,1,1-Trichloroethane; methyl chloroform	

30) Perfluorooctane sulfonates (PFOS)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- All uses (water repellent agents, etc)	- Intentionally added	Banned
Exception	- Resists for semiconductors		

31) Boric acid, specific sodium borates (*31)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 3	- All uses (flame retardants, etc.)	- More than 1000 ppm (or 0.1 wt%) of the parts	N/A
*31 Note	List of boric acids and specified sodium borates		
	CAS No.	Name and other information	
	10043-35-3	Boric acid Chemical formula: BH ₃ O ₃ Use: Borate glass, fiberglass, boron-based compound metal	
	11113-50-1	Boric acid Chemical formula: BH ₃ O ₃	
	12179-04-3	Disodium tetraborate, anhydrous; Tetraboron disodium heptaoxide pentahydrate	
	1330-43-4	Disodium tetraborate, anhydrous; Tetraboron disodium heptaoxide	
	1303-96-4	Disodium tetraborate, anhydrous; Disodium tetraborate decahydrate; Borax	
	12267-73-1	Tetraboron disodium heptaoxide, hydrate	

32) 4-(1,1,3,3-tetramethylbutyl) phenol (*32)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 3	- All uses (surfactant, etc.)	- More than 1000 ppm (or 0.1 wt%) of the parts	N/A
*32 Note	- The target substance is following material. CAS No. 140-66-9 Chemical formula: C ₁₄ H ₂₂ O Synonym: 4-tert-Octylphenol		

33) Bis(2-methoxyethyl) ether (*33)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 3	- All uses (solvent for dissolving electrolyte of battery, etc.)	- More than 1000 ppm (or 0.1 wt%) of the parts	N/A
*33 Note	- The target substance is following material. CAS No. 111-96-6 Chemical formula: C ₆ H ₁₄ O ₃ Synonym: Diethylene glycol dimethyl ether; Diglyme		

34) N,N-dimethylacetamide (DMAc) (*34)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 3	- All uses (cleaning agents, etc.)	- More than 1000 ppm (or 0.1 wt%) of the parts	N/A
*34 Note	- The target substance is following material. CAS No. 127-19-5 Chemical formula: C ₄ H ₉ NO Synonym: DMA, DMAC - Use: As a polar solvent of the high boiling point, it is used in organic synthetic chemistry widely.		

35) Ethylene glycol dimethyl ether (EGDME) (*35)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 3	- All uses (solvent for dissolving electrolyte of lithium battery, etc.)	- More than 1000 ppm (or 0.1 wt%) of the parts	N/A
*35 Note	- The target substance is following material. CAS No. 110-71-4 Synonym: 1,2-dimethoxyethane		

36) Perchlorates

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 3	- All uses (oxidizers for matches, etc.)	- 6 ppb (or 0.006 ppm) or more of the parts	N/A

37) Perfluorooctanoic acid (PFOA) and individual salts and esters of PFOA (*37)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- Coatings applied to textiles, leathers and fabrics	- More than 1 µg/m ² of the coated material	Banned
	- All applications other than above and Level 2	- More than 1000 ppm (or 0.1 wt%) of the parts	Banned
	- Photographic coatings applied to films, papers, or printing plates	- More than 1 µg/m ² of the coated material	Banned
	- Additives for adhesives, foil or tape in semiconductor	- More than 1000 ppm (or 0.1 wt%) of the parts	Banned
*37 Note	- 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		

38) Polycyclic aromatic hydrocarbons (PAH) (*38)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- 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	- More than 1 ppm (or 0.0001 wt%) of the material	Banned
*38 Note	- CAS No. 50-32-8, 192-97-2, 56-55-3, 218-01-9, 205-99-2, 205-82-3, 207-08-9, 53-70-3		

39) Trixylyl phosphate (TXP) (*39)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 3	- All uses (additives for resins, etc.)	- More than 1000 ppm (or 0.1 wt%) of the parts	N/A
*39 Note	- CAS No. 25155-23-1		

40) Radioactive materials (*40)

Targets		Criteria/threshold levels	Effective date of the ban on the delivery
Level 1	- All uses	- Intentionally added	Banned
*40 Note	- The example of the target substances CAS No. 7440-46-2, Cesium (Cs)		

5 Additional rules for packaging components and materials**5.1 Definition of "packaging components and materials"**

Packaging components and materials are defined as products made from any materials and components of any nature to be used for the containment, protection, handling, delivery and presentation of goods, from raw materials to processed goods from the manufacturer to the customer.

However, the definition excludes the components and materials for the returnable boxes, which are reused or recycled under the control of carriers or parts suppliers, and are not disposed of by end-users or Magnescale Co., Ltd.

5.2 Additional rules for packaging components and materials

Heavy metals (cadmium, lead, mercury, and hexavalent chromium)

Targets	Criteria/threshold levels (*A)	Effective date of the ban on the delivery
Level 1	<ul style="list-style-type: none"> - All packaging components and materials Some examples are given in PACKAGING of Table 5.2.1 	<ul style="list-style-type: none"> - 100 ppm(or 0.1 wt%) or more of the total-concentration of four heavy metals (cadmium, lead, mercury, and hexavalent chromium) contained in each part, ink, or paint that constitutes a package.
Exception	<ul style="list-style-type: none"> - Cartons for returnable boxes owned by carriers or parts suppliers 	
*A Note	<p>1) For hexavalent chromium:</p> <ul style="list-style-type: none"> - First analyze total chromium content and verify that the total concentration of cadmium, lead, mercury and total chromium is less than 100 ppm. When analyzing, the same sample preparation methods as those used for cadmium and lead are applicable. - If this total concentration is more than 100 ppm, verify that the sum of the cadmium, lead and mercury concentration is less than the 100 ppm limit. When the sum of the cadmium, lead and mercury concentration is less than the 100 ppm limit, analyze and confirm that no hexavalent chromium is present, using the standard methods for detecting hexavalent chromium provided in this clause. <p>2) Standard methods for detecting hexavalent chromium: Note: Standard methods specified hereafter are applicable when total concentration of the four elements of cadmium, lead, mercury, and total chromium in packaging components and materials is 100 ppm or more.</p> <p>Detection methods:</p> <p>1) Sample preparation</p> <ul style="list-style-type: none"> - Extraction methods such as boiling water extraction and alkaline extraction (e.g. IEC 62321:2008 Annex C, EPA 3060A) <p>2) Measurement method</p> <ul style="list-style-type: none"> - Ultraviolet-Visible (UV/VIS) Spectroscopy (e.g. IEC 62321:2008 Annex C, EPA 7196A) - If a combination of a sample preparation method and a measurement method can ensure the following limits of quantification, the combination is also available. - Less than 5 ppm for mercury - Less than 5 ppm for cadmium - Less than 5 ppm for the total chromium - Less than 30 ppm for lead 	
Standards for measurement	<p>1) Sample preparation</p> <ul style="list-style-type: none"> - For cadmium and lead, follow the methods respectively specified in Clause 4.2 1), 2). - For total chromium, follow the methods specified in Clause 4.2 1). - For mercury, follow the methods specified in Clause 4.2 3) <p>2) Measurement methods Regarding the measurement of cadmium, lead, and total-chromium concentrations, follow the methods specified in Clause 4.2 1), 2). Regarding the measurement of mercury concentrations, follow the method specified in Clause 4.2 3). When the mercury concentration is predicted to be low, you are advised to use one of the following methods:</p> <ul style="list-style-type: none"> - A reduction-evaporation atom-absorption method - ICP-OES (ICP-AES) method with a hydride-generation apparatus - ICP-MS method with a hydride-generation apparatus 	

Table 5.2.1 Illustrative examples of packing components/materials

Note: These does not cover all packing parts, materials here.

No	Name	Description
1.	Carton	Including master carton and sub-master carton made from any materials.
2.	Cusion	
3.	Protection bag, protection sheet	Such as made from foamed plastic or nonwoven fabric
4.	Plastic bag	
5.	Gas barrier envelop	
6.	Envelop	Such as used for warranty card
7.	Film	Including protection films such as used for the LCD displays
8.	Separator, spacer, partition	
9.	Printing ink	Used for packaging components
10.	Adhesive tape	Such as used for closing carton or poly bag, or, fixing or protection for removable component
11.	Label	Attached to the packaging components under control of Magnescale Co., Ltd., such as bar-code label
12.	Crate	Such as wooden frame
13.	Shrink film	
14.	Jewel box	Such as packaging for accesory for the Gauging probe
15.	Magazine stick	Such as used for IC
16.	Stopper	
17.	Tray	Such as used for IC
18.	Reel	Such as used for resistors and/or capacitors
19.	Pallet	Made from wood, plastic, paper, etc. which is used in one-way transportation, including slip sheet.
20.	Wooden box	
21.	Stretch film	Wrap around palletized unit
22.	Wooden container	
23.	Items used for over packaging	Such as carton, cushion, adhesive tape, etc. which is used for component delivery
24.	Band, string	Such as PP band

6 Revisions

Edition	Released date	Remarks
1	18 January, 2010	Japanese edition 1
2	15 March, 2010	Japanese edition 2
3	1 August, 2010	Janapese / English edition 3
4	1 June, 2012	Janapese / English edition 4
5	13 January, 2014	English edition 5
6	27 February, 2015	English edition 6
7	24 March, 2015	English edition 7
8	12 September, 2017	English edition 8
9	28 February, 2018	English edition 9 < Latest edition >