Engineering Specification

Lenovo Engineering Specification 41A7731

Baseline Environmental Requirements for Lenovo Products, Materials, and Parts

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1.1 Objectives
This Lenovo Engineering Specification establishes baseline environmental requirements for all *Materials, Parts and Products that comprise a Lenovo hardware Product for which this specification is referenced in a Statement of Work, print, contract or other procurement documents. This specification implements Lenovo's environmental policy objectives and contains some, but not all, environmental legal requirements for Materials, Parts and Products.

Compliance with the requirements in this specification alone may not satisfy the Supplier's responsibilities to Lenovo since this specification does not encompass all environmental legal requirements in various countries around the world for Materials, Parts and Products. This specification also contains some restrictions on Materials and on certain chemicals used in manufacturing. It also requires suppliers to disclose information about the content of certain substances in their products. This specification also includes requirements for batteries, marking of plastic parts, and other product labeling requirements.

It is important to note that in addition to this specification, Lenovo also maintains environmental and/or related requirements in other specifications, contracts or procurement documents

1.2 Definitions
Article - an object which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition. This definition is from EU Regulation 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

Battery or accumulator: 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 cells (rechargeable). This definition is from the EU Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators.

Deliverable(s): any tangible item(s) delivered by or for a Supplier to Lenovo in accordance with a purchase contract or other agreement with Lenovo. Deliverables include, but are not limited to, components, materials, parts, and products.

EPEAT: Electronic Products Environmental Assessment Tool (EPEAT). EPEAT is a procurement tool designed to help purchasers evaluate, compare and select desktop computers, laptops and monitors based upon their environmental attributes as specified in the IEEE Standard for the Assessment of Personal Computer Products (1680). Refer to: www.epeat.net

Intentionally Added or Intentional Addition shall mean that a substance is deliberately utilized in the production of a Material or Part.

Materials are chemical substances and preparations that are supplied for the production of Parts and Products (for example structural plastics, metals, coatings, paints, adhesives) and chemical substances or preparations that are shipped with Products, such as toner, cleaners, lubricants, oils, and refrigerants.

Not Detected - Below the detection limit of established test standards or appropriate industry wide test methods. In general, these test standards/ methods should achieve trace level detection or at the lowest detection capabilities of the specific sample matrix.

Homogenous Material is a unit that cannot be mechanically disjointed into different materials. The term "Homogenous" means having uniform composition throughout. Examples of homogenous materials are individual types of plastics, ceramics, glass, metals, alloys, resins, and coatings. Mechanically disjointed means that the materials can, in principle, be separated by mechanical actions such as unscrewing, cutting, crushing, grinding, and abrasive processes.

Parts include fabricated Materials, components, devices and assemblies.

Preparation: a mixture or solution composed of two or more substances, for example paint, lubricant or ink. This definition is found in the EU Council Directive relating to restrictions on the marketing and use of certain dangerous substances and preparations and EU Regulation 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

Products are stand alone, final assemblies that Lenovo markets under its own brand including complete machines supplied by an original equipment manufacturer (OEM) to Lenovo for sale under a Lenovo brand.

RoHS - an acronym for the European Union Directive 2002/95/EC on the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment and subsequent amendments to this Directive.

RoHS substances: substances restricted by European Union Directive 2002/95/EC, "Restriction on the Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment" Refer to Lenovo RoHS Engineering Specification 41A7733.

REACH: an acronym for the European Commission Regulation Number 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of CHemicals.

Substance: a chemical element and its compounds in the natural state or obtained by any manufacturing process, including any additive necessary to preserve its stability and any impurity deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition. This definition is

found in the EU Council Directive relating to restrictions on the marketing and use of certain dangerous substances and preparations and EU Regulation 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). Substance includes such examples as ethanol and metals. Note: metals are included here not in the form of a part or product such as a heat sink or sheet metal cover but as a metal such as aluminum or aluminum alloy. Substance goes beyond a pure chemical compound defined by a single molecular structure. The definition of the substance includes different constituents such as impurities. Also note the word "substance" is used throughout this specification, only the "Substance" with a capital letter refers to this specific definition.

Substance(s) of Very High Concern (SVHC)
1. Substances meeting the criteria for classification in accordance with EU Directive 67/548/EEC:
Carcinogenic category 1 or 2
Mutagenic category 1 or 2
Toxic for reproduction category 1 or 2;
2. Substances which are persistent, bioaccumulative and toxic (PBT) or very persistent and very bioaccumulative (vPvB) in accordance with the criteria set out in Annex XIII of the EU REACH Regulation;
3. Substances- such as those having endocrine disrupting properties or those having PBT properties or vPvB properties which do not fulfill the criteria of 2 above - for which there is scientific evidence of probable serious effects to human health or the environment which give rise to an equivalent level of concern to those of other substances listed in 1 or 2 and which are identified on a case-by-case basis in accordance with the procedure set out in Article 59 of REACH. This definition is from the EU REACH Regulation, Article 57.

WEEE - an acronym for the European Union Directive 2002/96/EC of the European Parliament and of the Council on Waste Electrical and Electronic Equipment.

Threshold Level: concentration level or limit (equal to or) above which the presence of a substance or material in a product or subpart must be declared. Threshold levels are provided in ppm (and mass %). The general conversion used is 1000 ppm = 0.1% by weight.

1.3 Application

This specification applies to all Materials, Parts, and Products supplied for Lenovo brand hardware Products that reference this specification. All suppliers must comply with **Sections 2.1 through 2.2 and 3.0** of this specification and their corresponding tables. In addition suppliers of Parts or Products containing molded thermoplastics must comply with **Section 2.3**. Suppliers of Parts and Products containing batteries must comply with **Section 2.4**. Suppliers of Parts and Products having decorative metal finishes must comply with section 2.5. Suppliers of Parts and Products containing mercury must comply with **Section 2.6**. Suppliers of chemicals must comply with **Section 2.7.** Suppliers of Products and operating chemicals (e.g., toner) must comply with **Section 2.8**. Products defined by the European Union as electrical and electronic equipment (EEE) for the Directive on

Waste Electrical and Electronic Equipment (2002/96/EC) must comply with **Section 2.9.** Suppliers are responsible for compliance with this specification in their own operations, in their subcontracted operations, and in the Materials they procure for the manufacture of components, Parts, assemblies, and Products for Lenovo hardware.

Compliance with the requirements in this specification alone may not satisfy the supplier's responsibilities to Lenovo since this specification does not necessarily encompass all applicable environmental requirements for Materials, Parts and Products.

In the event of conflict between this specification and any Lenovo part drawing requirement, suppliers shall immediately notify their Lenovo procurement representative. **Any deviation from the requirements of this specification must have prior written approval by Lenovo's procurement representative.**

1.4 Document Administration

This document is maintained and controlled by Lenovo Global Environmental Affairs. Technical questions regarding the requirements in this specification may be referred through Lenovo procurement to:

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1.5 List of Documents Referenced in This specification

1.5.1 External Documents

- **Joint Industry Guide (JIG)101 A**
- **European Union Directive 2002/96/EC on waste electrical and electronic equipment (WEEE)**
- **European Union Directive 2002/95/EC on the restriction of the use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)**
- **EU Regulation 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).**
- **EU Commission Regulation No 1275/2008**
- **National Standard of the People's Republic of China GB 21520-2008**
- **Korean e-Standby Program Application Regulation**

1.5.2 Lenovo Documents

Lenovo Information for Suppliers can be found at:
http://www.lenovo.com/global_procurement/us/en/Guidelines/Restrictions_and_Packaging.html

Product Content Restrictions and Packaging Requirements

- Environmental Product Content Restrictions
  - Baseline Environmental Requirements for Materials, Parts and Products, 41A7731
  - RoHS Engineering Specification, 41A7733
  - Supplier Material Declaration
  - Lenovo Supplier Declaration Users Guide
  - REACH: SVHC Disclosure

- Packaging Requirements
  - Wooden Packaging - Material Selection, Treatment, and Marking Requirements, 41A0609
  - Expanded Packaging Materials - Prohibited Expansion Agents, 41A0610
  - Packaging Materials, Environmental Requirements, 41A0612
  - Recyclable Packaging Materials - Selection and Identification, 41A0613

Lenovo requires Suppliers to provide Declarations confirming that materials, parts and products meet the requirements of Lenovo's Restricted Materials Specifications. At Lenovo's request, the supplier may be asked to provide additional technical documentation or test results supporting the declaration.

- Supplier Material Declaration
- Lenovo Supplier Declaration Users Guide

2.0 Requirements

2.1 Restricted Substances

2.1.1 Lenovo Restrictions

Table 1, "Restricted Substances," lists restrictions for categories of substances which are restricted for use in Materials, Parts, and Products for Lenovo hardware. The scope of restrictions varies by substance category. Relatively few categories have general bans; most restrictions pertain to limited applications for the substance categories. Details of the restrictions for each category are provided in **Table 1** along with some applicable regulatory references. These references are not intended to be a complete list, but rather examples of the regulations driving these restrictions. Restrictions on chemicals used in manufacturing of Lenovo hardware Products may also be included as specified in the table or notes. Expanded listings of relevant substances in each of the categories are available in the Annexes for this specification referenced in **Table 1**.

Table 1. Restricted Substances		
Chemical Substance Category	**Details of Restriction**	**Regulatory/ Industry References**
Arsenic and compounds (Annex S)	Prohibited in wood products and paints. Applications other than for wood or paint are reportable on the Supplier Material Declaration.	1I, 2
Asbestos (Annex A)	Prohibited Must not be used. Report any content.	1A, 2, 3 JIG Level A
Azo colorants (Annex B)	Azodyes which may release one or more aromatic amines (listed in 1B, 1J, 2 Annex B (1)) are prohibited above 30 ppm in textile and leather articles which may come into direct and prolonged contact with human skin. Azodyes (listed in Annex B (2)) are prohibited in concentrations above 0.1% by weight in colorants for textile and leather articles (e.g., fabrics for headphones and wrist straps).	1B, 1J, 2 JIG Level A
Benzidine, CAS No 92-87-5, and its salts	Prohibited	1, 2, 12, 15
Benzo[a]pyrene (CAS No 50-32-8)	Prohibited in wood based materials in excess of 0.5 milligrams per kilogram of dry matter.	2
Brominated Flame Retardants: • Polybrominated biphenyl (PBBs) • Polybrominated diphenyl ether (PBDEs) including Decabromobiphenyl Ether (DecaBDE)	Prohibited RoHS Substances: no exemptions Any content must be reported	1D, 14 JIG Level A
Cadmium/Cadmium Compounds Annex L)	100 ppm or Intentionally Added in homogenous material RoHS Substance: allowance made for RoHS exemptions EPEAT Products: 50 ppm in homogenous material For restrictions in battery applications see Table 5	Annex L 1G, 2, 12, 28 JIG Level A California Health and Safety Code sections 25214.9-25214.10.2 EPEAT 4.1.2.1 (IEEE STD 1680-2006)
Creosote, coal tar, tar oils and anthracene substances (see Annex FF for list)	Prohibited for the treatment of wood.	1S, 2
Decabromo diphenyl ether (CAS number 1163 19 5)	Decabromo diphenyl ether is prohibited in computer plastic housings at any detectable level. Computer plastic housings also includes attachments to the housings such as buttons (e.g. Power on and off), drive bezels (e.g. DVD and tape drive bezels) and snap in logos. Prohibited in Substances, Preparations and Products (other than computer plastic housings which have a more restrictive level, see	19, 23 22 Lenovo Requirement

	above) at levels and above 0.1% by weight. Lenovo prohibits the Intentional Addition of Deca BDE in any Homogeneous Material.	
Formaldehyde CAS No 50-00-0	Materials capable of releasing formaldehyde into the air, under reasonably foreseeable conditions of use at concentrations reaching or exceeding 0.1ppm are prohibited. The use of formaldehyde in textiles intended for skin contact is prohibited (e.g. Wrist straps and headphones) above 120 mg/kg formaldehyde. The use of formaldehyde in wood applications may not be used if the formaldehyde emission caused by the wooden materials exceeds 0.1 ml/m3 (ppm) in the air of a test chamber. Formaldehyde emission standards in Composite Wood must not exceed the following limits (see Section 2.12 for more details): Hardwood Plywood Veneer Core - 0.05ppm Hardwood Plywood Composite Core - 0.05ppm Particleboard - 0.09ppm Medium Density Fiberboard - 0.11 ppm Thin Medium Density Fiberboard - 0.13 ppm	25 11 20,21 24
Halogenated aromatic substances (Annex C)	Prohibited from use in capacitors and transformers above 500 ppm for monohalogenated or 50 ppm for polyhalogenated aromatic substances in materials of the component.	2
Halogenated diphenyl methanes (Annex D)	Prohibited	1C, 12
Hexachlorobutadiene (CAS 87-68-3)	Prohibited	10, 15
Hexachloroethane (Annex F)	Prohibited in manufacturing or processing of nonferrous metals.	1k, 2, 15
Hexavalent Chromium/Hexavalent Chromium Compounds (Annex M)	Intentionally Added in homogenous material RoHS Substance: allowance made for RoHS exemptions Intentional Addition is prohibited by Lenovo in paints and plastic resins. EPEAT Products: 500 ppm in any Homogenous Material	Annex M JIG Level A California Health and Safety Code sections 25214.9-25214.10.2 EPEAT 4.1.5.1 (IEEE STD 1680-2006)
Lead/Lead Compounds (Annex N)	1000 ppm or Intentionally Added in homogenous Material RoHS Substance: allowance made for RoHS exemptions Paint: Intentionally Added External PVC cables, wire coatings: 300 ppm Visual Display Units for EPEAT products: 0.005% (50 ppm) by weight (not homogenous) For restrictions in battery applications see **Table 5**	Annex N 1F, 12 JIG Level A California Health and Safety Code sections 25214.9-25214.10.2

		EPEAT 4.1.4.1(IEEE STD 1680-2006)
Mercury/Mercury Compounds (Annex O)	Must not be present; except in lamps. RoHS Substance: allowance made for RoHS exemptions In exempt applications, labeling requirements and maximum content limits apply (see **Section 2.6**); when present in an approved application, Lenovo must be supplied with a data sheet on mercury content. For mercury restrictions in batteries, see **Table 5**	Annex O 2, 8, 9, 12, 13, 17, 18 JIG Level A
Nickel (Annex E)	Nickel finishes are prohibited on Product surfaces that are designed to be in prolonged contact with skin	1H
Ozone-Depleting Substances (CFCs, HCFCs, HBFCs, carbon tetrachloride, etc.) (Annex F)	Prohibited for Products to contain or be manufactured with these substances	2, 5, 6, 7, 12 JIG Level A
Pentachlorophenol (CAS No 87-86-5) and its salts and esters	Prohibited in the treatment of wood. Prohibited in wood based materials in excess of 3 milligrams per kilogram of dry matter.	1R 2
Perfluorocarbons (PFC) (Annex G)	Must not be contained in Products; not prohibited from use in production of Products in which the gas is not present in the final Product	4, 27
Perfluorooctane sulfonates (PFOS) and salts, C8F17SO2X (X=OH, metal salt, halide, amide and other derivatives including polymers), or Compounds that contain C8F17SO2, C8F17SO3 or C8F17SO2N, (for a list of PFOS CAS numbers see OECD ENV/JM/MONO(2006) 15 at http://appli1.oecd.org/olis/2006doc.nsf/linkto/env-jm-mono(2006)15	Prohibited as a Substance or as a constituent of Preparations. Prohibited in products or parts. The above shall not apply to the following applications: photoresists or anti reflective coatings for photolithography processes, and photographic coatings applied to films, papers or printing plates. Refer to the EU Directive and the Canada Regulations referenced for more details on these requirements and exemptions.	1I, 15
Phenol, 2- (2H - benzotriazol -2-yl) - 4,6-bis (1,1-dimethylethyl)- (CAS No 3846-71-7)	Prohibited in decorative laminate, adhesives, paints, printing inks, inked ribbon, and molded plastic products.	10
Polychlorinated biphenyls (PCBs) (Annex H)	Prohibited	1 JIG Level A
Polychlorinated naphthalenes (more than 3 chlorine atoms) (Annex I)	Prohibited	10 JIG Level A
Polychlorinated terphenyls (PCTs)	Prohibited	1
Polycyclic Aromatic Hydrocarbons (PAH)		Annex CC.

Benzo(a)pyrene Sum of 16 PAHs***	1 mg/kg (Materials with foreseeable contact with skin for longer than 30 seconds (long-term skin contact) 20 mg/kg (Materials with foreseeable contact with skin up to 30 seconds (short-term skin contact) or without skin contact 10 mg/kg (Materials with foreseeable contact with skin for longer than 30 seconds (long-term skin contact) 200 mg/kg (Materials with foreseeable contact with skin up to 30 seconds (short-term skin contact) or without skin contact	German GS EK1 ZEK 01-08 for GS certification
Polyvinyl chloride (PVC) (Annex Y)	External covers for Lenovo products must not contain Polyvinyl Chloride (PVC). Sheathing for wires and cables, connectors, and electronic components are exempt from this requirement.	Lenovo Commitment
Radioactive Substances (Annex Z)	Intentionally addition is prohibited	JIG Level A
Shortchain Chlorinated Paraffins (Annex J)	Prohibited above 1.0% by weight in paints, coatings, sealants, rubbers and oils	1E, 2, 12 JIG Level A
Toluene CAS No. 108-88-3	Prohibited as a Substance or constituent of Preparations in concentrations equal to or greater than 0.1% by mass in adhesives and spray paints.	1M
Tributal Tin (TBT) and Triphenyl Tin (TPT)	Intentionally added	JIG Level A
Tributyl Tin Oxide (TBTO) (Annex K)	Intentional Addition is prohibited in chemical products	10 JIG Level A
Tris (2,3 dibromopropyl) phosphate CAS No 126-72-7 and Tris-(aziridinyl) - phosphineoxide CAS No 545-55-1	Prohibited from use in textile articles intended to come into contact with skin, e.g. Wrist straps and headphones.	1N, 1O, 12

Regulatory references for Table 1

1. 76/769/EEC, Marketing and Use of Dangerous Substances
   - A. With amendments 83/478/EEC; 85/610/EEC; 87/217/EEC; 91/659/EEC; 99/77/EEC (Asbestos fibres)
   - B. With amendments 2002/61/EC (azocolourants)
   - C. With amendment 91/339/EEC (Ugilec 141, 121, 21 and DBBT)
   - D. With amendment 2003/11/EC (pentabromodiphenylether and octabromodiphenylether)
   - E. With amendment 2002/45/EC (short-chain chlorinated paraffins)
   - F. With amendment 89/677/EEC (lead carbonates and lead sulphates)
   - G. With amendment 91/338/EEC (cadmium)
   - H. With amendment 94/27/EC (nickel)
   - I. EU Directive 2006/122/ECOF of the European Parliament and of the Council 12 December 2006 Marketing and Use of Dangerous Substances and Preparations (perfluorooctane sulfonates)

J. With amendment 2003/3/EC (blue colourant)
K. With amendment 2001/91/EC (hexachloroethane)
L. With amendment 96/55/EC (chlorinated solvents)
M. With amendment 85/478/EEC (PCBs, PCTs)
N. With amendment 83/264/EEC (PBBs, Tris-aziridinyl-phosphinoxide)
O. With amendment 79/663/EEC ((Tris (2,3 dibromopropyl) phosphate))
P. EU Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
Q. With amendment 2003/2/EC of 6 January 2003 (arsenic)
R. With amendment 1999/51/EC of 26 May 1999 (pentachlorophenol)
S. With amendment 2001/90/EEC of 26 October 2001 (cresote and other wood preservatives)
T. With proposed amendment for organostannic compounds.

Note: On June 1, 2009 the EU Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) will replace the above Directive.
2. Switzerland's Chemikalien Rest Risiko Verordnung from 1 July, 2005.
3. United States Toxic Substances Control Act; Occupational Safety and Health Act (29 CFR 1910.1001-1051).
4. Statutory Order no. 552 of 2 July 2002 Regulating Certain Industrial Greenhouse Gasses (Denmark).
5. EU Regulation (EC) No. 2037/2000.
6. Section 611 of the 1990 amendments of the Clean Air Act (United States); 40 CFR Part 82.
7. Law Concerning the Protection of the Ozone Layer through the Control of Specified Substances and Other Measures (Law No. 53 of May 20, 1988) (Japan).
8. No. 553 Decree of 9 September 1998, comprising regulations regarding products containing mercury (Decree on Product Containing Mercury, 1998 Environmentally Hazardous Substances Act) Netherlands.
9. The Mercury-containing Products (Certain) Ordinance (SFS 1991:1290) Sweden.
10. Japan's Act on the Evaluation of chemical substances and Regulation of Their Manufacture, etc. (Act No. 117 of October 16, 1973, last revised April 27, 2005).
11. The Netherlands 178 Besluit van 22 maart 2001, houdende vaststelling van het Warenwetbesluit formaldehyde in textiel.
12. Norway Product Control Regulation Chapter 2. Restricted Substances and Preparations.
13. Connecticut Public Law 02-90, The Mercury Education and Reduction Act.
14. California Safe Drinking Water and Toxic Enforcement Act of 1986.
15. Canada Environmental Protection Act, 1999. Prohibition of Certain Toxic Substances Regulations, 2005. Updated 2008-05-29.
16. State of Washington Title 70 RCW An act relating to phasing out the use of polybrominated diphenyl ethers.
17. Louisiana Mercury Risk Reduction Act of 2006.
18. Rhode Island Mercury Education and Reduction Act.
19. Maine Public Law Chapter 296 Section 1. 38 MRSA 1609.
20. Austria - BGB I 1990/194: Formaldehydeverordnung, 2, 12/2/1990.
21. Germany: LMBG B 82.02-1 Untersuchungen von Bedarfsgegenständen; Bestimmung der Formaldehydabgabe aus textilen Bedarfsgegenständen; Ausgabe: 1985-06.
22. Norway Regulation amending regulation of 1 June 2004 No 922 relating to restrictions on the use of chemicals dangerous to health and environment and other products.
23. Minnesota 325E.387 Ban on deca-BDE in computer enclosures.
24. California Regulation 93120 Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products.
25. USA 29 CFR 1910.1048 Toxic and Hazardous Substances - Formaldehyde.
26. EU Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).
27. Austria Ordinance on bans and restrictions of partly fluorinated and fully fluorinated hydrocarbons and of sulfur hexafluroide 447/2002, with amendments 246/2005, 86/2006 and 139/2007.
28. Sweden. The Chemical Products Ordinance 1998:944 to 2009:14.

2.1.2 EU RoHS

The DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 bans the use of the following in new electrical and electronic products put on the market after July 1, 2006:

- **Lead (Pb),**
- **Mercury (Hg),**
- **Cadmium (Cd),**
- **Hexavalent chromium (Cr^{+6}),**
- **Polybrominated biphenyl (PBB) flame retardants and**
- **Polybrominated diphenyl ether (PBDE) flame retardants.**

Lenovo **Engineering Specification 41A7733** provides the detailed requirements.

Certain substances affected by the European Commission's Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) are already restricted by other regulations at concentration levels that are more stringent than those associated with RoHS compliance. **Table 1** presents the requirements for these substances as defined by certain existing legislation and/or Lenovo internal standards.

2.1.3 Additional Requirements for "Low Halogen" Products

Lenovo's plans require the elimination of brominated and chlorinated flame retardants (BRFs, CFR) and polyvinyl chloride (PVC) in new products starting in 2010. These plans are dependent upon the identification and availability of safe, environmentally proven alternative materials that do not compromise product safety, reliability or performance. The alternative materials identified must also be:

- Equal to or better than existing materials in quality, reliability, performance
- Cost competitive
- Available in high volume
- Continue to meet applicable regulatory requirements, international fire safety standards and agency certification requirements.

Lenovo "Low Halogen" materials, parts and products must meet all of the following requirements:

Table 2. "Low Halogen" Substance Requirements		
Substance	**Threshold Level**	**Reference**
All Printed Circuit Board (PCB) and substrate laminates materials must meet Bromine (Br) and Chlorine (Cl) requirements for low halogen as defined in IEC 61249-2-21. Printed Circuit Board (PCB) and substrate laminates do not include the solder mask. Solder mask is considered a separate homogenous plastic material.	.	IEC 61249-2-21 JEDEC - JEP709
Bromine (Br)	Maximum concentration of 900 ppm (0.09%) by weight	
Chlorine (Cl)	Maximum concentration of 900 ppm (0.09%) by weight	
	Note: Combined total concentration of bromine and chlorine must not exceed 0.15 % (1500ppm) by weight	
All other materials and components, with the exceptioin of Printed Circuit Board (PCB) and substrate laminates, must meet the following requirements:		IEC 61249-2-21 JEDEC - JEP709 JIG Level B
Bromine (Br) in Brominated Flame Retardants (BFRs)	Less than 1000 ppm (0.1%) by weight in homogenous materials	
Chlorine (Cl) in Chlorinated Flame Retardants (CFRs) or Polyvinyl Chloride (PVC)	Less than1000 ppm (0.1%) by weight in homogenous materials	

Note:

1. Halogens fluorine (F), iodine (I), and astatine (At) are not restricted
2. Any materials and components other than PCB laminates and prepreg materials fall under item 2 "All other." in Table 2 above.
3. A listing of BFR compounds may be found in the Joint Industry Guide (JIG) 101-A Annex (www.eia.org)
4. Low Halogen materials, parts and products require a unique part number to differentiate them from "non-low-halogen" versions
5. Suppliers must submit a Part Change Notice (PCN) identifying alternate materials
6. Supplier must complete and provide a Lenovo Supplier Material Declaration showing Br and Cl < 900 ppm by weight in any Printed Circuit Board laminates; Br in BFRs < 1000 ppm, Cl in CFRs < 1000 ppm, Cl in PVC < 1000 ppm in homogenous material for other components and materials.
7. Supplier shall provide Lenovo a **Test Report** from a qualified, independent laboratory upon request

8. Reactive TBBPA for printed circuit boards is exempt, until acceptable alternative materials are identified

Exemptions:
Reactive TBBPA for printed circuit boards until acceptable alternative materials are identified
Server and Third-party option products
Parts for standard, "non-low-halogen" products are exempt

2.2 Supplier Material Declarations

Suppliers must declare the presence of certain of substances in its Lenovo hardware Products to meet regulatory reporting requirements and customer requirements for Product content disclosures.. Lenovo's Supplier Material Declaration process and template is available on-line at www.lenovo.com – About Lenovo – Global Procurement – Product Content Restrictions.

Lenovo's Requirements for Suppliers:

All materials, parts and products incorporated into Lenovo products or bundled with Lenovo products as part of a delivered solution are required to meet the requirements of applicable laws and regulations, Lenovo's Specification 41A7731 Baseline Environmental Requirements for Materials, Parts and Products and Lenovo RoHS Specification 41A7733.

Suppliers are expected to complete and return the Lenovo Supplier Material Declaration.

At Lenovo's request, the supplier must be able to provide technical documentation in the form of internal design controls, supplier declarations, or analytical test data.

Additional requirements for EPEAT products:

Desktop, notebook, workstation and computer monitor products designated to be registered under the Electronic Products Environmental Assessment Tool (EPEAT) require additional Supplier Verification information shown in the Lenovo Supplier Declaration. EPEAT is a procurement tool designed to help large volume purchasers evaluate, compare and select desktop computers, laptops and monitors based upon their environmental attributes as specified in the IEEE Standard for the Assessment of Personal Computer Products (1680). The registration criteria and list of registered products are provided at www.epeat.net.

Substances in **Table 3** are included in industry standardized product content declarations for electronic products, or other regulatory or Lenovo requirements. Lenovo requires that these substances be quantified and reported by suppliers if they are present in a supplier's product at concentrations greater than the specified thresholds per **Table 3** in any individual Part in the item supplied to Lenovo. For example, if the item supplied to Lenovo is a power supply, then the substances in **Table 3** should be reported to Lenovo if they occur above the specified thresholds in any of the individual Parts (e.g., fan, circuit board, fasteners, connectors) of the power supply.

If the supplier determines that substances in **Table 3** are present in any Parts of the Product above their respective specified thresholds, **then the absolute weight in grams of the substance present in the Part supplied to Lenovo shall be reported to Lenovo**. Absolute weights, rather than weight percentages or ppm, shall be reported to allow aggregation of the data with that from other Parts that comprise the final Lenovo Product.

Table 3. Reportable Substances		
Reportable Substance	**Threshold for reporting in non-restricted applications***	**Regulatory or other Reference**
Antimony/Antimony Compounds (Annex R)	1000 ppm (0.1%)	JIG Level B Phase-out target date: 2012
Arsenic/Arsenic Compounds (Annex S)	1000 ppm (0.1%)	JIG Level B
Beryllium/Beryllium Compounds (Annex T)	200 ppm (0.02%)	JIG Level B – Lenovo threshold below the JIG threshold of 1000 ppm due to requirements of European recyclers Phase-out target date: 2012
Bismuth/Bismuth Compounds (also alloys) (Annex U)	1000 ppm (0.1%)	JIG Level B
Brominated Flame Retardants: • Polybrominated biphenyl (PBBs) • Polybrominated diphenyl ether (PBDEs) including Decabromobiphenyl Ether (DecaBDE)	Prohibited RoHS Substances: no exemptions Any content must be reported	1D, 14 JIG Level A
Brominated / Chlorinated Flame Retardants (other than PBBs or PBDEs). Note: suppliers must report use of brominated flame retardants and provide CAS number or ISO 1043-4 code (Annex V)	1000 ppm (0.1%) by weight in homogenous material This restriction does not apply to plastic parts weighing less than 25 grams, printed circuit board laminates / base materials, printed circuit board assemblies, the sheathing of wires and cables until acceptable alternative materials are identified.	JIG Level B Exception: Servers and reactive TBBPA for printed circuit boards are exempt from the Low Halogen requirements.
Cadmium	100 ppm or Intentionally Added in homogenous material RoHS Substance: allowance made for RoHS exemptions EPEAT Products: 50 ppm in homogenous material For restrictions in battery applications see Table 5	Annex L 1G, 2, 11, 14 JIG Level A California Health and Safety Code sections 25214.9-25214.10.2 EPEAT 4.1.2.1 (IEEE STD 1680-2006)
Hexavalent chromium (Cr+6)	Intentionally Added in homogenous material	Annex M

	RoHS Substance: allowance made for RoHS exemptions EPEAT Products: 500 ppm in any Homogenous Material	JIG Level A California Health and Safety Code sections 25214.9-25214.10.2 EPEAT 4.1.5.1 (IEEE STD 1680-2006)
Hydrofluorocarbons (HFCs) having up to 6 carbons	Any Intentional Addition	Austrian Ordinance by the Federal Minister for Agriculture, Forestry, Environment and Water Management on Bans and Restrictions for Partly Fluorinated and Fully Fluorinated Hydrocarbons and Sulphur Hexafluoride
Lead	1000 ppm or Intentionally Added in homogenous Material RoHS Substance: allowance made for RoHS exemptions Paint: Intentionally Added External PVC cables, wire coatings: 300 ppm Visual Display Units for EPEAT products: 0.005% (50 ppm) by weight (not homogenous) For restrictions in battery applications see **Table 6**	Annex N 1F, 12 JIG Level A California Health and Safety Code sections 25214.9-25214.10.2 EPEAT 4.1.4.1(IEEE STD 1680-2006)
Magnesium/Magnesium Alloys (Annex W)	1000 ppm (0.1%)	Requirement from Recyclers
Mercury **	Must not be present; except in lamps. RoHS Substance: allowance made for RoHS exemptions In exempt applications, labeling requirements and maximum content limits apply (see **Section 2.6**); when present in an approved application, Lenovo must be supplied with a data sheet on mercury content. For mercury restrictions in batteries, see **Table 5**	Annex O 2, 8, 9, 13,14 JIG Level A
Nickel	1000 ppm (external applications)	JIG Level B
Phthalates (Annex X)	1000 ppm (0.1%)	JIG Level B

Plant based materials	Includes wood and paper based materials excluding paper used in publications and packaging and corn/soy based plastics and rubbers. Import of plant based materials into US requires special declaration. Notify Lenovo if and wood or paper materials are used (except in publications and packaging).	US Lacey Act
Polyvinyl chloride (PVC) (Annex Y)	1000 ppm	JIG Level B
Selenium/Selenium Compounds (Annex AA)	1000 ppm (0.1%)	JIG Level B

***** Restricted applications are defined in **Table 1**.

****** Mercury is only permitted in lamps. The threshold for mercury reporting reflects regulations cited in **Table 1** which are currently more stringent than RoHS maximum concentration limits.

2.2.1. Substances of Very High Concern (SVHC) in Articles - Reporting Requirements

Lenovo requires suppliers to identify if any Substances of Very High Concern (SVHC) present in an Article (Deliverable) at or above the 0.1% weight by weight (w/w) concentration and report the name and CAS number of the SVHC candidate and the quantity on the Supplier Material Declaration (IPC-1752 form) for the Deliverable. See **Table 4** in this section for a list of SVHC which must be reported on the Supplier Material Declaration. The current candidate list of SVHC as published by the EU is located at: Http://echa.europa.eu/chem_data/candidate_list_table_en.asp. This list is subject to change by the European Chemicals Agency (ECHA).

Two of the SVHC are not included on this table. They are:

- 5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene)
- Alkanes, C10-C13, chloro (Short Chained chlorinated Paraffins)

It is unlikely that musk xylene is present in electronic hardware and the short chained chlorinated paraffins are banned in Lenovo Deliverables, see Table 1. If these substances are present in a Deliverable please report them on the Supplier Material Declaration (IPC 1752 form). There is a section for "Other" which can be used for this purpose.

If an SVHC is present in a Deliverable at or above the reporting concentrations, the Supplier must provide a customer communication to Lenovo meeting the requirements of Article 33 of the EU REACH Regulation.

Table 4.	**Substances of Very High Concern (SVHC)**		
SVHC (from proposed	**CAS Number**	**Reporting Concentration**	**Examples of industry uses**

Candidate List)	(EC#)		
Anthracene	120-12-7 (204-371-1)	At or above 0.1% weight by weight of the Deliverable	Scintillator for radiation detection. Radiation therapy dosimetry.
4,4'-diaminodiphenylmethane (or methylene dianiline)	101-77-9 (202-974-4)	At or above 0.1% weight by weight of the Deliverable	As intermediate for polyurethane foam and resins. Hardener for epoxy resins and adhesives.
Dibutyl phthalate (DBP)	84-74-2 (201-557-4)	At or above 0.1% weight by weight of the Deliverable	Plasticiser in plastics(e.g., polyvinyl chloride). Used in sealants, varnishes, paper coatings, inks, resins and adhesives.
Cobalt dichloride	7646-79-9 (231-589-4)	At or above 0.1% weight by weight of the Deliverable	Cobalt plating and cobalt based pigments and drier compounds (desiccants).
Diarsenic pentaoxide	1303-28-2 (215-116-9)	At or above 0.1% weight by weight of the Deliverable	Hardener for copper, lead or gold in alloys. Used in production of dyes and glass. Wood preservative.
Diarsenic trioxide	1327-53-3 (215-481-4)	At or above 0.1% weight by weight of the Deliverable	Used to make elemental arsenic, gallium arsenide and some alloys. Used in glass industry. Wood preservative.
Sodium dichromate, dihydrate	7789-12-0; 10588-01-9 (234-190-3)	At or above 0.1% weight by weight of the Deliverable	Metal finishing, passivation and metal plating. Pigments in paints, plastics, and glass.
Bis (2-ethyl(hexyl)phthalate) (DEHP)	117-81-7 (204-211-0)	At or above 0.1% weight by weight of the Deliverable	Plasticiser in plastics(e.g., polyvinyl chloride). Used in sealants, varnishes, paper coatings, inks, resins and adhesives.
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α – HBCDD, β-HBCDD, γ-HBCDD)	25637-99-4; 134237-50-6; 134237-51-7; 134237-52-8 (247-148-4; 221-695-9)	At or above 0.1% weight by weight of the Deliverable	Flame retardant in extruded and expanded polystyrene and flexible polyurethane foam.
Bis(tributyltin)oxide (TBTO)	56-35-9 (200-268-0)	At or above 0.1% weight by weight of the Deliverable	Antiseptic, antifungal agent, paint, pigment, antistaining, refrigerant, foaming agent, extinguishant.
Lead hydrogen arsenate.	7784-40-9 (232-064-2)	At or above 0.1% weight by weight of the Deliverable	Biocide for wood.
Triethyl arsenate	15606-95-8 (427-700-2)	At or above 0.1% weight by weight of the Deliverable	Biocide for wood.
Benzyl butyl phthalate (BBP)	85-68-7 (201-622-7)	At or above 0.1% weight by weight of the Deliverable	Plasticiser in plastics(e.g., polyvinyl chloride). Used in sealants, varnishes, paper coatings, inks, resins and adhesives.

EC# - found in EINECS (European INventory of Existing Commercial chemical Substances).
EU REACH Regulation Number 1907/2006 can be found at http://reach.jrc.it/legislation_en.htm
The EU provides guidance documents for REACH, specifically guidance documents for Substances in Articles as well as the candidate list for SVHC at http://reach.jrc.it/guidance_en.htm
Additional information about REACH can be found at the European Chemicals Agency web site at http://echa.europa.eu/

2.3 Marking of Hardware Plastic Parts

Hardware plastic Parts molded and/or fabricated from thermoplastic materials and weighing 25 grams or more must be marked in accordance with the International Organization for Standardization's international standard ISO 11469, 2000-05 "Plastics- Generic identification and marking of plastics products." The marking convention of ISO 11469 is outlined in the following sections. Marking is optional for Parts weighing less than 25 grams, however, all Parts having adequate surface area for coding should be marked. **Marking requirements do not apply to cable and cable assemblies or experimental tooling.** The marking of protective packaging materials is not in the scope of this specification.

2.3.1 Coding Method

The marking shall be made by injection molding, stamping, or other means of permanently affixing the information in a readily visible area on non-decorative or nonfunctional surfaces.
Marking in a readily visible area means that the marking can be seen on the disassembled plastic Parts. Use of labels with adhesives for coding Parts is not allowed.

Notes:

1. When two or more resins may be used for production of a Part, identification of the actual resin used for fabrication is required.

2. If the Parts must be plated or painted on the internal surface, it may not be possible to have a readily visible injection molded-in marking. In such cases, it may be necessary to code the Parts with a stamp or other means of permanently affixing the information. If the Parts must be painted with a decorative paint, it must be indicated on the internal surface with an appropriate means (for example, stamp) that the Part has been painted.

2.3.2 Symbol to Signify Recyclability

To indicate that the plastic Material used for the fabrication of the Part is recyclable, the two symbols ">" and " <" (normally used to indicate *greater than* and *less than*) will be used. These symbols are shown in **Section 2.3.3**. Marking with these symbols indicates that the Part Material is recyclable. **Note:** The size of the symbol is optional as long as it is clearly legible.

2.3.3 Resin Generic Identification

Resin identification will be marked on Parts using the symbol for polymer type in between the symbols > and < as shown in the example of polycarbonate/ABS blend below.

> PC+ABS <

The symbols for the plastic Materials shall be selected from Part 1 of international standard ISO 1043, *Plastics-Symbols and abbreviated terms*. Symbols of plastics not appearing in ISO 1043-1 shall be selected from ASTM D 4000, *Classification System for Specifying Plastic Materials*; and ASTM D 1600, *Terminology Relating to Abbreviations, Acronyms and Codes for Terms Relating to Plastics*. See **Table 5** "Commonly Used Resins" for typical examples.

Table 5. Commonly Used Resins	
Generic Family Name	**Polymer Symbol**
Polyamide	PA
Polycarbonate	PC
Poly(phenylene ether)	PPE
Polymethylmethacrylate	PMMA
Polystyrene	PS
Polyvinyl chloride	PVC
Acrylonitrile/Butadiene/Styrene	ABS
Polycarbonate + Acrylonitrile/Butadiene/Styrene	PC +ABS
Polycarbonate with 10% glass fiber	PC - GF10

When two or more resins may be used for production of a Part, identification of the actual resin used for fabrication can be displayed by arrows. See **Table 6** for examples.

Table 6. Examples of Completed Plastic Part Markings	
Example	**Marking**
Single material used in production of Part	> ABS-FR(17) <
Two or more generically different materials allowed for production of Part	Arrow points to actual material used in production. > ABS-FR(17) < –> > PC + ABS – FR(40) <

2.3.4 Additives Generic Identification

Additives identification shall be marked on Parts using the generic symbols from the series of international standards ISO 1043-2, 1043-3 and 1043-4. For example, a blend of polycarbonate/ABS with halogen-free organic phosphate flame retardant compounds is marked with the following code:

> PC+ABS-FR(40) <

2.4 Additional Requirements for Batteries

2.4.1 Battery Content Restrictions

Table 6 "Restrictions on Content of Batteries" lists restrictions on content of batteries sold by Lenovo. Also, all batteries contained in Parts or Products covered by this specification shall meet the requirements of **Table 7.**

Table 7. Restrictions on Content of Batteries	
Battery Type	**Restrictions**
All Battery Types	• No intentionally-introduced mercury • ≤ 0.0005% mercury by weight. Button cell batteries, and batteries composed of button cell batteries, with a mercury content of no more than 2% by weight are exempt. • 0.002% cadmium by weight (Note the lower cadmium restrictions for some battery types below)* • Only battery types which are exempted from all hazardous materials transport regulations (surface

	and air), i.e., not classified as a hazardous material (for purposes of transport) or dangerous good, can be used.
Alkaline Manganese	≤ 0.001% cadmium by weight**** 0.200% lead by weight ** 0.0001% mercury by weight *****
Button Cell Batteries	≤ 0.0005% cadmium by weight
Sealed Lead Acid (Pb)	Must be classified as non-spillable and meet the requirements of the US federal regulation, 49 CFR 173.159(d).
Nickel Cadmium (Ni-Cd)	Restricted to applications where no technically feasible alternative exists. Use requires written approval of a Lenovo procurement representative unless battery(ies) have been specified by an Lenovo print or specification.*
Nickel Metal Hydride (Ni-MH)	≤ 0.025% cadmium by weight
Zinc Carbon Batteries sizes R6, R14, R20	≤ 0.001% cadmium by weight****

Note - the regulations cited below are only a sample of the regulations pertaining to batteries. They are provided for example purposes only.
* EU Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators
* *Argentina National Legislature Act 26.184 on the manufacturing, assembly and importing of batteries.
*** New York Battery Reduction and Elimination. New York State Consolidated Laws. Environmental Conservation Http://caselaw.lp.findlaw.com/nycodes/c37/a125.html
****Austrian Battery Ordinances 514/1990, as amended by BGB1 No. 3/1991(4 January, 1991) and BGB1.II Nol. 495/1999 (28 December 1999) of the Ordinance of Federal Ministry for Environment, Youth and Family.
*****New Jersey Dry Cell Battery management Act; NJSA 13:1E-99.59-81.

2.4.2 Product Design and Labeling Requirements for Batteries

All batteries contained in Parts and Products covered by this specification shall be designed for easy identification and removal.

All Non-Spillable Wet Batteries purchased for use in Lenovo or non-Lenovo equipment must be non-regulated for shipment per IATA Special Provision A67; 49 CFR 173.159 (d); and all other application transportation regulations. The battery and external package must be marked "NONSPILLABLE" or "NONSPILLABLE BATTERY" according to 49 CFR 173.159 (d) (2). All Lithium Batteries purchased for use in Lenovo or non-Lenovo equipment must be non-regulated for shipment per IATA Special Provision A45; 49 CFR 173.185 (b) or (c); and all other applicable transportation regulations. Bulk shipments of Lithium cells or batteries must be in quantities of 12 or less and have a gross package weight of 5 kg or less for all field use shipments. This requirement does not apply to Lithium battery or cell shipments used to support manufacturing operations as long as all transportation regulations are met.

IMPORTANT: The U.S. Department of Transportation (USDOT) prohibits the shipment of primary (non-rechargeable) lithium batteries and cells on passenger aircraft for both foreign and domestic passenger-carrying aircraft entering, leaving, or operating in the United States according to 49 CFR 172.102 Special Provision A100. In addition, the package must also be

marked "PRIMARY LITHIUM BATTERIES - FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT" when transported by highway, rail, vessel and cargo aircraft in the U.S. Per 49 CFR 173.185 (b)(5) or (c)(4). Secondary (rechargeable) lithium batteries and cells are only permitted on passenger aircraft for both foreign and domestic passenger-carrying aircraft entering, leaving, or operating in the United States with a gross package weight not exceeding 5 kg according to 49 CFR 172.102 Special Provision A100.

Documentation from the manufacturer/supplier of the battery must be provided to Lenovo clearly stating that the part number being purchased by Lenovo meets all the requirements which make the battery non-hazardous for shipment by IATA, 49 CFR, and any other applicable regulation such as ADR, IMDG, TDG, etc. Data (industry test reports) used to classify batteries as non-hazardous in transport must be supplied upon request.

All rechargeable primary batteries must be labeled with a reference to Lenovo's website for further information on recycling. For example, the label may read: "Please see www.lenovo.com/lenovo/environment for more information about recycling options in your area." Variations on this label require Lenovo GEA approval.

Batteries shall have appropriate labels affixed, including but not limited to battery type and chemistry, manufacturer name and other markings as required by applicable laws and regulations. The battery marking shall be located on or adjacent to each battery. Parts and Products containing batteries that are not readily identifiable must be clearly labeled on the exterior to indicate the presence of a battery inside. In battery packs, individual cells may be labeled (in cases where multiple manufacturers or chemistries cannot clearly be identified using a single label for the pack) or one label may be used for the pack.

If a label design is specified by Lenovo in a Part print, drawing or assembly specification, the specified label on the print or assembly specification must be affixed. In the absence of a battery label specified by Lenovo in a Part print, the supplier shall refer to country requirements. For reference, the following **Sections 2.4.2.1 - 2.4.2.5** summarize battery marking requirements for selected geographies.

2.4.2.1 Marking Requirements for the European Union

Instructions must be provided in the Product or Part hardware publications, showing how batteries can be removed safely and informing the customer of the type of battery in the Deliverable.

In the European Union, a mark indicating separate collection must be printed on all batteries or accumulators. See **Figure 1**. The mark must (1) consist of a crossed-out wheeled bin container; (2) cover 3% of battery or accumulator's largest side area, and be of a maximum size of 5 cm x 5 cm; (3) for cylindrical cells, cover 3% of half the surface area of battery or accumulator, and maximum size of 5 cm x 5 cm; and (4) where the mark would be smaller than 0.5 cm x 0.5 cm, a separate mark measuring at least 1 cm x 1 cm must be printed on the package.

In addition, batteries and accumulators containing heavy metals must be marked with specific symbols for heavy metal content: Hg for mercury content greater than 0.0005% mercury; Cd for cadmium content greater than 0.002% cadmium; Pb for lead content greater than 0.004% lead. These symbols must be printed beneath the separate collection mark and must be at least 1/4 of the size of the separate collection mark.

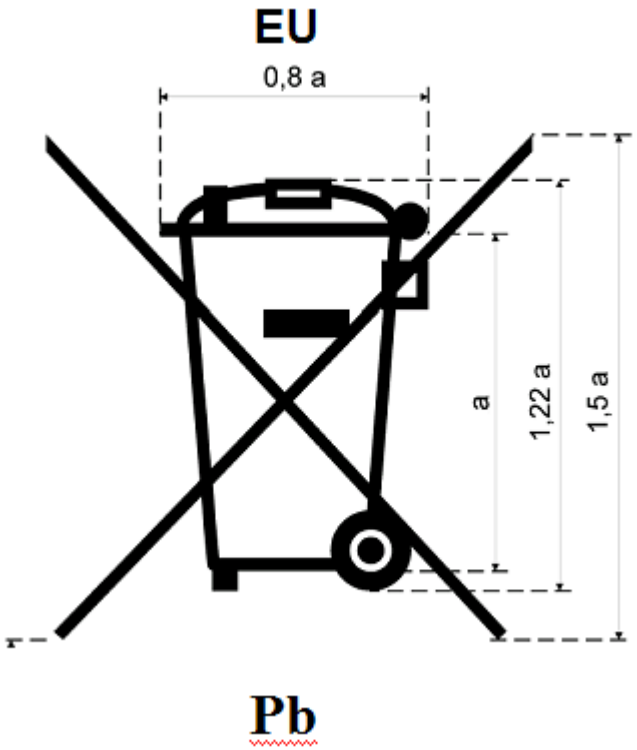


Figure 1. Collection mark and heavy metal content marking for a battery containing lead.

The capacity rating must be labeled on all portable batteries. Portable battery is defined by the EU Directive 2006/66/EC on batteries and accumulators to mean any battery, button cell, battery pack or accumulator that is sealed, can be hand carried, and is neither an industrial battery or accumulator nor an automotive battery or accumulator. Capacity rating (e.g., Watt-hour, Wh) for button or coin cell batteries may be located on the packaging if space is not available on the battery.

2.4.2.2 Labeling Requirements for the United States

2.4.2.2.1 Requirements for Rechargeable Ni-Cd and Small Sealed Lead Acid Batteries

In the United States, the Mercury-Containing and Rechargeable Battery Management Act (Public Law 104-142) establishes national, uniform labeling requirements for rechargeable Ni-Cd, small sealed lead acid batteries, and products containing these regulated batteries as a primary energy

supply. Products that include an internal uninterrupted power supply (UPS) device are exempt. Regulated batteries must display three chasing arrows or a comparable recycling symbol and the text indicated in **Table 8** for the respective regulated items. No size or color requirements for the recycling symbol are specified in the regulation. EPA publication EPA530-K-97-009, "Implementation of the Mercury-Containing and Rechargeable Battery Management Act" depicts the three chasing arrows symbol shown in **Figure 2**.

Figure 2. Three chasing arrows symbol as cited by the U.S. EPA for the U.S. Battery Act

The required labeling must appear on the packaging of the Products containing regulated batteries that are not easily removable, and on the packaging of regulated batteries that are sold separately from such Products, if the labeling on the Product or battery is not visible through the packaging.

Table 8. Texts for Battery Marking for the U.S. Battery Act	
Regulated Item	**Text**
Nickel-cadmium batteries*	Nickel-cadmium or Ni-Cd with the phrase BATTERY MUST BE RECYCLED OR DISPOSED OF PROPERLY
Lead acid batteries	Pb or the words "LEAD," "RETURN," and "RECYCLE", and if the batteries are sealed, the phrase "BATTERY MUST BE RECYCLED."
Products containing regulated lead-acid batteries that are not easily removable	"CONTAINS SEALED LEAD BATTERY. BATTERY MUST BE RECYCLED."
Product containing Ni-Cd batteries that are not easily removable	"CONTAINS NICKEL-CADMIUM BATTERY. BATTERY MUST BE RECYCLED OR DISPOSED OF PROPERLY."

* Unless specifically called out on an Lenovo print or specification, nickel cadmium batteries may not be used in Parts and Products covered by this specification.

2.4.2.2.2 Requirements for Rechargeable Lithium Ion Batteries Sold in US and Canada

Lenovo is a licensee of the Rechargeable Battery Recycling Corporation (RBRC) for rechargeable lithium ion batteries sold in the US and Canada. As part of this program, all Lenovo rechargeable lithium ion batteries offered for sale in the US and Canada must bear the Rechargeable Battery Recycling Corporation (RBRC) seal (**Figure 3**). This requirement applies to rechargeable lithium ion batteries that will be included in products as well as batteries that will be sold as stand alone parts or replacements.

The seal must be placed on the battery itself. It should also be placed on battery packaging, in user manuals, and in informational materials wherever possible. The seal must be at least 13mm in diameter and must have white space around the seal at least equal to the width of the outer ring of the seal. The seal must contain the RBRC toll free number (1-800-822-8837), the word "RECYCLE," and the battery chemistry as illustrated in **Figure 3** below.

US & Canada Only

US & Canada Only

Figure 3. RBRC seals for rechargeable lithium ion batteries (color or black and white).

Lenovo requires the additional text "**US & Canada Only**" to appear below the seal when Products are sold outside the US or Canada. The size of the lettering "**US & Canada Only**" shall have a minimum text height of 2mm. Helvetica font, 8 or 10 points is recommended. Text is to be centered under the seal but must not touch the seal.

2.4.2.2.3 Requirements for Batteries Containing Perchlorate

Many manganese dioxide lithium coin cell batteries used in Lenovo applications such as desktop and laptop computers contain perchlorate. The use of any material, part, or product containing perchlorate triggers specific labeling and notification requirements in the US. California's Perchlorate Contamination Prevention Act requires that all perchlorate containing materials and products containing perchlorate be labeled with or accompanied by the following statement:

Perchlorate Material - special handling may apply, See www.dtsc.ca.gov/hazardouswaste/perchlorate

The statement must appear on either (1) a label conspicuously applied to the exterior of all outer shipping packages and on consumer packages or (2) the statement may be included on a document included with the shipment such as an owners manual or package insert. The above statement must be used verbatim and must be accompany every Lenovo part or product containing perchlorate that will be shipped in the US.

2.4.2.3 Requirements for Batteries Sold in China

The Regulation on Mercury Content Limitation for Batteries requires all domestically manufactured and imported alkaline batteries sold in China to be marked to indicate mercury content using Chinese characters equivalent to "low mercury" (if the mercury content is less than 0.025% of the weight of the battery) or "mercury free" (if the mercury content is less than 0.0001% of the weight of the battery).

2.4.2.4 Additional Requirements for Taiwan

All batteries sold in Taiwan are required to have the "Four-in-One" recycling symbol. See **Figure 4**. The "Four-in-One" recycling symbol must be printed in any solid color (monotone), must be square in shape with each side not smaller than 0.5 cm in packaging and 1.5 cm in user manuals and product literature. The recycle symbol should be placed on the battery.

Figure 4. Four-in-One recycling symbol for Taiwan

Electronic products with embedded dry cells must be affixed with Four-in-One Recycling Symbol on the product packaging, product labels or instruction books. Nearby the Four-in-One Recycling Symbol, the Chinese characters for "Please Recycle Batteries" must be indicated. See Figure 4.1.

Figure 4.1 Four-in-One recycling symbol and words for Taiwan

2.4.2.5 Requirements for Rechargeable Batteries Sold in Japan

Rechargeable sealed lead acid, nickel cadmium, nickel metal hydride, and lithium ion batteries sold inside Japan shall be labeled according to the Ordinance No. 95 of Ministry of Economy, Trade, and Industry under the Law for the Promotion of the Effective Utilization of Resources (Law No. 48, 1993 as amended, 2001). These requirements are summarized in the Tables and Forms below. Sealed lead acid batteries with greater than 234,000 coulombs charge and small coin type rechargeable batteries that are contained inside Products are exempted from the special Japanese labeling requirements of this section. Recommended background color of label is silver (PANTONE877C) or gray (PANTONE421C) for sealed lead acid, yellowish green (PANTONE389C) for sealed nickel-cadmium, orange (PANTONE1375C) for sealed nickel-hydrogen, and blue (PANTONE312C) for sealed lithium storage battery.

In case of Li-ion battery, it is recommended the following two digits be added.

Indication of Li-ion battery : Li-ion XY Near the three arrow mark, indicating "X: the maximum amount of metal contained in the positive electrode" and "Y: the metals which disturb the recycling of main metals" with two numbers.

1st Number(X): Max. amount of metal contained in the positive electrode
- 0: Cobalt
- 1: Manganese
- 2: Nickel

2nd Number(Y): metals which disturb recycling main metals
- 0: None
- 1: In case the total "Tin(Sn)" content in the cell(s) is more than 1.0 wt% per battery pack weight
- 2: In case the total "Phosphorous(P)" content in the cell(s) is more than 0.5 wt% per battery pack weight

See **Figure 5** for detail specifications for symbol and battery type.

Table 9. Battery Label Requirements for Japan	
Class of the Specified Labeled Product	
Storage batteries not covered by using plastic or other materials and storage batteries covered by using plastic or other materials with height of less than 10mm	**Battery type**
Sealed lead storage batteries covered by using plastic or other materials with height of 10mm or more	**Symbol with Battery type**
Sealed nickel-cadmium storage batteries covered by using plastic or other materials with height of 10mm or more	
Sealed nickel-hydrogen storage batteries covered by using plastic or other materials with height of 10mm or more	
Sealed lithium storage batteries covered by using plastic or other materials with height of 10mm or more	

Figure 5. Chasing Arrows recycling symbol and Battery type for Japan

2.5 Requirement for Decorative Metal Finishing

Powder coating is the preferred material for decorative metal finishing of Lenovo hardware products. This includes the finishing of decorative metal parts and OEM products. Exceptions to this

requirement are applications where production volumes don't justify using the powder coating process; a unique color, texture, or "feel" (e.g., soft-touch) is specified; or conductive (e.g., electrostatic discharge (ESD), electromagnetic compatibility (EMC)) functional coatings are required. Powder coatings are not applicable, at this time, for the finishing of plastic parts). Contact your Lenovo procurement representative to identify the Lenovo approved powder coating supplier and qualified color matched materials for decorative metal finishing of Lenovo hardware products.

2.6 Requirements for Parts and Products Containing Mercury

While most mercury-containing components are prohibited from Lenovo hardware Products (see **Table 1**), mercury is allowed in energy efficient lamps. The use of a mercury-containing component must be reported to your Lenovo procurement representative to ensure that the applicable legal requirements are met for Products containing mercury. All Parts or Products containing mercury must be labeled in English per the requirements of **Table 9** for certain U.S. State laws. Appropriate text as defined in **Table 9** must be added to user and service manuals (or instructions for projector replacement lamps) for mercury-added Products indicating which Product components contain mercury and directing the Product owner to dispose of the Product per local regulations. Product packaging for products with mercury added lamps that are easily removable by the consumer (such as projectors and projector replacement lamps) and packaging for all mercury containing replacement parts must also be labeled per the requirements of **Table 9**.

Table 10 provides a list of those Lenovo Product categories that are known to contain mercury and provides exact requirements for label wording, label font size, and user manual text. Labels and manual text for Product categories not listed in **Table 10** must be reviewed and approved by your Lenovo procurement representative.

Table 10. Mercury Added Product Labeling Information for the United States

Product Type	Mercury Location	Mercury Amount	Product Label Requirements	Package Label Requirements	User / Service Manual Requirements
Laptop / Notebook Computer	Fluorescent lamp in Display module	0-5 mg per lamp; 1-3 lamps per product Eco Labels such as "EU Flower" and Nordic Swan" requires that each bulb has <3.0 mg of Hg.	• Label Wording- "This product contains a lamp(s) which contains mercury; dispose according to local, state, or federal laws." • Label Location - Bottom of product; must be clearly visible. • Label Construction – Per requirements of UL 969 Standard, "Marking and Labeling Systems "	• Statement Wording - "The fluorescent lamp in the liquid crystal display contains mercury; dispose according to local, state or federal laws."	• Statement Wording - "The fluorescent lamp in the liquid crystal display contains mercury; dispose according to local, state or federal laws." • Statement must be 10 point font or greater.

			• Label font size must be 10 point or greater		
Flat Panel LCD Display	Fluorescent lamp in Display module	0-5 mg per lamp; 2-12 lamps per products	• Label Wording - "This product contains a lamp(s) which contains mercury; dispose according to local, state, or federal laws." • Label Location - Rear panel of product; must be clearly visible. • Label Construction – Per requirements of UL 969 Standard, "Marking and Labeling Systems" • Label font size must be 10 point or greater	• Statement Wording - "The fluorescent lamp in the liquid crystal display contains mercury; dispose according to local, state or federal laws."	• Statement Wording - "The fluorescent lamp in the liquid crystal display contains mercury; dispose according to local, state or federal laws." • Statement must be 10 point font or greater.
Mercury containing replacement parts for notebooks and flat panel LCD monitors	Fluorescent lamp	0-5 mg per lamp	• None for replacement parts	• Replacement part package must be labeled with "This part contains a lamp which contains mercury; dispose according to local, state, or federal laws." • Label font size must be 10 point or greater	• None for replacement parts

Digital Projectors (LCD Data and Video)	Metal Arc lamp	10-50 mg per lamp; 1 lamp per product	• Label Wording - "This product contains a lamp which contains mercury; dispose according to local, state, or federal laws." • Label Location - bottom panel of product; must be clearly visible. • Label Construction – Per requirements of UL 969 Standard, "Marking and Labeling Systems" • Label font size must be 10 point or greater	• Individual product package must be labeled with "This product contains a lamp which contains mercury; dispose according to local, state, or federal laws." • Label font size must be 10 point or greater	• Statement Wording - "This product contains a lamp which contains mercury; dispose according to local, state, or federal laws. See www.lenovo.com/lenovo/environment for information on Lenovo recycling programs or www.lamprecycle.org for additional information on lamp recycling." • Statement must be 10 point font or greater
Video Projector Replacement lamp assembly	Metal Arc lamp	10-50 mg per lamp	• Label Wording - "This lamp contains mercury; dispose according to local, state, or federal laws." • Label Location – lamp assembly housing; must be clearly visible. • Label Construction – Per requirements of UL 969 Standard, "Marking and Labeling Systems" • Label font size must be 10 point or greater	• Individual lamp package must be labeled with "This lamp contains mercury; dispose according to local, state, or federal laws." • Label font size must be 10 point or greater	• Statement in instructions - "This lamp contains mercury; dispose according to local, state, or federal laws. See www.lenovo.com/lenovo/environment for information on Lenovo recycling programs or www.lamprecycle.org for additional information on lamp recycling." Statement must be 10 point font or greater
Video Projector Replacement lamp	Metal Arc lamp	10-50 mg per lamp	• See requirements for replacement lamp assembly above • If lamp manufacturer has approved alternative label from Vermont for lamp, must submit to Lenovo a copy of	• See requirements for replacement lamp assembly above	• See requirements for replacement lamp assembly above

			approval from Vermont and lamp only can be labeled according to alternative (housing and machine must be labeled to Lenovo specification)		

2.7 Requirements for Chemicals

The following requirements apply to any

- Chemical used to maintain or service hardware Products. Examples include adhesives, cleaning solvents or solutions, lubricants, and paint
- Chemical contained in a Product or assembly which is not normally consumed but may require replacement of the chemical to maintain operation of Product or assembly. Examples include silicone grease for heat radiation sealing, refrigerants, lubricants, biocides, or corrosion inhibitors in a closed looped system.

The chemical's individual container or individual protective packaging must be labeled with:

- The chemical name as it appears on the associated Material Safety Data Sheet(s)
- The name and address of the appropriate chemical manufacturer, supplier or other responsible party, (in some cases, Lenovo may designate the responsible party) and
- Appropriate hazard warnings as applicable.

The label must be provided in English at a minimum. The label may also be required to have text in other languages and format as required by law or regulation in countries outside the U.S.
The Supplier shall work with the Lenovo chemical representative through the Lenovo procurement representative to ensure proper labeling. In some cases, Lenovo may specify the label and its contents.

A Material Safety Data Sheet (MSDS) for the chemical must be supplied to the Lenovo procurement representative or other Lenovo designated representative. The MSDS must be provided in English at a minimum and comply with legal requirements for information content and format. The MSDS may be required in other languages and formats as required by law or regulation in countries outside the U.S. The supplier shall work with the appropriate Lenovo chemical representative through the Lenovo procurement representative to ensure proper format, information content, and translation requirements. In some cases, Lenovo may specify the language and format of an MSDS.

Chemical FUMs are materials stocked by Lenovo to support customers. Some examples include cleaners, adhesives, glues, paint, oils, alcohol, and chemicals in kits. Chemical FUMs must be packaged according to this specification including the following:

a. They must be packaged in field use units (usually a unit of one) so that Lenovo can reship them in the same package.

b. Under special circumstances, Lenovo Purchasing may permit the use of a single combination package that consolidates **multiple** inner containers inside a **single** outer container. Such configurations may be acceptable due to the small physical package size, shipping quantity or other factors as defined by Lenovo. In this instance, only government approved third-party test laboratories are permitted to authorize and certify the UN specification package. Authorization to use a combination package, which consists of multiple inner packages in a single outer package, must be provided by Lenovo Purchasing in writing.

c. A FUM containing liquids must use combination packagings, as single packaging is restricted by some airlines.

d. Packaging, labeling and marking must be compliant with all transportation regulations where materials will be shipped (ie IATA / 49 CFR / ADR....). All FUM packaging, labeling and marking must be compliant with IATA regulations as purchased from the supplier no matter where it is intended to be shipped.

e. The net quantity per package shall not exceed the standard maximum net quantity per package as allowed on "Passenger and Cargo Aircraft", as defined by IATA regulations. The net quantity per package is not required to meet IATA Limited Quantity requirements.

2.8 Product Chemical Emissions

Chemical emissions analyses shall be performed on Products and supplies (e.g. toner), but are not necessary for Parts or subassemblies of Lenovo hardware Products. Products covered by this specification shall not emit chemicals during normal use conditions which exceed the threshold values or requirements listed in U.S. 29 CFR 1910 (tables Z 1-3) (see http://www.gpoaccess.gov/cfr/index.html) or the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) (see http://www.calepa.ca.gov/). Product chemical emissions requirements are delineated in ECMA 328: Detection and Measurement of Chemical Emissions From Electronic Equipment (see http://www.ecma-international.org/).

2.9 WEEE Marking

2.9.1 Affected Products and Jurisdictions

Electrical and electronic equipment (EEE) that is put on the market in the European Union after August 13, 2005, and that is listed in the category of IT and telecommunications products in Annex 1B3 of the EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) is subject to the requirements for product markings in accordance with the Directive. In addition to the products specified in Annex 1B3 of the WEEE Directive, stand alone options that operate external to the products listed in Annex 1B3 (e.g., keyboards, monitors, mice, external drives) should also be marked. Components and internal parts of the stand alone equipment listed in Annex 1B3 do not need to be marked.

Lenovo requires the use of the WEEE markings on Products sold in non-EU countries to be qualified by adding the text "EU Only" below the solid bar as shown in **Figure 6**. Contact your Lenovo procurement representative to confirm the latest requirements for WEEE marking implementation for affected Products.

2.9.2 WEEE Marking Elements

The marking of EEE to comply with the WEEE Directive requires all three of the following:

1) the crossed-out wheeled bin symbol in accordance with Annex IV of the WEEE Directive per Article 10(3). The symbol of the crossed-out wheeled bin is the same as required for the battery collection mark in the EU (see **Figure 1**).

2) a unique identification of the producer such as a brand name, trademark, company registration number or other suitable means recorded in EU member state's register of producers per Article 12(1) of the Directive and

3) the date of manufacture/put on the market.

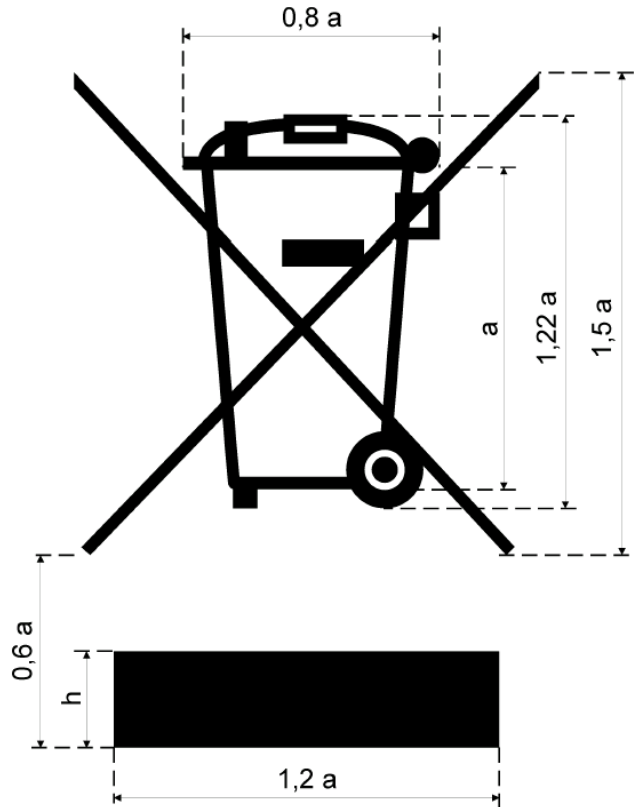
European Standard EN 50419:2005 identifies three options for the indication of the date of manufacture/put on the market:

A) Indicate the date of manufacture or date put on the market in un-coded text in accordance with EN 28601 (This European Standard is equivalent to ISO 8601) or other coded text, for which the code shall be made available for treatment facilities; or

B) Use the solid bar symbol as shown in **Figure 6** below in conjunction with the crossed out wheeled bin symbol. The height (h) of the solid bar shall be the greater of 0.3a or 1 mm. The bar must only be used in conjunction with the crossed out wheeled bin to indicate that the product is put on the market after August 13, 2005.

C) Use both options A) and B).

All three marking elements (the crossed-out wheeled bin, the producer identification, and the date of manufacture/put on the market or the solid bar under the crossed out wheeled bin) must be present on the Product; however, the specific placement of these markings is not prescribed other than for the relationship of the solid bar to the crossed-out wheeled bin if the bar symbol is used.



EU Only

Figure 6. The marking and dimensional relationship of the solid bar symbol for indication of products manufactured or put on the EU market after August 13, 2005.

Lenovo requires the additional text "**EU Only**" to appear below the solid bar when Products are sold in non-EU countries where the WEEE mark may be inconsistent with local regulations. The size of the lettering "**EU Only**" shall have a minimum text height of 2mm. Helvetica font, 8 or 10 points is recommended. Text is to be centered under the black bar.

The markings must be visible, durable, legible, and indelible; that is, each marking element must be located on a permanent portion of the Product such as a frame member or chassis that cannot be removed or exchanged. Markings can be located behind a door or cover, but must be viewable without the use of a tool by a customer or operator.

European Standard 50419:2005 also prescribes that the marking must meet minimum marking durability requirements. The marking must remain legible after rubbing by hand for 15 seconds with a piece of cloth soaked with water and again for 15 seconds with a piece of cloth soaked with aliphatic solvent hexane. If marking plates or labels are used, after this test they shall not show curling.

2.10 Electronic Product Environmental Assessment Tool (EPEAT) Marking

Products which meet the requirements of the EPEAT program may exhibit the appropriate certification mark on the product, product manual, product promotional materials or packaging. Lenovo Global Environmental Affairs must be contacted to determine the level of EPEAT compliance (if at all) and ensure product is registered in EPEAT database prior to the use of any EPEAT certification mark. Only one form of the mark should be used in any one publication (either preferred mark or optional mark). Clear space of at least 20% of the size of the mark must be maintained around the mark, and the mark must be used in a size large enough that it is identifiable and the Designation (gold, silver, bronze) is clearly legible. The preferred mark must be at least 0.5 inches high and the optional mark must be at least 0.1875 inches high (**figure 7**). Marks may be printed in black and white (as shown or reversed) so long as the designation is clearly legible. When color is available, the preferred colors for the marks are

Gold: Pantone 871; 3c/26m/81y/4k
Silver: Pantone 877; 20c/0m/0y/40k
Bronze: Panton 874; 30c/45m/70y/15k

Preferred Marks: **Optional Marks:**

Figure 7. EPEAT markings.

2.11 Product Energy Requirements

The following sections summarize requirements for selected geographies.

2.11.1 Monitors

2.11.1.1 Requirements for China

Computer monitors shall meet the energy efficiency requirements of the National Standard of the People's Republic of China GB 21520-2008, Sections 4.2 and 4.4. The scope of this standard includes general purpose computer monitors, both cathode ray tubes and liquid crystal displays used for computers using normal electrical network voltages and to display equipment with modulator/receivers mainly used for computers. Monitors must meet the minimum Efficiency standards for Grade 2. See table in this section for requirements for Grade 2.

Table 11. Minimum Efficiency Standards for Grade 2 Monitors

Monitor Type	Energy Efficiency Grade					
	Grade 1		Grade 2		Grade 3	
	Energy efficiency / (cd/W)	Energy consumption in off mode / W	Energy efficiency / (cd/W)	Energy consumption in off mode / W	Energy efficiency / (cd/W)	Energy consumption in off mode / W
CRT	0.18	1	0.16	3	0.14	5
LCD	1.05	0.5	0.85	1	0.55	2

Monitors shall be tested, the testing reported and registered in accordance with the GB 21520-2008 and the China Rules for Computer Monitor Energy Label.

Monitors shall be labeled with the China Energy Label in accordance with the China Rules for Computer Monitor Energy Labeling. See Figure below for an example label. The label can be on the product, on the packaging, or displayed at least two seconds on the monitor when the monitor is turned on. The minimum length is 80 mm and the minimum width is 54 mm. The label must be in color with a blue and white background. The label must have the name of the manufacturer, product model, energy efficiency level, energy efficiency (cd/W), energy consumption under off mode (W) and number of energy efficiency standard. The label, if placed on the packaging or on the product, must be on 80 gram or more coated paper. The label or information from the label shall also be included in the product instructions. If there are no product instructions, then this last requirement is not needed.

Figure 8. Example of a China Energy Label

2.11.1.2 Requirements for Korea

Standby Product meeting standby power criteria : e-Standby Warning Label Products (Mandatory)

In 2008, certain products were designated as requiring mandatory energy efficiency labeling. Therefore, besides the best e-standby product labeling program (voluntary), manufacturers or importers of certain MKE and KEMCO designated electric appliances ("e-Standby Warning Label Products") must test covered products by a designated testing institution and report the testing result to KEMCO. If the standby power falls short of the e-standby power reduction criteria the manufacturer or importer is legally obliged to attach an e-Standby Warning Label.

MKE and KEMCO designated the following 7 products as e-Standby Warning Label Products: computers, monitors, printers, multifunction devices, televisions, set top boxes, and microwave ovens. However, this mandatory labeling system became effective only with respect to televisions as of August 28, 2008; it will further become effective with respect to the remaining six products as of July 1, 2009. In addition, beginning January 1, 2010, almost all target products of the e-Standby Program will become the target products of the e-Standby Warning Label system.

Definitions

Computer - Computers with nameplate output power of power supply less than equal to 1,000W. Covers mainly computers sold commercially or for household use in the market, including personal computers, notebook computers, and including integrated computer systems. Computers for network servers, workstations and computers in standby mode awaiting instructions remotely are excluded

Monitor - Electrical appliance with rated power consumption of 1000W or less, consisting of a display screen (CRT, LCD, PDP, etc.) to display the output information from the computer via one or more input terminals such as VGA or DVI terminal, and its associated electronic equipment. This includes those with both computer monitor and TV functions, either with a focus on computer monitor as the primary function or with equal dual function. Integrated computer systems (where computer and monitor combined into a single unit), network monitor and monitors embedded with special functions including VoIP are excluded.

Requirements

Computers and Monitors must be labeled according to Annex VII of the Korean e-Standby Program Application Regulation, August 28, 2008 with a warning logo if the monitors do not meet the requirements in the following tables:

Table 12. Low Power Performance Requirements		
Category	**Watts in Sleep Mode**	**Watts in Off mode**
Monitor	<2.0W	<1.0W

Category	**Sleep mode**		Watts in off mode
	Default time	Watts in low power mode	
Personal Computers(Laptop)	≤30 min	≤1.7W	≤1.0W
Personal Computers(Desktop)	≤30 min	≤4.0W	≤2.0W
Integrated Computer System	≤30 min	≤4.0W	≤2.0W

Note: When applying the standards listed in table above to computers shipped to the market, additional allowable tolerance of +0.7W is given at sleep and off modes for computers with WOL (Wake on Lan) function.

The figure below has an example warning logo. The minimum diameter of the logo is 2.5cm. The logo is to be labeled on the front or top side of the product. The logo may be monochrome, the predominant color of the product's surface, or in the colors suggested by the Korean e-Standby Regulation.

Figure 9. Example of a warning logo for e-Standby Power Program Target Products**.**

The manufacturer of the monitor shall submit the appropriate reporting forms as required to the Korea Energy Management Corporation (KEMCO).

2.11.1.2 Requirements for the EU and Switzerland

This section applies to Energy Using Products (EUP) including information technology equipment intended primarily for use in the domestic environment (see Annex I of EU Commission Regulation No 1275/2008.)

Definitions
Electrical and electronic household and office equipment - means any energy-using product which:

(a) is made commercially available as a single functional unit and is intended for the end-user;
(b) falls under the list of energy-using products of Annex I (in EU Regulation (EC) No 1275/2008);
(c) is dependent on energy input from the mains power source in order to work as intended; and
(d) is designed for use with a nominal voltage rating of 250 V or below.

This definition is from EU Commission Regulation (EC) No 1275/2008. Energy-using products in Annex I include information technology equipment intended primarily for use in the domestic environment which means products classified as Class B per EN55022 in EU Directive 89/336/EEC for Electromagnetic Compatibility (EMC). Examples of products which may be classified as Class B include monitors, workstations and laptops. EU Regulation 1275/2008 for ecodesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment can be found at:
Http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:339:0045:0052:EN:PDF

Requirements
Electronic equipment, such as monitors, workstations and laptops which are EMC Class B Information Technology equipment as defined in EN 55022:2006 and newly releasing must meet the following requirements:

1. Power consumption in off-mode shall not exceed 1.0 W,
2. Power consumption in standby mode with a reactivation function shall not exceed 1.0 W,
3. Power consumption in standby mode providing only information or status display shall not exceed 2.00 W, and

4. When equipment is not providing the main function, or when other energy-using product(s) are not dependent on its functions, equipment shall, unless inappropriate for the intended use, offer a power management function that switches equipment after the shortest possible period of time into standby mode, or off mode, or another condition which does not exceed the applicable power consumption requirements for off mode and/or standby mode when the equipment is connected to the mains power supply.

Electronic equipment, such as monitors, workstations and laptops, which are EMC Class B Information Technology equipment as defined in EN 55022:2006 and currently shipping to Lenovo as of September 1, 2009 must meet the following requirements:

1. Power consumption in off-mode shall not exceed 1.00 W,
2. Power consumption in standby mode with a reactivation function shall not exceed 1.00 W, and
3. Power consumption in standby mode providing only information or status display shall not exceed 2.00 W.

The product must be marked with the CE conformity marking. See the following Figure. The CE mark must have a height of at least 5 mm. The CE marking must be affixed to the EuP. Where this is not possible, it must be affixed to the packaging and to the accompanying documents.

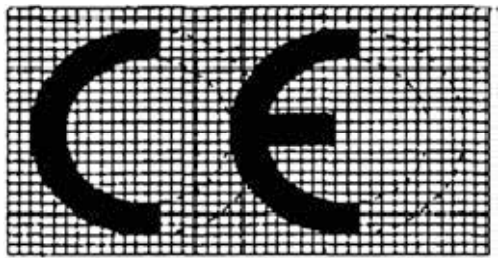


Figure 10. Example of CE conformity marking.

The following technical documents must be provided to Lenovo:
A. Declaration of Conformity (DoC) to EU Regulation 1275/2008 as required by EU Directive 2005/32/EC. The DoC must include:
i. Name and address of the manufacturer or of its authorized representative;
ii. A description of the model sufficient for unambiguous identification;
iii. Where appropriate, the references of the harmonized standards applied;
iv. Where appropriate, the other technical standards and specifications used;
v. Where appropriate, the reference to other EU Community legislation providing for the affixing of the CE mark that is applied;
vi. Identification and signature of the person empowered to bind the manufacturer or its authorized representative.
B. Statement indicating which energy efficiency tier (or both) the DoC applies to (see the first two paragraphs of this section for energy efficiency tier information), and
C. The technical documentation showing efficiency data must be provided. The technical documentation must meet the requirements of Annex IV of EU Commission Regulation No 1275/2008.

2.11.2.1 External Power Supplies, Adapters and Chargers

Requirements for USA/ Australia/ New Zealand

Definitions

External Power Supply (EPS) – A single voltage external AC to DC or AC to AC power supply is a device designed to convert line voltage AC input to a lower AC or DC voltage, converting to only 1 AC or DC output at a time, is sold with or intended to be used with a separate end-use product that constitutes the primary load, is contained in a separate physical enclosure from the end use product, is connected to the end-use product via removable or hard wired male/female electrical connection, cable, cord or other wiring, and has a nameplate output power less than or

equal to 250 watts. Please note, for Australia and New Zealand only, these countries have an additional phrase for the definition of an EPS. The EPS must have an input from a mains supply. The EPS must have an integral mains plug to be within scope of the Australia/NZ requirements.

Requirements

External power supplies manufactured after July 1 2007 must meet the requirements of the California Code of Regulations, Title 20, Sections 1601 - 1608 Tier 1 and those manufactured after July 1 2008 must meet the requirements of the Tier 2. Tier 2 efficiency standards are listed below.

Table 13. External Power Supply Requirements	
Active Mode	
Nameplate Output	**Required Efficiency (decimal equivalent of a percentage)**
Less than 1 watt	0.5 times the Nameplate Output
From 1 watt to not more than 51 watts	The sum of 0.09 times the Natural Logarithm of the Nameplate Output and 0.5
Greater than 51 watts	0.85
No-Load Mode	
Nameplate Output	**Maximum Consumption**
Not more than 250 watts	0.5 watts

The power supply and packaging must be labeled according to the International Efficiency Marking Protocol. In keeping with the above efficiency standards, the power supply must have a marking of IV or higher. The marking is determined by comparing the unit's active and no load test data with the performance requirements of the International Efficiency Marking Protocol scale. The marking shall be permanently shown on the nameplate of the power supply. The font should be a plain serif font such as Times Roman. The size must be legible and indelible in a color that contrasts with the nameplate background. The label must include the manufacturer's name, model number, and Date of Manufacture. Further information about the International Efficiency Marking Protocol can be found at:
Http://www.energystar.gov/index.cfm?c=ext_power_supplies_pd.intl_power_supply_eff_init

The manufacturer must register each model or family of models in Australia, New Zealand and other jurisdictions as required (e.g., Arizona and New York.) The supplier must provide Lenovo with a copy the Energy Efficiency test results, used to verify the supply meets the IV mark criteria. See the following web site for more details for registration in Australia:
Http://www.energyrating.gov.au/forms.html

2.11.2.2 Requirements for Korea

Definitions

Adapter – A single voltage external power supply (AC-DC or AC-AC) under 150 W (nameplate output power) without any charging function.

Charger – Single voltage external power supply (AC-DC) with charging function to charge a lithium ion battery and has an input of 20W.

Requirements
Adapters (external power supply without charging) shall meet the requirements found in the table below.

Table 14. Minimum Energy Performance Standards for Adapters	
Minimum Energy Performance Standards (MEPS)	
Output power on name plate (P_{no})	**Running Efficiency (On mode energy efficiency)**
$0<P_{no}<1W$	$>0.49 \times P_{no}$
$1W<P_{no}<49W$	$>[0.09 \times Ln(P_{no})] + 0.49$
$49W<P_{no}<150W$	>0.84

Output power on name plate (P_{no})	**Maximum Standby Power (Power consumption on No-Load Mode)**
$0<P_{no}<10W$	<0.5W
$10W<P_{no}<150W$	<0.75W

Chargers (external power supply with charging function to charge Li-Ion Battery) must meet the requirements found in the table below.

Table 15. Minimum Energy Performance Standards for Chargers	
Minimum Energy Performance Standards (MEPS)	
$0<P_{in}<10W$	<0.5W
$10W<P_{in}<20W$	<0.75W

Adapters and Chargers must be tested and labeled in accordance with the Korean Regulation on Energy Efficiency Labeling and Standards, July 31, 2008. The required label is in the Figure below. The label shall be on the front or top of the product. Please note that "ABC-12345" represents the model number of the external power supply. If the model number is already shown on the unit, then the line text with the model number can be eliminated on this label. The KC mark does not need to be right next to the Korean text but does need to be on the front or top of the unit.

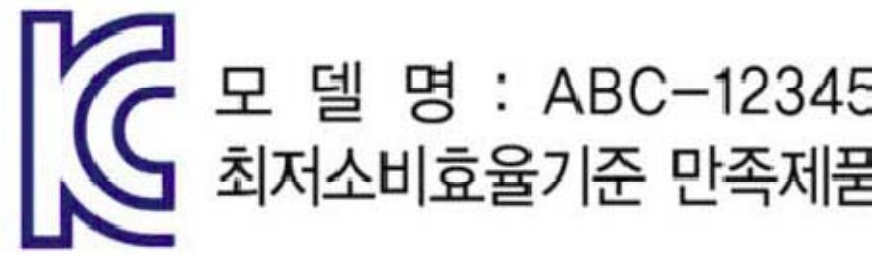


Figure 11. Korea Energy Label for Adapters and Chargers.

2.12.2.3 Requirements for the EU and Switzerland

The section applies to external power supplies (EPSs) irrespective of the EMC classification of A or B. This section does not apply to uninterruptable power supplies (UPSs).

Definitions

External power supply - device which meets all of the following criteria:
1. It is designed to convert alternating current (AC) power input from the mains power source into lower voltage direct current (DC) or AC output;
2. It is able to convert to only one DC or AC output voltage at a time;
3. It is intended to be used with a separate device that constitutes the primary load;
4. It is contained in a physical enclosure separate from the device that constitutes the primary load;
5. It is connected to the device that constitutes the primary load via a removable or hard-wired male/ female electrical connection, cable, cord or other wiring;
6. It has nameplate output power not exceeding 250 Watts;
7. It is intended for use with electrical and electronic household and office equipment as referred to in EU Regulation (EC) No 1275/ 2008 Article 2(1).

Requirements

External power supplies must meet the following requirements (effective April 2010):
1. The no-load condition power consumption shall not exceed 0.50 W
2. The average active efficiency shall be not less than:
a. 0.500 * P_O, for P_O < 1.0 W;
b. 0.090 * Ln(P_O) + 0.500, for 1.0 W < P_O < 51.0 W;
c. 0.850 for P_O > 51.0 W.

1. The no-load condition power consumption shall not exceed the following limits (effective April 2011):

	AC-AC EPSs, except low voltage EPSs	**AC-DC EPSs except low voltage EPSs**	**Low voltage EPSs**
P_O < 51.0 W	0.50 W	0.30 W	0.30 W
P_O 51.0 W	0.50 W	0.50 W	Not Applicable

2. The average active efficiency shall be not less than the following limits:

	AC-AC and AC-DC EPSs, except low voltage EPSs	**Low voltage EPSs**
$P_O < 1.0$ W	0.480 x P_O + 0.140	0.497 x P_O + 0.067
1.0 W < P_O < 51.0 W	0.0626 x Ln(P_O) + 0.622	0.075 x Ln(P_O) + 0.561
$P_O > 51.0$ W	0.870	0.860

The product must be marked with the CE conformity marking. See Figure 10. The CE mark must have a height of at least 5 mm. The CE marking must be affixed to the EPS. Where this is not possible, it must be affixed to the packaging and to the accompanying documents.

The following technical documents must be provided to Lenovo:
1. Declaration of Conformity (DoC) to EU Regulation 1275/2008 as required by EU Directive 2005/32/EC. The DoC must include:
i. Name and address of the manufacturer or of its authorized representative;
ii. A description of the model sufficient for unambiguous identification;
iii. Where appropriate, the references of the harmonized standards applied;
iv. Where appropriate, the other technical standards and specifications used;
v. Where appropriate, the reference to other EU Community legislation providing for the affixing of the CE mark that is applied;
vi. Identification and signature of the person empowered to bind the manufacturer or its authorized representative.

2. The technical documentation showing efficiency data must be provided. The technical documentation must meet the requirements of Annexes I and II of EU Commission Regulation No 278/2009 and Switzerland Energy Regulation Appendix 2:11.

EPSs which are packaged as service or spare parts must clearly indicate the primary load product for which the EPS is intended to be used with.

2.12 Environmental Notifications - Customer Hardware Publications

Customer Hardware Publications for Lenovo Logo Deliverable**s** must include specific Environmental Notices. Suppliers providing Lenovo with customer hardware publications must contact their Lenovo Procurement representative or the author of this specification for details.

3.0 Notification Procedures

If the Material, Part, or Product being supplied to Lenovo does not meet one or more of the applicable requirements in this ES, the supplier must immediately notify the Lenovo procurement representative. This also applies if the supplier or a subcontractor(s) makes changes in their

operations that will cause a Material, Part, or Product to no longer comply with this ES. If any Material, Part, or Product contains any substances in applications restricted by **Tables 1 or 2**, or contains any mercury, suppliers must immediately report such information to their Lenovo procurement representative.

4.0 References

Argentina National Legislature Act 26184. Published 21 December 2006. Prohibitions on the manufacturing, assembly and importing of batteries and primary batteries.

Australian Ozone Protection and Synthetic Greenhouse Gas Management Act of 1989
http://www.environment.gov.au/atmosphere/ozone/legislation/commonwealthleg.html
Austrian Battery Ordinances 514/1990, as amended by BGB1 No. 3/1991(4 January, 1991) and BGB1.II Nol. 495/1999 (28 December 1999) of the Ordinance of Federal Ministry for Environment, Youth and Family.

Austrian Ordinance by the Federal Minister for Agriculture, Forestry, Environment and Water Management on Bans and Restrictions for Partly Fluorinated and Fully Fluorinated Hydrocarbons and Sulphur Hexafluoride

California Code of Regulations, title 22, division 4.5: Chapter 33. Best Management Practices for Perchlorate Materials.
Http://www.dtsc.ca.gov/LawsRegsPolicies/Title22/index.cfm

California Safe Drinking Water and Toxic Enforcement Act of 1986:
Http://www.oehha.org/prop65/law/P65law72003.html

Canada Prohibition of Certain Toxic Substances Regulations, 2005. Canadian Environmental Protection Act, 1999.
Http://laws.justice.gc.ca/en/showtdm/cr/SOR-2005-41//?showtoc=&instrumentnumber=SOR-2005-41

Connecticut Public Law 02-90, The Mercury Education and Reduction Act
http://www.ct.gov/dep/cwp/view.asp?a=2708&q=324028&depNav_GID=1638

Denmark Statutory Order no. 552 of 2 July 2002 Regulating Certain Industrial Greenhouse Gasses
http://glwww.mst.dk/homepage/

EU Commission Decision 2005/618/EC of 18 August 2005 amending Directive 2002/95/EC of the European Parliament and of the Council for the purpose of establishing the maximum concentration values for certain hazardous substances in electrical and electronic equipment.
Http://europa.eu.int/comm/environment/waste/weee_index.htm

EU Commission Decision 2005/717/EC of 13 October 2005 amending for the purposes of adapting to the technical progress the Annex to Directive 2002/95/EC of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
Http://europa.eu.int/comm/environment/waste/weee_index.htm

EU Commission Decision 2005/747/EC of 21 October 2005 amending for the purposes of adapting to technical progress the Annex to Directive 2002/95/EC of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
Http://europa.eu.int/comm/environment/waste/weee_index.htm

EU Commission Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment. Official Journal of the European Union 13.2.2003
Http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l_037/l_03720030213en00190023.pdf

EU Commission Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE)
Http://ec.europa.eu/environment/waste/weee/index_en.htm

EU Commission Directive 2006/122/ECOF of 12 December 2006 amending for the 30th time Council Directive 76/769/EEC on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations (perfluorooctane sulfonates)
http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2006:372:SOM:en:HTML

EU Council Directive 76/769/EEC, on the approximation of the laws, regulations and administrative provisions of the Member States relating to the restrictions on the marketing and use of dangerous substances and preparations
http://eur-lex.europa.eu/LexUriServ/site/en/consleg/1976/L/01976L0769-20030215-en.pdf

EU Commission Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators
Http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_266/l_26620060926en00010014.pdf

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Http://eur-lex.europa.eu/JOIndex.do?year=2006&serie=L&textfield2=396&Submit=Search

EU Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators

http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_266/l_26620060926en00010014.pdf

EU Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
Http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_396/l_39620061230en00010849.pdf

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http://eur-lex.europa.eu/LexUriServ/site/en/consleg/2000/R/02000R2037-20041224-en.pdf

EU Commission Directive 2006/122/ECOF of 12 December 2006 amending for the 30th time Council Directive 76/769/EEC on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations (perfluorooctane sulfonates)
http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2006:372:SOM:en:HTML

Florida Statutes Title XXIX, Chapter 403.7192 Batteries; requirements for consumer, manufacturers, and sellers.
Http://www.leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0403/SEC7192.HTM&Title=->2007->Ch0403->Section%207192#0403.7192

Lenovo Packaging Specification 41A0613 - Recyclable Packaging Materials, Selection and Identification
http://www.pc.ibm.com/ww/lenovo/procurement/Guidelines/41A0613_L10412_R0_WORD_PDF.pdf

Lenovo Information for Suppliers web site:
http://www.pc.ibm.com/ww/lenovo/procurement/Guidelines/

Japan Ordinance No. 95 of the Ministry of Economy, Trade, and Industry under the Law for the Promotion of the Effective Utilization of Resources (Law No. 48, 1993 as amended, 2001).
Japan Law Concerning the Protection of the Ozone Layer through the Control of Specified Substances and Other Measures (Law No. 53 of May 20, 1988)

Japan's Law concerning the examination and regulation of manufacture, etc. of chemical substances (1973 Law No. 117, Amended July 2002)

Louisiana Mercury Risk Reduction Act of 2006
http://www.legis.state.la.us/billdata/streamdocument.asp?did=399136

Maine Public Law Chapter 296 Section 1. 38 MRSA 1609 An Act to Protect Pregnant Women and Children from Toxic Chemicals released into the home.
http://janus.state.me.us/legis/ros/lom/LOM123rd/PUBLIC296.asp

Maine Title 38, Chapter 24, Subchapter 4, 2165 Regulation of certain dry cell batteries
Http://janus.state.me.us/legis/statutes/38/title38sec2165.html

Maryland Title 6 of the Environment Code, Subtitle 11 Rechargeable Batteries, 6-1101 - 1114.
Http://www.dsd.state.md.us/comar/Annot_Code_Idx/EnvirIndex.htm

Minnesota Statutes 115A 9155 - Disposal of certain dry cell batteries. 115A 9157 - Rechargeable batteries and products.
Http://ros.leg.mn/revisor/pages/forms/getstatute.php

Netherlands, The, No. 553 Decree of 9 September 1998, comprising regulations regarding products containing mercury (Decree on Product Containing Mercury, 1998 Environmentally Hazardous Substances Act)
http://www2.vrom.nl/docs/internationaal/kwikbesluit_engels.pdf

Netherlands, The, 178 Besluit van 22 maart 2001, houdende vaststelling van het Warenwetbesluit formaldehyde in textiel.

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Http://lis.njleg.state.nj.us/cgi-bin/om_isapi.dll?clientID=27915686&depth=2&expandheadings=off&headingswithhits=on&infobase=statutes.nfo&softpage=TOC_Frame_Pg42

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Http://caselaw.lp.findlaw.com/nycodes/c37/a125.html

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http://www.sft.no/seksjonsartikkel____30217.aspx

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Http://www.aeanet.org/governmentaffairs/gajl_Packaging_GB18455_2001ENG.asp

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Chinese: Http://www.mii.gov.cn/art/2006/03/02/art_521_7344.html
English: Http://www.aeanet.org/governmentaffairs/gabl_ChinaRoHS_FINAL_March2006.asp

People's Republic of China - Ministry of Information Industry - Electronic Information Products Classification and Explanation
Chinese: Http://www.mii.gov.cn/art/2006/03/16/art_1221_8441.html
English: Http://www.aeanet.org/governmentaffairs/gabl_HK_Art3_EIPTranslation.asp

People's Republic of China SJ/T 11363-2006 Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products
Http://www.aeanet.org/governmentaffairs/gajl_MCV_SJT11363_2006ENG.asp

People's Republic of China SJ/T 11364-2006 Marking for Control of Pollution Caused by Electronic Information Products
Http://www.aeanet.org/governmentaffairs/gajl_LABELING_SJT11364_2006ENG.asp

People's Republic of China SJ/T 11365-2006 Testing Methods for Toxic and Hazardous Substances in Electronic Information Products (draft version)
Http://www.aeanet.org/governmentaffairs/gajl_ChinaRoHS_TestingMethods_August2006.asp

Rhode Island Mercury Education and Reduction Act
http://www.rilin.state.ri.us/Statutes/TITLE23/23-24.9/INDEX.HTM

Sweden Mercury-containing Products (Certain) Ordinance (SFS 1991:1290)

Switzerland Ordinance on Risk Reduction related to Chemical Products (ORRChem)
Http://www.bafu.admin.ch/chemikalien/01410/01411/index.html?lang=en

United States Section 611 of the 1990 amendments of the Clean Air Act http://www.epa.gov/air/caa/

United States Mercury-Containing and Rechargeable Battery Management Act (Public Law 104-142)
http://www.epa.gov/epaoswer/hazwaste/state/policy/pl104.pdf

United States Toxic Substances Control Act; Occupational Safety and Health Act (29 CFR 1910.1001-1051)
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9696

Vermont Statutes Title 10. Chapter 159. Subchapter 1. 6621b. Regulation of dry cell batteries and 6621c Lead Acid Batteries; collection for recycling.
Http://www.leg.state.vt.us/statutes/sections.cfm?Title=10&Chapter=159

Washington, Revised Code, Title 70, Public Health and Safety. An Act relating to phasing out the use of polybrominated diphenyl ethers.
Http://www.leg.wa.gov/pub/billinfo/2007-08/Pdf/Bills/Session%20Law%202007/1024-S.SL.pdf

5.0 Revision History

Date	EC Level	Change Summary
2008-11-19	M07196M	Modified document Title. Table 1 Changed references to PCD to SMD (Supplier Material Declaration) Asbestos - description changed to be consistent with IPC-1752 Brominated Flame Retardants - add "Intentionally Added" and remove all other comments. Mercury/Mercury Compounds - change the description to "Not present except in lambs"; consistent with Table 3. Hexavalent Chromium/Hexavalent Chromium - changed the description to be consistent with description in 41A7733; consistent with Table 3. Polyvinyl chloride (PVC) – removed threshold limit; changed description to reflect no usage in external plastic covers; consistent with Table 3. Polycyclic Aromatic Hydrocarbons (PAH) – moved requirements from Table 3 Red Phosphorous (Red-P) flame retardants – changed description Table 2 "Low Halogen" Substance Requirements – changed description Table 3 Antimony/Antimony Compounds – added phase-out target Beryllium/Beryllium Compounds – added phase-out target Brominated / Chlorinated Flame Retardants (other than PBBs or PBDEs) – changed description to be consistent with Table 3. Change the *Copyright Lenovo Corp. 2006* to *Copyright Lenovo Corp. 2008* EC release dates added under the EC numbers. 2.4.2.4 Additional Requirements for Taiwan – revised to reflect recent updates Figure 4. Four-in-One recycling symbol for Taiwan – updated symbol 2.4.2 Product Design and Labeling Requirements for Batteries - "EU" notation added to EU Battery Directive Mark per EPBA recomendation.
2009-02-10	**M07339F**	Added REACH requirements and information. Updated reference documents. Updated BFR/PVC phaseout plans (beginning 2011); criteria and requirements. Updated rechargeable battery labelling requirements for Japan. Added Product Energy requirements for monitors, external power adapters, PC's (China, Korea, EU, Switzerland, Australia, New Zealand).

ANNEXES: Detailed Chemical Lists with CAS Numbers

Unless specifically indicated as complete for the chemicals affected, these annex listings are not exhaustive.

Annex A. Asbestos

Asbestos	1332-21-4
Actinolite	77536-66-4
Amosite (Grunerite)	12172-73-5
Anthophyllite	77536-67-5
Chrysotile	12001-29-5
Crocidolite	12001-28-4
Tremolite	77536-68-6

Annex B. Azo colorants

Note: The EC azo dyes ban only applies to certain azo colorants that by reductive cleavage of azo groups may release one of the following 22 aromatic amines.

biphenyl-4-ylamine	92-67-1
benzidine	92-87-5
4-chloro-o-toluidine	95-69-2
2-naphthylamine	91-59-8
o-aminoazotoluene	97-56-3
5-nitro-o-toluidine	99-55-8
4-chloroaniline	106-47-8
4-methoxy-m-phenylenediamine	615-05-4
4,4'-methylenedianiline	101-77-9
3,3'-dichlorobenzidine	91-94-1
3,3'-dimethoxybenzidine	119-90-4
3,3'-dimethylbenzidine	119-93-7
4,4'-methylenedi-o-toluidine	838-88-0
6-methoxy-m-toluidine	120-71-8
4,4'-methylene-bis(2-chloroaniline)	101-14-4
4,4'-oxydianiline	101-80-4
4,4'-thiodianiline	139-65-1
o-toluidine	95-53-4
4-methyl-m-phenylenediamine	95-80-7
2,4,5-trimethylaniline	137-17-7
o-anisidine	90-04-0
4-amino azobenzene	

Annex C. Halogenated aromatic substances

Polychlorinated biphenyls (PCB)
Halogenated diarylalcanes
Halogenated benzenes

Annex D. Halogenated diphenyl methanes

Monomethyl tetrachloro diphenyl methane ade name: Ugilec 141	76253-60-6
Monomethyl dichloro diphenyl methane	81161-70-8

Trade name: Ugilec 121, Ugilec 21	
Monomethyl dibromo dipenyl methane Trade name: DBBT	99688-47-8

Annex E. Nickel

Nickel	7440-02-0
Nickelacetate	373-02-4
Nickelcarbonate	3333-67-3
Nickelcarbonyl	13463-39-3
Nickelhydroxide	12054-48-7, 11113-74-9
Nickelocene	1271-28-9
Nickeloxide	1313-99-1
Nickelsulfide	12035-72-2
Other nickel compounds	-

Annex F. Ozone Depleting Substances

Chlorofluorocarbons (CFCs):	
Trichlorofluoromethane (CFC-11) and its isomers	75-69-4 DR[2] 62185-70-0 DR[2] 79620-41-0 DR[2] 83589-40-6 DR[2] 91315-61-6
Dichlorodifluoromethane (CFC-12) and its isomers	75-71-8 DR[2] 185009-39-6 DR[2] 62185-71-1
Trichlorotrifluoroethane (CFC-113) and its isomers	76-13-1 DR[2] 39349-94-5 DR[2] 56996-61-3 DR[2] 57762-34-2
Dichlorotetrafluoroethane (CFC-114) and its isomers	76-14-2
Monochloropentafluoroethane (CFC-115) and its isomers	76-15-3 DR[2] 12770-91-1
Chlorotrifluoromethane (CFC-13) and its isomers	75-72-9 185009-43-2
Pentachlorofluoroethane (CFC-111) and its isomers	354-56-3 29756-45-4
Tetrachlorodifluoroethane (CFC-112) and its isomers	76-12-0 76-11-9
Heptachlorofluoropropane (CFC-211) and its isomers	422-78-6 135401-87-5
Hexachlorodifluoropropane (CFC-212) and its isomers	3182-26-1
Pentachlorotrifluoropropane (CFC-213) and its isomers	2354-06-5 134237-31-3
Tetrachlorotetrafluoropropane (CFC-214) and its isomers	29255-31-0 2268-46-4
Trichloropentafluoropropane (CFC-215) and its isomers	1599-41-3 4259-43-2 76-17-5
Dichlorohexafluoropropane (CFC-216) and its isomers	661-97-2
Chloroheptafluoropropane (CFC-217) and its isomers	422-86-6 76-18-6
Halons:	

Bromochlorodifluoromethane (Halon-1211) and its isomers	353-59-3 11104-73-7
Bromotrifluoromethane (Halon-1301) and its isomers	75-63-8 62395-25-9
Dibromotetrafluoroethane (Halon-2402) and its isomers	124-73-2 DR[2] 76199-55-8
Carbon tetrachloride	56-23-5
1,1,1-trichloroethane (methyl chloroform) and its isomers except 1,1,2-trichloroethane	71-55-6 DR[2] 74552-83-3
Bromomethane (methyl bromide)	74-83-9
Chlorobromomethane	74-97-5
Hydrobromofluorocarbons (HBFCs) and their isomers:	
Bromodifluoromethane and its isomers	1511-62-2
HBFC-22B1 (FM-100) 1511-62-2	
CHFBr2	1868-53-7
CH2FBr	NA
C2HFBr4	NA
C2HF2Br3	NA
C2HF3Br2	354-04-1 DR[2] 66542-88-9
C2HF4Br	NA
C2H2FBr3	NA
C2H2F2Br2	75-82-1
C2H2F3Br	421-06-7
C2H3FBr2	358-97-4
C2H3F2Br	NA
C2H4FBr	762-49-2
C3HFBr6	NA
C3HF2Br5	NA
C3HF3Br4	NA
C3HF4Br3	NA
C3HF5Br2	NA
C3HF6Br	NA
C3H2FBr5	NA
C3H2F2Br4	NA
C3H2F3Br3	NA
C3H2F4Br2	NA
C3H2F5Br	NA
C3H3FBr4	NA
C3H3F2Br3	NA
C3H3F3Br2	NA
C3H3F4Br	NA
C3H4FBr3	NA
C3H4F2Br2	NA
C3H4F3Br	NA
C3H5FBr2	NA
C3H5F2Br	NA
C3H6FBr	NA
Hydrochlorofluorocarbons (HCFCs) and their isomers:	
Dichlorofluoromethane (HCFC-21)	75-43-4 DR[2] 39289-28-6
Chlorodifluoromethane (HCFC-22)	75-45-6 DR[2] 73666-77-0 DR[2] 134191-96-1
Chlorofluoromethane (HCFC-31)	593-70-4

Tetrachlorofluoroethane (HCFC-121)	130879-71-9
	DR[2] 134237-32-4[3]
1,1,1,2-tetrachloro-2-fluoroethane	354-11-0
1,1,2,2-tetrachloro-1-fluoroethane	354-14-3
Trichlorodifluoroethane (HCFC-122)	41834-16-6
Trichloro-1,1-difluoroethane	55949-46-7
1,2,2-trichloro-1,1-difluoroethane	354-21-2
	DR[2] 134237-33-5[3]
	DR[2] 62549-18-2
1,2,2-trichloro-1,2-difluoroethane	354-15-4
1,1,1-trichloro-2,2-difluoroethane	354-12-1
1,1,2-trichloro-2,2-difluoroethane	NA
Dichlorotrifluoroethane (HCFC-123)	34077-87-7
Dichloro-1,1,2-trifluoroethane	90454-18-5
2,2-dichloro-1,1,1-trifluoroethane	306-83-2
1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a)	354-23-4
1,1-dichloro-1,2,2-trifluoroethane	812-04-4
2,2-dichloro-1,1,2-trifluoroethane	NA
Chlorotetrafluoroethane (HCFC-124)	63938-10-3
2-chloro-1,1,1,2-tetrafluoroethane	2837-89-0
1-chloro-1,1,2,2-tetrafluoroethane (HCFC-124a)	354-25-6
Trichlorofluoroethane (HCFC-131)	27154-33-2
	134237-34-6[3]
1,1,2-trichloro-2-fluoroethane	359-28-4
1,1,2-trichloro-1 (or 2)-fluoroethane	90134-98-8
1,1,2-trichloro-1-fluoroethane (HCFC-131a)	811-95-0
1,1,1-trichloro-2-fluoroethane (HCFC-131b)	2366-36-1
Dichlorodifluoroethane (HCFC-132)	25915-78-0
Dichloro-1,1-difluoroethane	55494-45-6
1,1-dichlorodifluoroethane	31153-51-2
(meso) 1,2-dichloro-1,2-difluoroethane	33579-37-2
(R,R)-(+-).1,2-dichloro-1,2-difluoroethane	33489-30-4
1,2-dichloro-1,1-difluoroethane (HCFC-132b)	1649-08-7
1,1-dichloro-1,2-difluoroethane	1842-05-3
1,1-dichloro-2,2-difluoroethane	471-43-2
1,2-dichloro-1,2-difluoroethane	431-06-1
Chlorotrifluoroethane (HCFC-133)	1330-45-6
	DR[2] 38097-47-1
1-chloro-1,2,2-trifluoroethane	431-07-2
1-chloro-1,1,2-trifluoroethane	421-04-5
2chloro-1,1,1-trifluoroethane (HCFC-133a)	75-88-7
Dichlorofluoroethane (HCFC-141)	25167-88-8
1,1-dichloro-1-fluoroethane (HCFC-141b)	1717-00-6
1,2-dichloro-1-fluoroethane	430-57-9
1,1-dichloro-2-fluoroethane	430-53-5
Chlorodifluoroethane (HCFC-142)	25497-29-4
	DR[2] 58561-84-5
	DR[2] 27175-71-9
Chloro-1,1-difluoroethane	55949-44-5
2-chloro-1,1-difluoroethane	338-65-8
1-chloro-1,1-difluoroethane (HCFC-142b)	75-68-3
	DR[2] 65762-25-6
1-chloro-1,2-difluoroethane (HCFC-142a)	338-64-7
Hexachlorofluoropropane (HCFC-221)	29470-94-8
	134237-35-7[3]
1,1,1,2,3,3-hexachloro-3-fluoropropane	431-79-8
1,1,1,2,3,3-hexachloro-2-fluoropropane	422-40-2

1,1,1,2,2,3-hexachloro-1-fluoropropane	422-26-4
1,1,2,2,3,3-hexachloro-1-fluoropropane	422-28-6
1,1,1,3,3,3-hexachloro-2-fluoropropane	NA
Pentachlorodifluoropropane (HCFC-222)	116867-32-4
	134237-36-8[3]
1,1,2,3,3-pentachloro-1,3-difluoropropane	421-82-3
1,1,1,2,3-pentachloro-3,3-difluoropropane	431-80-1
1,1,1,3,3-pentachloro-2,2-difluoropropane	422-49-1
1,2,2,3,3-pentachloro-1,1-difluoropropane	422-30-0
1,1,1,2,2-pentachloro-3,3-difluoropropane	422-27-5
1,1,1,2,3-pentachloro-2,3-difluoropropane	NA
1,1,1,3,3-pentachloro-2,3-difluoropropane	NA
(1,1,3,3,3-pentachloro-1,2-difluoropropane)	
1,1,2,2,3-pentachloro-1,3-difluoropropane	NA
1,1,2,3,3-pentachloro-1,2-difluoropropane	NA
Tetrachlorotrifluoropropane (HCFC-223)	29470-95-9
	134237-37-9[3]
1,1,1,3-tetrachloro-2,3,3-trifluoropropane	54002-59-4
1,1,2,3-tetrachloro-1,3,3-trifluoropropane	431-83-4
1,1,1,2-tetrachloro-3,3,3-trifluoropropane	431-81-2
1,1,3,3-tetrachloro-1,2,2-trifluoropropane	422-52-6
1,1,1,3-tetrachloro-2,2,3-trifluoropropane	422-50-4
1,2,3,3-tetrachloro-1,1,2-trifluoropropane	422-41-3
2,2,3,3-tetrachloro-1,1,1-trifluoropropane	422-35-5
1,1,2,2-tetrachloro-1,3,3-trifluoropropane	422-29-7
1,1,1,2-tetrachloro-2,3,3-trifluoropropane	NA
1,1,3,3-tetrachloro-1,2,3-trifluoropropane	NA
1,2,2,3-tetrachloro-1,1,3-trifluoropropane	NA
1,1,2,3-tetrachloro-1,2,3-trifluoropropane	NA
Trichlorotetrafluoropropane (HCFC-224)	127564-91-4
	134237-38-0[3]
1,1,3-trichloro-1,2,3,3-tetrafluoropropane	53063-53-9
1,1,1-trichloro-2,3,3,3-tetrafluoropropane	53063-52-8
1,1,2-trichloro-1,3,3,3-tetrafluoropropane	431-84-5
1,3,3-trichloro-1,1,2,2-tetrafluoropropane	422-54-8
1,1,3-trichloro-1,2,2,3-tetrafluoropropane	422-53-7
1,1,1-trichloro-2,2,3,3-tetrafluoropropane	422-51-5
2,3,3-trichloro-1,1,1,2-tetrafluoropropane	422-47-9
1,2,3-trichloro-1,1,2,3-tetrafluoropropane	422-42-4
1,2,2-trichloro-1,1,3,3-tetrafluoropropane	422-32-2
2,2,3-trichloro-1,1,1,3-tetrafluoropropane	NA
1,1,2-trichloro-1,2,3,3-tetrafluoropropane	NA
Dichloropentafluoropropane (HCFC-225)	127564-92-5
1,3-dichloro-1,1,2,3,3-pentafluoropropane	136013-79-1
3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)	422-56-0
1,3-dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	507-55-1
2,2-dichloro-1,1,1,3,3-pentafluoropropane (HCFC-225aa)	128903-21-9
1,1-dichloro-1,2,3,3,3-pentafluoropropane	111512-56-2
(R,S)2,3-dichloro-1,1,1,2,3-pentafluoropropane	111512-55-1
(R,R)2,3-dichloro-1,1,1,2,3-pentafluoropropane	111512-51-7
1,1-dichloro-1,2,2,3,3-pentafluoropropane	13474-88-9
1,2-dichloro-1,1,3,3,3-pentafluoropropane (HCFC-225da)	431-86-7
2,3-dichloro-1,1,1,2,3-pentafluoropropane (HCFC-225ba)	422-48-0
1,2-dichloro-1,1,2,3,3-pentafluoropropane	422-44-6
Chlorohexafluoropropane (HCFC-226)	28987-04-4
	134308-72-8[3]
2-chloro-1,1,1,2,3,3-hexafluoropropane (HCFC-226ba)	51346-64-6

2-chloro-1,1,1,3,3,3-hexafluoropropane (HCFC-226da)	431-87-8
3-chloro-1,1,1,2,2,3-hexafluoropropane (HCFC-226ca)	422-57-1
1-chloro-1,1,2,2,3,3-hexafluoropropane (HCFC-226cb)	422-55-9
1-chloro-1,1,2,3,3,3-hexafluoropropane (HCFC-226ea)	359-58-0
Pentachlorofluoropropane (HCFC-231)	NA 134190-48-0[3]
1,1,1,2,3-pentachloro-2-fluoropropane	421-94-3
1,1,2,3,3-pentachloro-2-fluoropropane	NA
1,1,1,3,3-pentachloro-3-fluoropropane	NA
1,1,2,2,3-pentachloro-1-fluoropropane	NA
1,1,1,2,2-pentachloro-3-fluoropropane	NA
1,1,1,2,3-pentachloro-3-fluoropropane	NA
1,1,1,3,3-pentachloro-2-fluoropropane	NA
1,1,2,2,3-pentachloro-3-fluoropropane	NA
1,1,2,3,3-pentachloro-1-fluoropropane	NA
Tetrachlorodifluoropropane (HCFC-232)	127564-82-3
1,2,3,3,-tetrachloro-1,1-difluoropropane	67879-59-8
1,1,3,3,-tetrachloro-2,2-difluoropropane	1112-14-7
1,1,1,3,-tetrachloro-2,2-difluoropropane	677-54-3
1,1,1,3,-tetrachloro-3,3-difluoropropane	460-89-9
1,1,1,3,-tetrachloro-2,3-difluoropropane	NA
1,1,1,2,-tetrachloro-2,3-difluoropropane	NA
1,1,1,2,-tetrachloro-3,3-difluoropropane	NA
1,1,2,3,-tetrachloro-1,2-difluoropropane	NA
1,1,2,3,-tetrachloro-1,3-difluoropropane	NA
1,2,3,3,-tetrachloro-1,2-difluoropropane (1,1,2,3,-tetrachloro-2,3-difluoropropane)	NA
1,2,2,3,-tetrachloro-1,1-difluoropropane	NA
1,2,2,3,-tetrachloro-1,3-difluoropropane	NA
1,1,3,3,-tetrachloro-1,3-difluoropropane	NA
1,1,2,2,-tetrachloro-3,3-difluoropropane (2,2,3,3,-tetrachloro-1,1-difluoropropane)	NA
1,1,2,2,-tetrachloro-1,3-difluoropropane	NA
Trichlorotrifluoropropane (HCFC-233)	61623-04-9 134237-40-4[3]
1,1,3-trichloro-2,2,3-trifluoropropane	131221-36-8
1,1,1-trichloro-2,2,3-trifluoropropane	131211-71-7
1,1,3-trichloro-1,2,3-trifluoropropane	54377-32-1
1,1,1-trichloro-2,3,3-trifluoropropane	54306-56-8
1,1,2-trichloro-2,3,3-trifluoropropane	13058-99-6
1,1,1-trichloro-3,3,3-trifluoropropane	7125-84-0
2,2,3-trichloro-1,1,1-trifluoropropane	7125-83-9
2,3,3-trichloro-1,1,1-trifluoropropane	431-51-6
1,1,3-trichloro-1,2,2-trifluoropropane	421-99-8
1,2,3-trichloro-1,1,2-trifluoropropane	421-95-4
1,1,3-trichloro-1,3,3-trifluoropropane	333-26-6
1,1,2-trichloro-1,2,3-trifluoropropane	NA
1,2,3-trichloro-1,2,3-trifluoropropane	NA
1,1,2-trichloro-1,3,3-trifluoropropane	NA
1,3,3-trichloro-1,1,2-trifluoropropane	NA
2,2,3-trichloro-1,1,3-trifluoropropane	NA
1,2,3-trichloro-1,1,3-trifluoropropane	NA
1,2,2-trichloro-1,1,3-trifluoropropane	NA
Dichlorotetrafluoropropane (HCFC-234)	127564-83-4
1,3-dichloro-1,1,3,3-tetrafluoropropane (HCFC-234fa)	76140-39-1
1,3-dichloro-1,2,2,3-tetrafluoropropane	70341-81-0
1,1-dichloro-1,2,2,3-tetrafluoropropane	70192-63-1

1,1-dichloro-1,3,3,3-tetrafluoropropane	64712-27-2
(R,R) 1,3-dichloro-1,1,2,3-tetrafluoropropane	53149-65-8
3,3-dichloro-1,1,1,2-tetrafluoropropane	53063-54-0
2,2-dichloro-1,1,3,3-tetrafluoropropane	17705-30-5
1,1-dichloro-2,2,3,3-tetrafluoropropane	4071-01-6
1,2-dichloro-1,2,3,3-tetrafluoropropane	425-94-5
1,3-dichloro-1,1,2,2-tetrafluoropropane (HCFC-234cc)	422-00-5
2,3-dichloro-1,1,1,3-tetrafluoropropane (HCFC-234da)	NA
1,1-dichloro-1,2,3,3-tetrafluoropropane	NA
1,2-dichloro-1,1,3,3-tetrafluoropropane	NA
2,3-dichloro-1,1,1,2-tetrafluoropropane	NA
2,2-dichloro-1,1,1,3-tetrafluoropropane	NA
1,2-dichloro-1,1,2,3-tetrafluoropropane	NA
1,3-dichloro-1,1,2,3-tetrafluoropropane	NA
Chloropentafluoropropane (HCFC-235)	108662-83-5
	134237-83-5[3]
3-chloro-1,1,1,2,3-pentafluoropropane	134237-41-5
2-chloro-1,1,1,3,3-pentafluoropropane (HCFC-235da)	134251-06-2
1-chloro-1,2,2,3,3-pentafluoropropane (HCFC-235ca)	28103-66-4
1-chloro-1,1,2,2,3-pentafluoropropane (HCFC-235cc)	679-99-2
1-chloro-1,1,3,3,3-pentafluoropropane (HCFC-235fa)	677-55-4
3-chloro-1,1,1,2,2-pentafluoropropane (HCFC-235cb)	460-92-4
2-chloro-1,1,1,2,3-pentafluoropropane	422-02-6
1-chloro-1,1,2,3,3-pentafluoropropane	NA
2-chloro-1,1,2,3,3-pentafluoropropane	NA
Tetrachlorofluoropropane (HCFC-241)	NA
	134190-49-1[3]
1,1,1,2-tetrachloro-3-fluoropropane	84816-05-7
1,1,1,3-tetrachloro-3-fluoropropane	23153-22-2
1,1,2,3-tetrachloro-3-fluoropropane	21981-25-9
1,1,2,2-tetrachloro-1-fluoropropane	7126-06-9
1,1,2,3-tetrachloro-2-fluoropropane	3175-26-6
1,1,1,2-tetrachloro-2-fluoropropane	3175-25-5
1,1,2,3-tetrachloro-1-fluoropropane	666-27-3
1,1,1,3-tetrachloro-2-fluoropropane	NA
1,1,2,2-tetrachloro-3-fluoropropane	NA
1,2,2,3-tetrachloro-1-fluoropropane	NA
1,1,3,3-tetrachloro-1-fluoropropane	NA
1,1,3,3-tetrachloro-2-fluoropropane	NA
Trichlorodifluoropropane (HCFC-242)	127564-90-3
	134237-42-6[3]
1,3,3-trichloro-1,1-difluoropropane	460-63-9
1,2,3-trichloro-1,2-difluoropropane	7164-14-9
1,1,3-trichloro-2,2-difluoropropane	1112-13-6
1,2,3-trichloro-1,1-difluoropropane	431-24-3
1,1,1-trichloro-2,2-difluoropropane	1112-05-6
1,2,2-trichloro-1,1-difluoropropane	7126-05-8
1,1,2-trichloro-1,2-difluoropropane	7126-04-7
1,1,1-trichloro-2,3-difluoropropane	NA
1,1,2-trichloro-1,3-difluoropropane	NA
1,1,3-trichloro-1,2-difluoropropane	NA
1,1,2-trichloro-2,3-difluoropropane	NA
1,2,2-trichloro-1,3-difluoropropane	NA
2,2,3-trichloro-1,1-difluoropropane	NA
1,1,1-trichloro-3,3-difluoropropane	NA
1,1,3-trichloro-1,3-difluoropropane	NA
1,1,2-trichloro-3,3-difluoropropane	NA

1,1,3-trichloro-2,3-difluoropropane	NA
1,2,3-trichloro-1,3-difluoropropane	NA
Dichlorotrifluoropropane (HCFC-243)	116890-51-8 134237-43-7[3]
2,2-dichloro-1,1,1-trifluoropropane	7126-01-4
1,1-dichloro-1,2,2-trifluoropropane	7125-99-7
1,2-dichloro-1,1,2-trifluoropropane	7126-00-3
2,3-dichloro-1,1,1-trifluoropropane (HCFC-243da)	338-75-0
1,3-dichloro-1,2,2-trifluoropropane	67406-68-2
1,1-dichloro-2,2,3-trifluoropropane	70192-70-0
3,3-dichloro-1,1,1-trifluoropropane	460-69-5
1,3-dichloro-1,1,2-trifluoropropane	NA
1,2-dichloro-1,1,3-trifluoropropane	NA
1,1-dichloro-1,2,3-trifluoropropane	NA
2,3-dichloro-1,1,2-trifluoropropane	NA
2,2-dichloro-1,1,3-trifluoropropane	NA
1,2-dichloro-1,2,3-trifluoropropane	NA
1,3-dichloro-1,1,3-trifluoropropane	NA
1,1-dichloro-1,3,3-trifluoropropane	NA
3,3-dichloro-1,1,2-trifluoropropane	NA
2,3-dichloro-1,1,3-trifluoropropane	NA
1,3-dichloro-1,2,3-trifluoropropane	NA
Chlorotetrafluoropropane (HCFC-244)	NA 134190-50-4[3]
2-chloro-1,1,1,3-tetrafluoropropane (HCFC-244db)	117970-90-8
3-chloro-1,1,2,2-tetrafluoropropane	679-85-6
1-chloro-1,2,2,3-tetrafluoropropane	67406-66-0
1-chloro-1,1,3,3-tetrafluoropropane (HCFC-244fb)	2730-64-5
2-chloro-1,1,3,3-tetrafluoropropane (HCFC-244da)	19041-02-2
2-chloro-1,1,1,2-tetrafluoropropane (HCFC-244ba)	421-73-8
1-chloro-1,1,2,2-tetrafluoropropane	421-75-0
1-chloro-1,1,2,3-tetrafluoropropane	NA
3-chloro-1,1,1,2-tetrafluoropropane	NA
2-chloro-1,1,2,3-tetrafluoropropane	NA
3-chloro-1,1,1,3-tetrafluoropropane	NA
3-chloro-1,1,2,3-tetrafluoropropane	NA
Trichlorofluoropropane (HCFC-251)	NA 134190-51-5[3]
(R,S)-(.+-.) 1,2,3-trichloro-1-fluoropropane	84847-80-3
(R,R)-(.+-.)	84847-79-0
[R(R,S)]	76985-34-7
[R(R,R)]	76985-33-6
(R,S)	67832-50-2
(R,R)	67832-44-4
1,2,3-trichloro-2-fluoropropane	7126-16-1
1,2,2-trichloro-3-fluoropropane	70192-89-1
1,1,3-trichloro-1-fluoropropane	818-99-5
1,1,3-trichloro-2-fluoropropane	76937-36-5
1,1,2-trichloro-1-fluoropropane	421-41-0
1,1,2-trichloro-2-fluoropropane	3175-24-4
1,1,1-trichloro-2-fluoropropane	NA
1,1,1-trichloro-3-fluoropropane	NA
1,1,2-trichloro-3-fluoropropane	NA
1,1,3-trichloro-3-fluoropropane	NA
1,2,2-trichloro-1-fluoropropane	NA
1,2,3-trichloro-1-fluoropropane	NA
Dichlorodifluoropropane (HCFC-252)	NA

	134190-52-6[3]
1,1-dichloro-2,2-difluoropropane	1112-01-2
1,1-dichloro-3,3-difluoropropane	131404-17-6
1,1-dichloro-1,3-difluoropropane	121612-64-4
1,2-dichloro-1,1-difluoropropane	7126-15-0
1,2-dichloro-2,3-difluoropropane	70192-74-4
2,3-dichloro-1,1-difluoropropane	82578-00-5
1,3-dichloro-1,1-difluoropropane	819-00-1
1,3-dichloro-1,2-difluoropropane	111483-26-2
1,3-dichloro-2,2-difluoropropane	1112-36-3
1,1-dichloro-1,2-difluoropropane	NA
1,1-dichloro-2,3-difluoropropane	NA
1,2-dichloro-1,2-difluoropropane	NA
1,2-dichloro-1,3-difluoropropane	NA
1,3-dichloro-1,3-difluoropropane	NA
2,2-dichloro-1,1-difluoropropane	NA
2,2-dichloro-1,3-difluoropropane	NA
Chlorotrifluoropropane (HCFC-253)	26588-23-8
	134237-44-8[3]
2-chloro-1,1,1-trifluoropropane	421-47-6
3-chloro-1,1,1-trifluoropropane	460-35-5
1-chloro-1,1,2-trifluoropropane	134251-05-1
2-chloro-1,1,2-trifluoropropane	69202-10-4
3-chloro-1,1,2-trifluoropropane	121612-65-5
1-chloro-1,1,3-trifluoropropane	83124-56-5
1-chloro-1,2,2-trifluoropropane	70192-76-6
1-chloro-2,2,3-trifluoropropane	56758-54-4
2-chloro-1,1,3-trifluoropropane	NA
3-chloro-1,1,3-trifluoropropane	NA
(1-chloro-1,3,3-trifluoropropane)	
1-chloro-1,2,3-trifluoropropane	NA
2-chloro-1,2,3-trifluoropropane	NA
Dichlorofluoropropane (HCFC-261)	127404-11-9
	134237-45-9[3]
1,1-dichloro-1-fluoropropane	7779-56-6
1,1-dichloro-2-fluoropropane	53074-31-0
1,1-dichloro-3-fluoropropane	53074-30-9
1,2-dichloro-1-fluoropropane	7799-55-5
1,2-dichloro-2-fluoropropane	420-97-3
1,2-dichloro-3-fluoropropane	453-01-0
1,3-dichloro-1-fluoropropane	83124-60-1
1,3-dichloro-2-fluoropropane	816-38-6
2,2-dichloro-1-fluoropropane	NA
Chlorodifluoropropane (HCFC-262)	NA
	134190-53-7[3]
1-chloro-1,1-difluoropropane	421-02-3
2-chloro-1,1-difluoropropane	430-93-3
	DR[2] 5268567-3
3-chloro-1,1-difluoropropane	83124-57-6
1-chloro-1,2-difluoropropane	430-96-6
1-chloro-2,3-difluoropropane	37161-81-2
2-chloro-1,3-difluoropropane	102738-79-4
1-chloro-2,2-difluoropropane	420-99-5
2-chloro-1,2-difluoropropane	NA
1-chloro-1,3-difluoropropane	NA
Chlorofluoropropane (HCFC-271)	NA
	134190-54-8[3]

1-chloro-1-fluoropropane	430-55-7
1-chloro-2-fluoropropane	430-46-6
1-chloro-3-fluoropropane	462-38-4
2-chloro-1-fluoropropane	20372-78-5
2-chloro-2-fluoropropane	420-44-0

Notes:
[1] Manufacturing processes do not include facilities equipment or systems such as chillers and fire suppression systems.
[2] DR denotes a deleted registry number that was replaced with another registry number.
[3] Chemical to which Chemical Abstract Service (CAS) assigned registry number based on premise that it was a trade name, although chemical may be the same as another one already listed.

Annex G. Perfluorocarbons (PFC)

Carbon tetrafluoride	75-73-0
Perfluoroethane	76-16-4

Annex H. Polychlorinated biphenyls (PCBs)

Polychlorinated Biphenyls	1336-36-3
Aroclor	12767-79-2
Chlorodiphenyl (Aroclor 1260)	11096-82-5
Kanechlor 500	27323-18-8
Aroclor 1254	11097-69-1
Terphenyls	26140-60-3

Annex I. Polychlorinated naphthalenes (more than 3 chlorine atoms)

Polychlorinated Naphthalenes	70776-03-3

Annex J. Shortchain Chlorinated Paraffins

Only short-chain chlorinated paraffins with carbon length of 10-13 atoms are covered.

Chlorinated paraffins (C10-13)	85535-84-8
Other Short Chain Chlorinated Paraffins	-

Annex K. Tributyl tin oxide (TBTO)

Bis(tri-n-butyltin) oxide	56-35-9

Annex L. Cadmium/Cadmium Compounds

Cadmium	7440-43-9
Cadmium oxide	1306-19-0
Cadmium sulfide	1306-23-6
Cadmium chloride	10108-64-2
Cadmium sulfate	10124-36-4
Other cadmium compounds	-

Annex M. Chromium VI Compounds

Chromium (VI) oxide	1333-82-0
Barium chromate	10294-40-3

Calcium chromate	13765-19-0
Chromic acetate	1066-30-4
Chromium trioxide	1333-82-0
Lead (II) chromate	7758-97-6
Sodium chromate	7775-11-3
Sodium dichromate	10588-01-9
Strontium chromate	7789-06-2
Potassium dichromate	7778-50-9
Potassium chromate	7789-00-6
Zinc chromate	13530-65-9

Annex N. Lead/Lead Compounds

Lead	7439-92-1
Lead (II) sulfate	7446-14-2
Lead (II) carbonate	598-63-0
Lead hydrocarbonate	1319-46-6
Lead acetate	301-04-2
Lead (II) acetate, trihydrate	6080-56-4
Lead phosphate	7446-27-7
Lead selenide	12069-00-0
Lead (IV) oxide	1309-60-0
Lead (II,IV) oxide	1314-41-6
Lead (II) sulfide	1314-87-0
Lead (II) oxide	1317-36-8
Lead (II) carbonate basic	1319-46-6
Lead hydroxidcarbonate	1344-36-1
Lead (II) phosphate	7446-27-2
Lead (II) chromate	7758-97-6
Lead (II) titanate	12060-00-3
Lead sulfate, sulphuric acid, lead salt	15739-80-7
Lead sulphate, tribasic	12202-17-4
Lead stearate	1072-35-1
Other lead compounds	-

Annex O. Mercury /Mercury Compounds

Mercury	7439-97-6
Mercuric chloride	33631-63-9
Mercury (II) chloride	7487-94-7
Mercuric sulfate	7783-35-9
Mercuric nitrate	10045-94-0
Mercuric (II) oxide	21908-53-2
Mercuric sulfide	1344-48-5
Other mercury compounds	-

Annex P. Polybrominated biphenyls (PBBs) including all congeners and isomers

Bromobiphenyl	2052-07-05, 2113-57-7, 92-66-0
Decabromobiphenyl	13654-09-06
Dibromobiphenyl	92-86-4
Heptabromobiphenyl	35194-78-6
Hexabromobiphenyl	59080-40-9, 36355-01-8, 67774-32-7
Nonabromobiphenyl	27753-52-2

Octabromobiphenyl	61288-13-9
Pentabromobiphenyl	56307-79-0
Polybrominated Biphenyl	59536-65-1
Tetrabromobiphenyl	40088-45-7
Tribromobiphenyl	59080-34-1

Annex Q. Polybrominated diiphenyl ethers (PBDEs) including all congeners and isomers

Bromobiphenyl Ether	101-55-3
Decabromobiphenyl Ether	1163-19-5
Dibromobiphenyl Ether	2050-47-7
Heptabromobiphenyl Ether	68928-80-3
Hexabromobiphenyl Ether	36483-60-0
Nonabromobiphenyl Ether	63936-56-1
Octabromobiphenyl Ether	32536-52-0
Pentabromobiphenyl Ether	32534-81-9
Tetrabromobiphenyl Ether	40088-47-9
Tribromobiphenyl Ether	49690-94-0

Annex R. Antimony/Antimony Compounds

Antimony (metallic)	7440-36-0
Antimony trioxide	1309-64-4
Antimony pentoxide	1314-60-9
Antimony trichloride	10025-91-9
Sodium antimonate	15432-85-6
Other antimony compounds	-

Annex S. Arsenic/Arsenic Compounds

Arsenic	7440-38-2
Gallium arsenide	1303-00-0
Calcium arsenate	7778-44-1
Calcium arsenite	27152-57-4
Arsenic pentoxide	1303-28-2
Arsenic trioxide	1327-53-3
Potassium arsenite	10124-50-2
Potassium arsenate	7784-41-0
Lead arsenate	3687-31-8
Other arsenic compounds	-

Annex T. Beryllium/Beryllium Compounds

Beryllium	7440-41-7
Beryllium-aluminum alloy	12770-50-2
Beryllium chloride	7787-47-5
Beryllium fluoride	7787-49-7
Beryllium hydroxide	13327-32-7
Beryllium oxide	1304-56-9
Beryllium phosphate	13598-15-7
Beryllium sulfate	13510-49-1
Beryllium sulfate tetrahydrate	7787-56-6
Beryl ore	1302-52-9

Other beryllium compounds	-

Annex U. Bismuth/Bismuth Compounds and Alloys

Bismuth	7440-69-9
Bismuth trioxide	1304-76-3
Bismuth nitrate	10361-44-1
Other bismuth compounds	-

Annex V. Brominated Flame Retardants (other than PBB or PBDE)

Poly(2,6-dibromo-phenylene oxide)	69882-11-7
Tetra-decabromo-diphenoxy-benzene	58965-66-5
1,2-Bis(2,4,6-tribromo-phenoxy) ethane	37853-59-1
3,5,3',5'-Tetrabromo-bisphenol A (TBBA)	79-94-7
TBBA carbonate oligomer, 2,4,6-tribromo-phenol terminated	71342-77-3
TBBA carbonate oligomer, phenoxy end capped	94334-64-2
TBBA carbonate oligomer	28906-13-0
TBBA-TBBA-diglycidyl-ether oligomer	70682-74-5
TBBA-epichlorhydrin oligomer	40039-93-8
TBBA, unspecified	30496-13-0
Brominated epoxy resin end-capped with tribromophenol	139638-58-7
Brominated epoxy resin end-capped with tribromophenol TBBA-(2,3-dibromo-propyl-ether)	135229-48-0 21850-44-2
TBBA bis-(2-hydroxy-ethyl-ether)	4162-45-2
TBBA-bis-(allyl-ether) TBBA-dimethyl-ether	25327-89-3 37853-61-5
Tetrabromo-bisphenol S	39635-79-5
TBBS-bis-(2,3-dibromo-propyl-ether) 2,4-Dibromo-phenol 2,4,6-tribromo-phenol	42757-55-1 615-58-7 118-79-6
Pentabromo-pheno 2,4,6-Tribromo-phenyl-alltl-ether	l 608-71-9 3278-89-5
Tribromo-phenyl-allyl-ether, unspecified	26762-91-4
Bis(2-ethlhexyl)tetrabromo-phtalate 2-Hydroxy-propyl-2-(2-hydroxy-ethoxy)-ethyl-TBP TBPA, glycol-and propylene-oxide esters	26040-51-7 20566-35-2 75790-69-1
N,N'-Ethylene –bis-(tetrabromo-phthalimide) Ethylene-bis(5,6-dibromo-norbornane-2,3-dicarboximide)	32588-76-4 52907-07-0
2,3-Dibromo-2-butene-1,4-diol	3234-02-4
Dibromo-neopentyl-glycol Dibromo-propanol Tribromo-neopentyl-alcohol	3296-90-0 96-13-9 36483-57-5
Poly tribromo-styrene Tribromo-styrene Dibromo-styrene grafted PP	57137-10-7 61368-34-1 171091-06-8
Poly-dibromo-styrene Bromo-/Chloro-paraffins Bromo-/Chloro-alpha-olefin	31780-26-4 68955-41-9 82600-56-4
Vinylbromide Tris-(2,3-dibromo-propyl)-isocyanurate Tris(2,4-Dibromo-phenyl) phosphate	593-60-2 52434-90-9 49690-63-3
Tris(tribromo-neopentyl) phosphate	19186-97-1

Chlorinated and brominated phosphate esther	125997-20-8
Pentabromo-toluene	87-83-2
Pentabromo-benzyl bromide	38521-51-6
1,3-Butadiene homopolymer,brominated	68441-46-3
Pentabromo-benzyl-acrylate, monomer	59447-55-1
Pentabromo-benzyl-acrylate, polymer	59447-57-3
Decabromo-diphenyl-ethane Tribromo-bisphenyl-maleinimide Brominated trimethylphenyl-lindane	84852-53-9 59789-51-4 59789-51-4
Other Brominated Flame Retardants	-
Hexabromo-cyclo-dodecane (HBCD), unspecified Tetrabromo-chyclo-octane 1,2-Dibromo-4-(1,2 dibromo-methyl)-cyclo-hexane	3194-55-6 31454-48-5 3322-93-8
TBPA Na salt Tetrabromo phthalic anhydride	25357-79-3 632-79-1

Annex W. Magnesium/Magnesium Alloys

Magnesium	7439-95-4
Other magnesium alloys	-

Annex X. Phthalates

Bis (2-ethylhexyl) phthalate (DEHP)	117-81-7
Dibutylphthalate (DBP)	84-74-2
Bis(2-methoxyethyl) phthalate (DBP)	117-82-8

Annex Y. Polyvinyl Chloride

Polyvinyl chloride (PVC)	9002-86-2

Annex Z. Radioactive Substances

Uranium	7440-61-6
Plutonium	7440-07-5
Radon	10043-92-2
Americium	7440-35-9
Thorium	7440-29-1
Cesium	7440-46-2
Strontium	7440-24-6
Other radioactive substances	-

Annex AA. Selenium/Selenium Compounds

Selenium	7782-49-2
Hydrogen selenide	7783-07-5
Sodium selenide	1313-85-5
Selenium dioxide	7446-08-4
Sodium selenate	10112-94-4
Dimethyl selenide	593-79-3
Selenium oxide	12640-89-0
Other selenium compounds	-

Annex BB. Tributyl Tin, Triphenyl Tin

Bis(tri-n-butyltin) oxide	56-35-9
Triphenyltin N,N'-dimethyldithiocarbamate	1803-12-9
Triphenyltin fluoride	379-52-2
Triphenyltin acetate	900-95-8
Triphenyltin chloride	639-58-7
Triphenyltin hydroxide	76-87-9
Triphenyltin fatty acid salts (C=9-11)	47672-31-1
Triphenyltin chloroacetate	7094-94-2
Tributyltin methacrylate	2155-70-6
Bis(tributyltin) fumarate	6454-35-9
Tributyltin fluoride	1983-10-4
Bis(tributyltin) 2,3-dibromosuccinate	31732-71-5
Tributyltin acetate	56-36-0
Tributyltin laurate	3090-36-6
Bis(tributyltin) phthalate	4782-29-0
Copolymer of alkyl acrylate, methyl methacrylate and tributyltin methacrylate(alkyl; C=8)	-
Tributyltin sulfamate	6517-25-5
Bis(tributyltin) maleate	14275-57-1
Tributyltin chloride	1461-22-9
Mixture of tributyltin cyclopentanecarboxylate and its analogs (Tributyltin naphthenate)	-
Mixture of tributyltin 1,2,3,4,4a,4b,5,6,10,10a-decahydro-7-isopropyl-1,4a-dimethyl-1-phenanthlen ecarboxylate and its analogs (Tributyltin rosin salt)	-
Other Tributyl Tins & Triphenyl Tins	-

Annex CC. Polycyclic Aromatic Hydrocarbons

Acenaphthene	83-32-9
Acenaphthylene	208-96-8
Anthracene	120-12-7
Benzo(a)anthracene	56-55-3
Benzo(a)pyrene	50-32-8
Benzo(b)fluoranthene	205-99-2
Benzo(g,h,i)perylene	191-24-2
Benzo(k)fluoranthene	207-08-9
Chrysene	218-01-9
Dibenzo(a,h)anthracene	53-70-3
Fluoranthene	206-44-0
Fluorene	86-73-7
Indeno(1,2,3-c,d)pyrene	193-39-5
Naphthalene	91-20-3
Phenanthrene	81-5-8
Pyrene	129-00-0