

RoHS/REACH Engineering Specification



Lenovo RoHS/REACH Engineering Specification
Addendum to Lenovo Environmental Specification 41A7731

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Applicability	Lenovo brand products worldwide
Owner	Global Environmental Affairs

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1.0 Purpose and Scope

This Specification communicates Lenovo's requirements for Lenovo brand products and materials, parts and assemblies incorporated into Lenovo Brand products worldwide, in accordance with European Union directive for the Restriction of Hazardous Substances (RoHS) and the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) in electrical and electronic equipment, similar regulations in other markets and more stringent limits set by Lenovo.

This Specification does not apply to spare parts for the repair, or reuse, of electrical and electronic equipment put on the market before the date defined by each regional RoHS directive, batteries or process chemicals.

1.1 Other Jurisdictions

There are other jurisdictions, other than the EU Member States, with RoHS types of requirements. The list below is not complete and is provided for information only. In some jurisdictions the product scope and requirements are different from the scope and requirements of the EU Directive. Deliverables to Lenovo which cite this specification must meet the requirements of this specification irrespective of the jurisdiction where the Deliverable is transferred to Lenovo.

- Multiple US States
- New York City
- People's Republic of China
- European Economic Area (EEA) States
- European Free Trade Association (EFTA) States
- EU Candidate Countries - Albania, Montenegro, Macedonia, Serbia, and Turkey
- EU potential Candidate Countries – Bosnia and Herzegovina, Kosovo
- Brazil
- Korea
- Ukraine
- Vietnam
- India
- Japan
- Thailand

2.0 RoHS Requirements

Lenovo brand products and materials, parts and assemblies in Lenovo brand electrical and electronic products must meet the following requirements:

1. Applicable laws and regulations;

2. Lenovo Engineering Specification [41A7731](#) Baseline Environmental Requirements for Materials, Parts and Products for Lenovo Hardware Products; and
3. This Lenovo RoHS/REACH Engineering Specification [41A7733](#).

Homogeneous materials within new Lenovo brand products and parts and assemblies for new Lenovo brand products must comply with the criteria shown in Table 1.

Non-Lenovo brand (i.e., third-party/Supplier logo) products must comply with applicable legal requirements.

Should the requirements of this Specification conflict with applicable governmental regulations or legislation the more stringent requirements shall take precedence.

2.2 Verification

Suppliers are expected to complete and submit an IPC 1752A XML Full Material Disclosure (FMD) via the Green Data Exchange (GDX), refer to [Lenovo Guide to Full Material Disclosures \(Version 1\)](#).

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

An authorized person, product assurance or similar must also sign the [Lenovo Supplier Material Self-Declaration](#). Lenovo specifications are available at: www.lenovo.com—About Lenovo—Global Procurement—[Product Content Restrictions and Packaging Requirements](#).

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Table 1 Lenovo's Maximum Concentration Values for RoHS substances		
Substance	Threshold in Homogeneous Level weight % (ppm)	Exemptions
Cadmium (Cd) and its compounds	<p>0.01% (100 ppm)</p> <p>EPEAT products: 0.005% (50 ppm)</p> <p>Test Method: IEC 62321: ICP-OES, ICP-MS, AAS</p>	<p>8. Cadmium and its compounds in electrical contacts and cadmium plating except for applications banned under Directive 91/338/EEC amending Directive 76/769/EEC relating to restrictions on the marketing and use of certain dangerous substances and preparations</p> <p>8a. Cadmium and its compounds in one shot pellet type thermal cut-offs. Expired on 1 January 2012 (except spare parts for EEE placed on market before Jan 1, 2012)</p> <p>8b. Cadmium and its compounds in electrical contacts</p> <p>13b. Cadmium and lead in filter glasses and glasses used for reflectance standards</p> <p>38. Cadmium and cadmium oxide in thick film pastes used on aluminium bonded beryllium oxide.</p>
Hexavalent Chromium (Cr6) and its compounds	<p>Metallic applications: Intentionally added</p> <p>Non-metallic applications: 0.1% (1000 ppm)</p> <p>EPEAT products: 0.05% (500 ppm)</p> <p>Test Method: Polymers, Electronics: IEC 62321: Alkaline Digestion / Colorimetric Method</p> <p>Metals: Spot-test procedure / boiling water extraction procedure. EPE 3060A is not an acceptable test method</p>	<p>9. Hexavalent chromium as an anticorrosion agent of the carbon steel cooling system in absorption refrigerators up to 0.75% by weight in the cooling solution:-</p>
Lead (Pb) and its compounds	<p>0.1% (1000 ppm)</p> <p>Paint: 0.01% (100 ppm)</p> <p>External PVC cables, wire coatings: 0.03% (300 ppm)</p> <p>Visual Display Units for EPEAT products: 0.005% (50 ppm) by weight (not homogenous)</p> <p>Test Method: IEC 62321: ICP-OES, ICP-MS, AAS</p>	<p>5b. Lead in glass of fluorescent tubes not exceeding 0.2 % by weight</p> <p>6a. Lead as an alloying element in steel for machining purposes and in galvanized steel containing up to 0.35% lead by weight.t</p> <p>6b. Lead as an alloying element in aluminum containing up to 0.4 % lead by weight</p> <p>6c. Lead as an alloying element in copper alloy containing up to 4% lead by weight</p> <p>7a. Lead in high melting temperature type solders (i.e., lead-based alloys containing 85 % by weight or more lead)</p> <p>7c-I. Electrical and electronic components containing Lead in a glass or ceramic other than dielectric ceramic in capacitors (piezoelectronic devices) or in a glass or ceramic matrix compound</p> <p>7c-II. Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher</p> <p>13a. Lead in white glasses used for optical applications</p> <p>13b. Cadmium and lead in filter glasses and glasses used for reflectance standards</p> <p>15. Lead in solders to complete a viable electrical connection</p>

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Substance	Threshold in Homogeneous Level weight % (ppm)	Exemptions
		<p>between semiconductor die and carrier within integrated circuit Flip Chip packages</p> <p>34. Lead in cermet-based trimmer potentiometer elements.</p> <p>37. Lead in the plating layer of high voltage diodes on the basis of a zinc borate glass body.</p>
Mercury (Hg) and its compounds	<p>Not present except in lamps</p> <p>1000ppm</p> <p>Test Method: IEC 62321: CV-AAS, AFS, ICP-OES, ICP-MS</p>	<p>1. Mercury in single capped (compact) fluorescent lamps not exceeding:</p> <p>1a. For general lighting purposes < 30 W: 2.5 mg per burner.</p> <p>1b. For general lighting purposes ≥ 30 W and < 50 W: 3.5 mg per burner</p> <p>1c. For general lighting purposes ≥ 50 W and < 150 W: 5 mg per burner</p> <p>1d. For general lighting purposes ≥ 150 W: 15 mg per burner</p> <p>1e. For general lighting purposes with circular or square structural shape and tube diameter ≤ 17 mm: 7 mg per burner</p> <p>1f. For special purposes: 5 mg per burner</p> <p>2a. Mercury in double-capped linear fluorescent lamps for general lighting purposes not exceeding:</p> <p>2a1. Tri-band phosphor with normal lifetime and a tube diameter < 9 mm (T2): 4 mg per lamp.</p> <p>2a2. Tri-band phosphor with normal lifetime and a tube diameter ≥ 9 mm and ≤ 17 mm (T5): 3 mg per lamp.</p> <p>2a3. Tri-band phosphor with normal lifetime and a tube diameter > 17 mm and ≤ 28 mm (T8): 3.5 mg per lamp.</p> <p>2a4. Tri-band phosphor with normal lifetime and a tube diameter > 28 mm (T12): 3.5 mg per lamp.</p> <p>2a5. Tri-band phosphor with long lifetime (≥ 25 000 h): 5 mg per</p> <p>2b. Mercury in other fluorescent lamps not exceeding:</p> <p>2b1. Linear halophosphate lamps with tube > 28 mm (T10 and T12): 10 mg per lamp Expired on April 13, 2012</p> <p>2b2. Non-linear halophosphate lamps (all diameters): 15 mg per lamp Expires on April 13, 2016</p> <p>2b3. Non-linear tri-band phosphor lamps with tube diameter > 17 mm (T9): 15 mg per lamp</p> <p>2b4. Lamps for other general lighting and special purposes (induction lamps): 15 mg per lamp</p> <p>3. Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding:</p> <p>3a. Short length (≤ 500 mm): 3.5 mg per lamp</p>

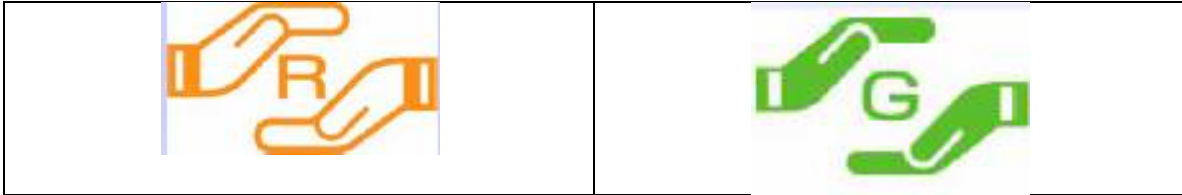
Table 1 Lenovo's Maximum Concentration Values for RoHS substances		
Substance	Threshold in Homogeneous Level weight % (ppm)	Exemptions
		3b. Medium length (> 500 mm and ≤ 1,500 mm): 5 mg per lamp 3c. Long length (> 1 500 mm): 13 mg per lamp 4a. Mercury in other low pressure discharge lamps: 15 mg per lamp 4b. Mercury in high pressure sodium (vapor) lamps for general lighting purposes in lamps with improved color rendering index Ra > 60 not exceeding: 4b-I. P ≤ 155 W: 30 mg per burner 4b-II. 155 W < P ≤ 405 W: 40 mg per burner 4b-III. P > 405 W: 40 mg per burner 4c Mercury in other high pressure sodium (vapor) lamps for general lighting purposes not exceeding: 4c-I. P ≤ 155 W: 25 mg per burner 4c-II. 155 W < P ≤ 405 W: 30 mg per burner 4c-III. P > 405 W: 40 mg per burner 4d. Mercury in high pressure mercury (vapor) lamps (HPMV) Expires on April 13, 2015 4e. Mercury in metal halide lamps (MH) 4f. Mercury in other discharge lamps for special purposes not specifically mentioned in this Annex 36. Mercury used as a cathode sputtering inhibitor in DC plasma displays with a content up to 30 mg per display until 1 July 2010.
Polybrominated biphenyl (PBB)	Not present Test Method: IEC 62321: GCMS	600ppm max in post consumer plastic feedstock and post consumer content plastic resin only. Subject to approval.
Polybrominated diphenyl ether (PBDE), including DecaBDE	Not present Test Method: IEC 62321: GCMS	600ppm max in post consumer plastic feedstock and post consumer content plastic resin only (excluding DecaBDE). Subject to approval.
Bis (2-ethylhexyl) phthalate (DEHP)*	0.1% (1000 ppm)	Category 8 (medical devices) and Category 9 (monitoring and control equipment) - from July 22, 2021
Butyl benzyl phthalate (BBP)*	0.1% (1000 ppm)	Category 8 (medical devices) and Category 9 (monitoring and control equipment) - from July 22, 2021
Dibutyl phthalate (DBP)*	0.1% (1000 ppm)	Category 8 (medical devices) and Category 9 (monitoring and control equipment) - from July 22, 2021
Diisobutyl phthalate (DIBP)*	0.1% (1000 ppm)	Category 8 (medical devices) and Category 9 (monitoring and control equipment)- from July 22, 2021

- *- shall apply from July 22, 2019

2.3 Product Marking and Information Disclosure

2.3.1 Products for Japan: must meet the requirements of Japanese Industrial Standard for The Marking the presence of the Specific Chemical Substances for electrical and electronic equipment (JIS C 0950:2005, "J-MOSS"). Product development teams must provide product conformity declarations to Lenovo's Japan Environment representative before offering product for sale in Japan.

1. Mandatory "R" mark if the product does not meet the requirements of the RoHS Directive.
2. Optional* green "G" mark to show no such substances are contained (*not required by Lenovo).
3. Product material declaration table in Japanese on external [Lenovo Japan Environment website](#)



2.3.2 "Korea RoHS": must meet the requirements of The Act for Resource Recycling of Electrical and Electronic Equipment and Vehicles ("[Korea RoHS](#)"). Product development teams must provide product conformity declarations to Korea's Country Manager representative before offering product for sale in Korea. Product declarations must be on the Korea ECOAS (<http://www.ecoas.or.kr/>) web page before offering product for sale in Korea.

2.3.3 Products for Turkey: must meet the requirements of Turkey's Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) regulation. Product development teams must provide product conformity declarations to Lenovo's Turkey Country Manager representative, annually beginning June 2009 for submission to the Turkey Ministry of Environment and Forestry.

2.3.4 Products for People's Republic of China: must meet requirements of "Management Methods for Restricted Use of Hazardous Substances in Electronic and Electrical Products" ("[China RoHS](#)"). The official documents are in Chinese at <http://www.mii.gov.cn/>

1. Environmental Protection Use Period (EPUP)
Electronic and electrical products, parts, accessories, options, Field Replacement Units (FRUs) and Customer Replaceable Units (CRUs) for "independent commercial sale" in China must be marked with one of two logos:

Logo 1: "e" inside circle indicates product is compliant with Requirements of concentration limits for certain substances in electrical and electronic products GB/T 26572-2011

Logo 2: Environment Protection Use Period (EPUP) in years in circle indicating product is noncompliant (exceeds) Requirements of concentration limits for certain substances in electrical and electronic products GB/T 26572-2011

Exception: Parts purchased for manufacturing (internal to a product) do NOT need to be marked

EPUP Mark artwork, color, size, font specifications are provided in: Labeling Standard SJ/T 11364-2014

- Logo 1 Green Mark: C:85,M:30,Y:85,K:20;
- Logo 2 Orange Mark: C:0,M:75,Y:100,K:0
- EPUP mark must be on product unless the product total surface area is <math>< 5000\text{mm}^2</math> or is of irregular shape. In this case, the EPUP mark must be included in the product documentation that accompanies the product.
- Minimum 5 mm x 5 mm EPUP mark size
- There are no marking color restrictions as long as the mark is visible (black and white is acceptable). The color green should not be used for Logo 2.
- Lenovo products use EPUP number is "10" for



No "China RoHS" Substances



Contains "China RoHS" Substances
In this example: "10" means EPUP period is 10 years

most PC products, monitors and options; "20" for enterprise and mobile products; "5" for batteries. Should the EPUP mark on a product differ from the EPUP mark on product documentation, the mark on the product shall take precedence.

2. Substance Disclosure Table

Products that require **Logo 2** must have a Substance Disclosure Table in the product documentation that accompanies the product (software or paper-based). This includes system products, parts, FRUs, accessories and options for independent commercial sale.

- Text must be in Simplified Chinese (except for "O" and "X")
- Table must include Product Name, Part Name(s), Insert "O" or "X" for each key part. In cases where "X" is shown, Lenovo uses an EU RoHS exemption
- Minimum font size is 1.8 mm
- See the example table below

Example: Substance Disclosure Table

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板组件*	X	O	O	O	O	O
外壳及附件	X	O	O	O	O	O

本表格依据SJ/T 11364的规定编制。
 O：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。
 X：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。
 表中标记“X”的部件，皆因全球技术发展水平限制而无法实现有害物质的替代。

2.3.5 Vietnam RoHS: must meet the requirements of Circular, provisionally stipulating allowable limit contents of a number of toxic or hazardous chemicals in electric or electronic products ("Vietnam RoHS"). Product development teams can choose one of following disclosure to show the information on the allowable limits of restricted substances before offering product for sale in Vietnam:

- Upload on Website of company
- User's guide / Instruction manual of product
- Information in electronic form (e.g. CD)
- Printing on the product or packaging

2.3.6 Taiwan RoHS: Must meet the requirements for the certified national standards, Guidance for the reduction of restricted chemical substances in electrical and electronic equipment (CNS15663). This provides the product categories, types of restricted hazardous substances, quantity standards and standardisation methods.

The presence restricted substances requires the use of the following mark and disclosure table on the body, packages, stickers, or user documentation:



設備名稱：液晶電視機，型號：YYY						
單元	限用物質及其化學符號					
	鉛 (Pb)	汞 (Hg)	鎘 (Cd)	六價鉻 (Cr ⁶⁺)	多溴聯苯 (PBB)	多溴二苯醚 (PBDE)
電路板	○	○	○	○	○	○
外殼	○	○	○	○	○	○
玻璃面板	-	○	○	○	○	○
揚聲器	○	○	○	○	○	○
配件(例：遙控器等)	-	○	○	○	○	○
備考1. "○" 係指該項限用物質之百分比含量未超出百分比含量基準值。						
備考2. "-" 係指該項限用物質為排除項目。						

3.0 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 or Sub-Deliverable as defined by latest EU Article definition) 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 IPC 1752A XML Full Material Disclosure (FMD) via the Green Data Exchange (GDx), refer to [Lenovo Guide to Full Material Disclosures \(Version 1\)](#), for the Deliverable/Sub-Deliverable.

See Table 2 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/authorisation_process/candidate_list_table_en.asp.

This list is subject to change by the European Chemicals Agency (ECHA); contains 168 unique substances/entries on the date this specification was published.

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.

SVHC (from proposed Candidate List)	CAS Number (EC#)	Reporting Concentration	Examples of industry uses
Acrylamide	79-06-1	At or above 0.1% weight by weight of the Deliverable	Synthesis of polyacrylamides. Polyacrylamides can be used in various applications, e.g., paper processing, gels, and grouting agent.
Aluminosilicate, Refractory Ceramic Fibers *	Not available	At or above 0.1% weight by weight of the Deliverable	High temperature insulating fiber for industrial furnaces, pipes, ducts, and cables. Fire protection equipment, e.g., heat shields. Brake pads, air bags, catalytic converters, and metal reinforcements.
Ammonium pentadecafluorooctanoate (APFO)	3825-26-1	At or above 0.1% weight by weight of the Deliverable	Processing aid in the production of fluoropolymers and fluoroelastomers and other surfactant uses.
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.

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Arsenic acid	7778-39-4	At or above 0.1% weight by weight of the Deliverable	Wood preservative, finishing agent for glass and metal, production of copper foil for printed circuit boards.
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.
1,2-Benzenedicarboxylic acid, di-C 6-8- branched alkyl esters, C7-rich (Diisoheptyl phthalate) (DIHP)	71888-89-6	At or above 0.1% weight by weight of the Deliverable	Plasticizer in PVC, sealants, and printing inks.
1,2-Benzenedicarboxylic acid, di-C 7-11- branched and linear alkyl esters (Di(heptyl, nonyl, undecyl) phthalate – DHNUP)	68515-42-4	At or above 0.1% weight by weight of the Deliverable	Plasticizer
1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate	68515-51-5 68648-93-1	At or above 0.1% weight by weight of the Deliverable	Used in polymer preparations and compounds and in plastic articles for building materials. - Additive in lubricants and adhesives. - Additive in coatings, paints, thinners, paint removes fillers, putties, plasters, modeling clay, finger paints, ink and toners, rubber and plastic articles for artist supply.
1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	At or above 0.1% weight by weight of the Deliverable	In adhesive, paint and plastics
1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	At or above 0.1% weight by weight of the Deliverable	Plasticizer
2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)	3846-71-7	At or above 0.1% weight by weight of the Deliverable	Light stabilizer for a variety of plastics and other organic substrates.
2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)	25973-55-1	At or above 0.1% weight by weight of the Deliverable	Light stabilizer for a variety of plastics and other organic substrates.
2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE)	15571-58-1	At or above 0.1% weight by weight of the Deliverable	Used as heat stabilizer in plastic (mainly PVC processing).
reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate and 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl) oxy]-2-oxoethyl] thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE and MOTE)		At or above 0.1% weight by weight of the Deliverable	Used as heat stabilizer in plastic (mainly PVC processing).
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.
Bis(2-methoxyethyl)ether	111-96-6	At or above 0.1% weight by weight of the Deliverable	Solvent for battery electrolytes, sealants, adhesives, paints and coatings.
Bis(2-methoxyethyl) phthalate	117-82-8	At or above 0.1% weight by weight of the Deliverable	Plasticizer for nitrocellulose, acetyl cellulose, polyvinyl acetate, polyvinyl chloride and polyvinylidene chloride.

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			Enameled wire, film, high-strength varnish and adhesive.
Bis(tributyltin)oxide (TBTO) *	56-35-9	At or above 0.1% weight by weight of the Deliverable	Antiseptic, antifungal agent, paint, pigment, antistaining, refrigerant, foaming agent, and extinguishant.
Boric acid	10043-35-3, 11113-50-1	At or above 0.1% weight by weight of the Deliverable	Applications include electrolytic capacitors, glass, ceramics, rubber, flame retardants, paints, industrial fluids, soldering products, wood veneers, pressed wood panels, and film developers.
Cadmium	7440-43-9	At or above 0.1% weight by weight of the Deliverable	Applications include batteries, electroplating baths, electrical connectors and connector inserts, cadmium plated fasteners and bearing components, as an alloying element in copper, tin, and zinc alloys, electrical conductors, electrical contact materials in line starters and solenoid relays, and other devices subject to high surge current, pigment in plastic, inks, and dispersant in plastic.
Cadmium chloride	10108-64-2	At or above 0.1% weight by weight of the Deliverable.	Manufacture of fungicides, dyeing and printing textiles, in metal finishing baths.
Cadmium fluoride	7790-79-6	At or above 0.1% weight by weight of the Deliverable.	Used to alloy metals and for optical deposition.
Cadmium oxide	1306-19-0	At or above 0.1% weight by weight of the Deliverable.	Applications include batteries, electroplating baths, electrical connectors and connector inserts, cadmium plated fasteners and bearing components, as an alloying element in copper, tin, and zinc alloys, electrical conductors, electrical contact materials in line starters and solenoid relays, and other devices subject to high surge current, pigment in plastic, inks, and dispersant in plastic.
Cadmium sulphate	10124-36-4 31119-53-6	At or above 0.1% weight by weight of the Deliverable.	Used for the electroplating of cadmium in electronic circuits.
Cadmium sulphide	1306-23-6	At or above 0.1% weight by weight of the Deliverable.	Used as a pigment. Used in manufacturing of photoresistors. Used for thin-film transistors. As a thin film can be used in piezoelectric and as transducers.
Cobalt (II) carbonate	513-79-1	At or above 0.1% weight by weight of the Deliverable.	Used as an intermediate in the hydrometallurgical purification of cobalt from its ores, as an inorganic pigment, and as a precursor to catalysts.

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Cobalt (II) diacetate	71-48-7	At or above 0.1% weight by weight of the Deliverable.	Used in production of intermediate chemicals, surface treatments, and adhesion improvement between rubber and steel.
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).
Cobalt (II) dinitrate	10141-05-6	At or above 0.1% weight by weight of the Deliverable.	Used in production of intermediate chemicals, surface treatment and batteries.
Cobalt (II) sulphate	10124-43-3	At or above 0.1% weight by weight of the Deliverable.	Used in production of intermediate chemicals, surface treatment, corrosion prevention, batteries, preparation of pigments, manufacture of drier in lithographic inks.
Diboron trioxide	1303-86-2	At or above 0.1% weight by weight of the Deliverable.	Glass
2,2'-dichloro-4,4'-Methylenedianiline	101-14-4	At or above 0.1% weight by weight of the Deliverable.	Production of polyurethane articles.
2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl)phenol (UV-327)	3864-99-1	At or above 0.1% weight by weight of the Deliverable.	UV-protection agents in coatings, plastics, rubber and cosmetics
2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350)	36437-37-3	At or above 0.1% weight by weight of the Deliverable.	UV-protection agents in coatings, plastics, rubber and cosmetics
Diisopentylphthalate	605-50-5	At or above 0.1% weight by weight of the Deliverable.	Plasticizer. Used in manufacture of propellants.
Di-n-hexyl phthalate (DNHP) (synonym - dihexyl phthalate)	84-75-3	At or above 0.1% weight by weight of the Deliverable.	Plasticizer
N,N-dimethylacetamide	127-19-5	At or above 0.1% weight by weight of the Deliverable.	Solvent for production of fibers for polymers, e.g., acrylic, polyurethanepolyurea copolymer
1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)	110-71-4	At or above 0.1% weight by weight of the Deliverable.	Possible use in batteries.
Dipentyl phthalate (DPP)	131-18-0	At or above 0.1% weight by weight of the Deliverable.	Plasticizer in polyvinyl chloride.
Disodium tetraborate, Anhydrous	1330-43-4 (anhydrous), 12179-04-3 (pentahydrate), 1303-96-4 (decahydrate)	At or above 0.1% weight by weight of the Deliverable	Wood preservative. Biocide. Electrolytic capacitors.
2-Ethoxyethanol	110-80-5	At or above 0.1% weight by weight of the Deliverable	Solvent for commercial and industrial applications. Multipurpose cleaner in such products as varnish remover and degreasers.
2-Ethoxyethyl acetate	111-15-9	At or above 0.1% weight by weight of the Deliverable	Solvent. Used in formulations of paints, lacquers and varnishes for industrial uses.
Fatty acids, C16-18, lead salts	91031-62-8	At or above 0.1% weight by weight of the Deliverable.	Potential use in PVC processing for cables and power cords.
Formaldehyde, oligomeric reaction products with aniline	25214-70-4	At or above 0.1% weight by weight of the	Hardener for epoxy resins in adhesives, used in the

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		Deliverable	production of high performance polymers.
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.
Hydrazine	7803-57-8; 302-01-2	At or above 0.1% weight by weight of the Deliverable	Blowing agent for thermoplastic and Elastomers. Organic dyes for textiles. Precursor to polymerization catalysts. Metallization of glass, plastics and metals. Nickel and palladium electroless deposition. Making PCB holes conductive.
Lead hydrogen arsenate	7784-40-9	At or above 0.1% weight by weight of the Deliverable	Biocide for wood.
Lead monoxide (lead oxide) trioxide	1317-36-8	At or above 0.1% weight by weight of the Deliverable.	Potential use in lead acid batteries Glass
Lead oxide sulphate	12036-76-9	At or above 0.1% weight by weight of the Deliverable.	Potential use in lead acid batteries
Lead titanium trioxide	12060-00-3	At or above 0.1% weight by weight of the Deliverable.	Ceramics
2-Methoxyethanol	109-86-4	At or above 0.1% weight by weight of the Deliverable	Manufacture of rubber and plastic products. Multipurpose solvent, for example, in varnishes, dyes, and resins.
1-Methyl-2-pyrrolidone	872-50-4	At or above 0.1% weight by weight of the Deliverable.	High temperature coating, urethane dispersions, acrylic and styrene latexes. Paint remover, industrial degreaser, and injection head and cast-molding equipment cleaner. Cleaning, de-fluxing, edge bead removal and photoresist stripping.
Nitrobenzene	98-95-3	At or above 0.1% weight by weight of the Deliverable.	Used in the production of aniline, which is a precursor to rubber chemicals, pesticides, dyes (particularly azo dyes), explosives, and pharmaceuticals.
Orange lead (lead tetroxide)	1314-41-6	At or above 0.1% weight by weight of the Deliverable.	Potential use in lead acid batteries.
Pentadecafluorooctanoic acid (PFOA)	335-67-1	At or above 0.1% weight by weight of the Deliverable.	Surfactant in emulsion polymerization of fluoropolymers
Perfluorononan-1-oic-acid and its sodium and ammonium salts	375-95-1 21049-39-8 4149-60-4	At or above 0.1% weight by weight of the Deliverable	Processing aid for fluoropolymer manufacture/lubricating oil additive/surfactant for fire extinguishers/cleaning agent/textile antifouling finishing agent/polishing surfactant/waterproofing agents and in liquid crystal display panels
[Phthalate (2-)]dioxotrilead	69011-06-9	At or above 0.1% weight by weight of the Deliverable	Potential plasticizer in cable jacketing
Potassium chromate	7789-00-6	At or above 0.1% weight by weight of the Deliverable	Treatment and coating of metals. Manufacture of reagents and chemicals.

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			Manufacture of textiles. Coloring agent in ceramics. Tanning and dressing of leather. Manufacture of pigments and inks.
Potassium dichromate	7778-50-9	At or above 0.1% weight by weight of the Deliverable	Chrome metal manufacturing. Treatment and coating of metals. Manufacture of chemicals. Tanning of leather. Textile manufacturing. Photolithography. Wood treatment. Corrosion inhibitor in cooling systems.
1,3-propanesultone	1120-71-4	At or above 0.1% weight by weight of the Deliverable	Chemical intermediate in the production of fungicides, insecticides, cationexchange resins, dyes, vulcanisation accelerators, detergents, lathering agents, bacteriostats, and a variety of other chemicals and as corrosion inhibitor for mild (untempered) steel and electrolyte fluid of lithium ion batteries.
Pyrochlore, antimony lead yellow	8012-00-8	At or above 0.1% weight by weight of the Deliverable	Potential pigment in paints and inks
5-sec-butyl-2-(2,4-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [1], 5-sec-butyl-2-(4,6-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [2] [covering any of the individual stereoisomers of [1] and [2] or any combination thereof]		At or above 0.1% weight by weight of the Deliverable	Fragrance ingredient
Sodium chromate	7775-11-3	At or above 0.1% weight by weight of the Deliverable	Manufacture of chromium compounds.
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.
Sodium perborate; perboric acid, sodium salt	Not available	At or above 0.1% weight by weight of the Deliverable	Bleaching agent
Sodium peroxometaborate	7632-04-4	At or above 0.1% weight by weight of the Deliverable	Bleaching agent
Strontium chromate	7789-06-2	At or above 0.1% weight by weight of the Deliverable	Paints, varnishes, sealants. Coatings in steel and aluminum coils.
Tetraboron disodium heptaoxide, hydrate	12267-73-1	At or above 0.1% weight by weight of the Deliverable	Applications include electrolytic capacitors, glass and glass fibers, ceramics, cleaners, industrial fluids, metallurgy, adhesives, wood applications, and flame retardants.
Tetralead trioxide sulphate	12202-17-4	At or above 0.1% weight by weight of the Deliverable	Potential stabilizer in PVC
Trichloroethylene	79-01-6	At or above 0.1% weight by weight of the Deliverable	Industrial solvent. Solvents for adhesives. Degreaser for metal parts. Intermediate in manufacture of chlorinated

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			and fluorinated organic compounds.
1,2,3-Trichloropropane	96-18-4	At or above 0.1% weight by weight of the Deliverable	Paint and varnish remover. Solvent for oils, fats, waxes, rubber, and resins. Degreasing agent.
Triethyl arsenate	15606-95-8 (427-700-2)	At or above 0.1% weight by weight of the Deliverable	Biocide for wood.
Zirconia Aluminosilicate, Refractory Ceramic Fibers	Not available	At or above 0.1% weight by weight of the Deliverable	High temperature insulating fiber for industrial furnaces, pipes, ducts, cables, and high-temp test equipment. Fire protection equipment such as heat shields. Also used for brake pads, catalytic converters, metal reinforcement, and air bags

EU REACH Regulation Number 1907/2006 can be found at http://echa.europa.eu/reach/legislation_en.asp
 The EU provides guidance documents for REACH, specifically guidance documents for Substances in Articles as well as the candidate list for SVHC at http://guidance.echa.europa.eu/guidance_en.htm
 Additional information about REACH can be found at the European Chemicals Agency web site at <http://echa.europa.eu>

Annex XVII
4.0 Definitions

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

RoHS: European Union Directive 2011/65/EU restriction of the use of certain hazardous substances in new electrical and electronic equipment that became effective July 1, 2006.

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.

Article - an object composed of one or more substances or mixtures which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition. Every single component in a product can also be defined as an article. This definition is from EU Regulation 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

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.

Electronic Product Environmental Assessment Tool (EPEAT): based upon IEEE Standard 1680 for the Assessment of Personal Computer Products (1680). Refer to: <http://www.epeat.net/>

Intentionally added: deliberate use in a product, material, part, assembly

Homogenous material: of uniform composition throughout (e.g., plastics, ceramics, glass, metals, alloys, resins, coatings, solder, flux).

Mechanically disjointed: Separated by mechanical actions such as unscrewing, cutting, crushing, grinding, and abrasive processes

ppm = parts per million = mg / kg. Mass of substance as a percentage of the homogenous material, not the weight of substance in the entire part or product unless otherwise noted. 1000 ppm = 0.1%; 100 ppm = 0.01% by weight

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).

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.

Threshold level: Concentration limit above which the presence of a substance in a material or product must be declared

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Appendix: Guidance: RoHS summary checklist			Requirement Met	
1. General			Yes	No
a. Lenovo Environmental Specifications 41A7731, 417733	Requirement:	Mandatory for new Lenovo brand products, materials, parts and assemblies incorporated into Lenovo Brand products worldwide*.		
	Affected Parts:	Electronic Hardware parts / Products		
	Supplier must declare compliance by:	Lenovo Supplier Material Declaration		
b. European Union RoHS Compliance	Requirement:	Mandatory for new Lenovo brand products, materials, parts and assemblies incorporated into Lenovo Brand products worldwide*.		
	Affected Parts:	New electronic Hardware products and parts. Does not apply to spare parts for equipment put on the market before July 1, 2006, batteries.		
	Supplier must declare compliance by:	Lenovo Supplier Material Declaration		
c. "China RoHS" Compliance	Requirement:	Mandatory for products offered for sale in the People's Republic of China		
	Affected Parts:	Electronic hardware parts / products except batteries,		
	Supplier must declare compliance by:	1. EPUP Mark on the product/option (or on the Pubs if the product is small or of irregular shape) 2. Substance Disclosure Table inside the product box shipping into China (must be in Chinese, except "O", "X") 3. Date of manufacture in YYYY-MM-DD format on the product or on the product's sales package 4. "China RoHS" Packaging Recycle Marks		
d. "J-Moss" Compliance	Requirement:	Mandatory for products imported into or manufactured in Japan		
e. "Turkey RoHS" Compliance	Requirement:	Mandatory for products offered for sale in the Republic of Turkey		
	Affected parts:	New products, options and parts must comply with Turkey RoHS material restrictions (same as European Union RoHS material restrictions)		
	Supplier must declare compliance by:	Lenovo Supplier Material Declaration Keep all information and documents showing that products they sale to Lenovo meet the technical criteria mentioned in this Regulation for 5 years starting from the date the product is released to the market. Retain information in Lenovo Filenet(ECM)-Worldwide Supplier Material Declarations		
f. "Korea RoHS" Compliance	Requirement:	Mandatory for products for Korea. Product Declaration required on Korea website before product is offered for sale		
g. EPEAT 4.1.2.1 Elimination of intentionally added Cadmium (Cd)	Requirement:	Mandatory for Lenovo EPEAT products. See http://www.epeat.net/ for more information Shall not exceed 50 ppm in homogeneous material		
	Affected Parts:	All parts except battery *1. Exceptions for recycled materials		
	Supplier must declare compliance by:	Lenovo Supplier Material Declaration		
	RoHS exempt substances:	Include in ppm calculation		
Remarks *1:	Computers, Workstations, Monitors. FRUs and Options are not in scope.			
h. EPEAT 4.1.4.1 Lead - Required for Visual Display Units Only	Requirement:	Required for Visual Display Units (VDUs) Required for EPEAT Products or when requested by Lenovo. See http://www.epeat.net/ Shall not contain lead greater than 50 ppm by weight		
	Affected Parts:	LCD and LCD front/rear cover only		
	Supplier must declare compliance by:	Lenovo Supplier Material Declaration		
	RoHS exempt	Can be removed from ppm calculation		

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Appendix: Guidance: RoHS summary checklist			Requirement Met	
	substance:			
i. EPEAT 4.1.5.1 Elimination of intentionally added Hexavalent Chromium (Cr6)	Requirement:	Required for EPEAT Products or when requested by Lenovo. See http://www.epeat.net/ Shall not exceed 500 ppm in homogenous materials		
	Affected Parts:	Hardware parts -- especially metals, fasteners		
	Supplier must declare compliance by:	Lenovo Supplier Material Declaration		
	RoHS Exempt Substances	Include in ppm calculation		
j. Supplier RoHS-compliance	Supplier responsibility	Mandatory. Supplier maintains effective compliance process including technical documentation which demonstrates actions to verify RoHS-compliance. Upon request by Lenovo the supplier will verify compliance of materials, parts, components, and/or products to Lenovo's RoHS Specification via analytical testing or other suitable means.		
k. Lenovo approved Lead (Pb)-free solder	Supplier	Lenovo approved lead (Pb)-free solders: Tin-silver-copper (Sn-Ag-Cu (SAC)) solder. Other lead (Pb)-free solders must be approved by Lenovo, on a case by case basis		
l. Lenovo approved Lead (Pb)-free printed circuit board finish	Supplier	. Lenovo approved lead (Pb)-free Printed Circuit Boards finishes: Organic Solder Preservatives (OSP). Other materials may be approved by Lenovo, on a case by case basis		
m. Whisker Mitigation	Supplier	Suppliers shall implement whisker growth countermeasures. Reference: JEDEC Standard JESD22-A121 Lenovo reserves the right to request Supplier tin whisker test data		

Revision History

Version	Date	Change Description
0	Jun 2006	Initial issue
1	Nov 2006	Added EU RoHS exemptions 22-29, Revised Cd threshold from 75 to 100 ppm, Added requirement for Supplier Test Report upon request, Defined OEM-contract manufacturer responsibility for Supplier Material Declaration, Added reference to China RoHS, J-Moss, US RoHS regulations
2	Jun 2007	Updated to include systems, printers, options, visual display devices, Deleted expired RoHS exemption for Cr6, Updated Packaging Specification Reference
3	Dec 2007	Added reference to Korea RoHS Declaration, ppm calculation, exemption 9a may not be used, Added Consumer product signoff
4	Aug 2008	EC M07149H. Added Lenovo RoHS Checklist, China RoHS Supplier Letter, J-Moss marks.
5	October 2008	Cr6 threshold changed to intentionally added; corrected typo (Table 1: 0.01 corrected to 0.1 for lead), added reference to Turkey RoHS effective June 2009); added 3 new RoHS exemptions 30. Cadmium alloys as electrical/mechanical solder joints to electrical conductors located directly on the voice coil in transducers used in high-powered loudspeakers with sound pressure levels of 100 dB (A) and more. 31. Lead in soldering materials in mercury free flat fluorescent lamps (which e.g. are used for liquid crystal displays, design or industrial lighting). 32. Lead oxide in seal frit used for making window assemblies for Argon and Krypton laser tubes
6	March 2010	Added REACH information (requirements, SVHC listing, etc.); added/updated EU RoHS exemptions 33-38 (Cadmium, Lead, Mercury); updated Turkey RoHS information.
7	September 2012	Updated RoHS exemption list; updated REACH SVHC listing
8	September 2013	Updated and included other jurisdictions with RoHS requirements. Updated RoHS exemption list per Directive 2011/65/EU. Updated REACH SVHC listing per 20 June 2013 Candidate List. Updated Environmental Protection Use Period (EPUP) information to reflect current regulation requirements. Added information describing Vietnam RoHS requirements. Updated EU Directive to reflect the current version.
9	July 2014	Updated REACH SVHC listing per 16 June 2014 Candidate List
10	March 2015	Updated REACH SVHC listing per 17 December 2014 Candidate List. Update: 600ppm allowance for PBBs, PBDEs, excluding DecaBDE in PCC recycle and plastic resins.
11	August 2015	Added 4 phthalates per new Directive (EU) 2015/863 to amend Annex II to EU RoHS 2 (Directive 2011/65/EU). Updated REACH SVHC listing per 15 June 2015 Candidate List
12	March 2016	Updated REACH SVHS listing per 17 December 2015 Candidate List. Added Taiwan RoHS mark and Disclosure table information.