IBM Engineering Specification 46G3772

Baseline Environmental Requirements For Supplier Deliverables to IBM

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Supersedes All Previous Updates

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1 Scope

1.1 Objectives

IBM Engineering Specification (ES) 46G3772 establishes baseline environmental requirements for all Deliverables where this specification is referenced in a Statement of Work, print, contract or other procurement documents. ES 46G3772 implements IBM's environmental policy objectives and contains some, but not all, environmental legal requirements for Deliverables. Supplier shall ensure Deliverables comply with the requirements provided in ES 46G3772. ES 46G3772 contains restrictions on Materials, certain chemicals used in manufacturing and includes other requirements, e.g., battery collection programs, labeling of batteries, energy efficiency, and marking of plastic Parts. If the Deliverable does not contain certain types of parts, then the section of 46G3772 referring to those parts would not apply, e.g., if there are no batteries in the Deliverable, then the battery requirements would not apply. ES 46G3772 requires Suppliers to disclose information about the content of certain substances in their Deliverables. This specification also applies to chemical Deliverables used for Field Use Materials, Chemical Product Supplies and chemicals contained in hardware Deliverables, Parts, or Products.

Compliance with the requirements in ES 46G3772 alone may not satisfy the Supplier's responsibilities to IBM because ES 46G3772 does not encompass all environmental legal requirements for Deliverables worldwide. In addition to ES 46G3772, Supplier shall ensure the Deliverables comply with all "Environmental Laws" and are ready for import, export, sale, or other distribution of the Deliverable in all jurisdictions worldwide, regardless of where they are sold to IBM. "Environmental Laws" include laws, rules and regulations at local, state, provincial, national, or international level that relate to environmental matters, including without limitation, material restrictions, material bans, labeling, availability of product environmental information, energy efficiency, end-of-life take back, battery requirements, and other similar requirements.

It is important to note that in addition to ES 46G3772; IBM maintains environmental and / or related requirements in other specifications, contracts, or procurement documents. Most notably, full compliance requirements for the European Union (EU) Directive 2011/65/EU on the Restriction on the use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) are not solely a part of ES 46G3772, but are rather applied through the combination of ES 46G3772, other applicable contract provisions, and IBM engineering specifications, such as 53P6233, 97P3864, and/ or 873444. In circumstances where multiple documents contain restrictions on the same chemical or substance in the same application, the most restrictive requirements apply.

1.2 Definitions

Additional definitions can be found in the applicable sections.

Agglomerate - a collection of weakly bound particles or aggregates where the resulting external surface area is similar to the sum of the surface areas of the individual components. [Source: EU Commission Recommendation 2011/696/EU on the definition of nanomaterial]

Aggregate - a particle comprising of strongly bound or fused particles. [Source: EU Commission Recommendation 2011/696/EU on the definition of nanomaterial]

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. [Source: EU Regulation 1907/2006 concerning the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH)]. In reference to EU REACH Substances of Very High Concern (SVHC), when a product is made up of more than one constituent Article, the SVHC concentration above 0.1% weight by weight applies to each constituent Article making up the product.

[Source: Judgement of the European Court for EU Regulation 1907/2006 (REACH) Articles 7(2) and 33, 10 September 2015]

Battery or accumulator- any source of electrical energy generated by direct conversion of chemical energy and consisting of one or more primary battery cells (nonrechargeable) or consisting of one or more secondary battery cells (rechargeable). [Source: EU Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators]

Chemical Product Supply - a chemical used as part of the operation of a hardware product which is consumed during the operation of the product and/or which must be periodically replaced to maintain the product.

Covered Electronic Device – video display device containing a screen greater than 4 inches, measured diagonally, such as computer monitors containing cathode ray tubes, laptop computers with a liquid crystal display, liquid crystal display containing monitors. [Source: California Electronic Waste Recycling Act, SB 20, 2003, and SB 50, 2004]

Deliverable(s) - any tangible item(s) delivered by or for a Supplier to IBM in accordance with a purchase contract or other agreement with IBM. Deliverables include, but are not limited to, components, Materials, Parts, Products, and tools.

Electrical and Electronic Equipment (EEE) - means equipment which is dependent on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such currents and fields and designed for use with a voltage rating not exceeding 1000 volts for alternating current and 1500 volts for direct current. [Source: EU Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE)]

Field Use Material (FUM) - a chemical used to maintain and/or service hardware products.

Frequently Handled Cables - cables and cords which are readily accessible to the consumer during ordinary use**,** e.g., computer mouse cords, computer peripheral wires and cables designed to plug into the front of system (e.g., USB cords), computer peripheral AC adapter cord and I/F cable for portable computers or portable peripheral devices, computer peripheral PCMCIA card cord for portable computers, computer peripheral wires and cables for portable computers, computer speaker cords used with portable computers, desktop computer power/patch/pin cords designed to plug into the front of a computer, external CD/DVD and tape drives for portable computers, mobile PC computer cords, computer joystick, audio or video adapter cords for portable products, audio or video cable for portable products, audio/video/computer/telecommunications cables, packaged individually for retail sales, portable digital imaging equipment, portable DVD player, portable power adapters, AC adapters for foreign outlets and other voltage converters, portable ZIP drives, scanners for portable computers, USB and firewire cords.

Homogeneous Material – means one material of uniform composition throughout or a material, consisting of a combination of materials that cannot be disjointed or separated into different materials by mechanical actions such as unscrewing, cutting, crushing, grinding and abrasive processes. [Source: EU Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment]

Intentionally Added or Intentional Addition - a substance is deliberately utilized in the production of a Deliverable.

Materials - chemical substances and preparations that are supplied for the production of Parts, Products and other items (e.g., structural plastics, metals, coatings, paints, and adhesives) and chemical substances or preparations that are shipped with Parts or Products (e.g., toners, cleaners, lubricants, oils, and refrigerants).

Mixture – a mixture or solution composed of two or more substances. [Source: EU Regulation No 1272/2008 on classification, labeling, and packaging of substances and mixtures]

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.

Particle - a minute piece of matter with defined physical boundaries. [Source: EU Commission Recommendation 2011/696/EU on the definition of nanomaterial]

Parts - fabricated Materials, components, devices, and assemblies.

Plastic – Material that contains, as an essential ingredient, one or more organic polymeric substances of large molecular weight, is solid in its finished state, and, at some stage in its manufacture or processing into finished articles, can be shaped by flow. [Source: National Sanitation Foundation International Draft Standard NSF/ANSI 426]

Postconsumer recycled material: Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain. [Source: National Sanitation Foundation International Draft Standard NSF/ANSI 426]

Preparation - a mixture or solution composed of two or more substances, for example paint, lubricant or ink. [Source: EU Regulation 1907/2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)]

Products - stand alone, final assemblies including complete machines supplied by an original equipment manufacturer (OEM).

RoHS - an acronym for EU Directive 2011/65/EU on the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment and subsequent amendments.

RoHS substances - substances regulated by EU Directive 2011/65/EU on RoHS and amendments. These substances (as of the last revision date of this specification) are: mercury, lead, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers, bis (2-ethylhexyl) phthalate, butyl benzyl phthalate, dibutyl phthalate and diisobutyl phthalate.

REACH - an acronym for European Commission Regulation Number 1907/2006 concerning the Registration, Evaluation, Authorization, and Restriction of Chemicals and amendments.

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. [Source: EU Regulation 1907/2006 concerning the Registration, Evaluation, Authorization, 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 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. [Source: EU REACH Regulation, Article 57]

WEEE - an acronym for European Union (EU) Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on Waste Electrical and Electronic Equipment (WEEE).

1.3 Application

ES 46G3772 applies to all Deliverables supplied to IBM that reference this specification in a Statement of Work, print, contract, or other IBM document.

Suppliers are responsible for compliance with ES 46G3772 in their own operations, in their subcontracted operations, and in the Materials they procure for the manufacture of Deliverables for IBM as described herein.

In the event of conflict between ES 46G3772 and any IBM part drawing requirement, Suppliers shall immediately notify their IBM procurement representative. **Any deviation from the requirements of ES 46G3772 must have prior written approval by IBM's procurement representative. IBM Procurement shall obtain consent from the appropriate IBM representatives. IBM Procurement must contact the author of this document for details on the requirements for deviations.**

1.4 Document Administration

This document is maintained and controlled by IBM Systems.

1.5 IBM Documents

ES 46G3772 and the following documents referenced herein can be accessed from the environmental requirements section of this website:
http://www-03.ibm.com/procurement/proweb.nsf/ContentDocsByTitle/United+States~Information+for+suppliers

- **Product Content Declaration for IBM Suppliers**, IBM Part Number 46C3484.
- **Engineering Specification 53P6233** Compliance Requirements for the European Union Directive (and other jurisdictions) on the Restriction of the Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment for IBM Products. This specification reference here is informational only. The IBM print, Statement of Work or other procurement documentation must reference this specification as applicable to the specific Deliverable.
- **Engineering Specification 97P3864** Compliance Requirements for the European Union Directive (and other jurisdictions) on the Restriction of the Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment for IBM Products. This specification does not allow for use of the EU RoHS exemption for "Lead in solders for servers, storage and storage array systems." This specification reference here is informational only. The IBM print, Statement of Work or other procurement documentation must reference this specification as applicable to the specific Deliverable.
- **873444** Product Quality Addendum (PQA) for Purchased Electronic Components. This specification reference here is for informational purposes only. The IBM print, Statement of Work or other procurement documentation must reference this specification as applicable to the specific Deliverable.
- **Engineering Specification 92F6933** Packaging Requirements for Dangerous Goods.
- **Engineering Specification 5897660** Packaging Materials, Essential Requirements.

2 Requirements

2.1 Prohibited From Use

2.1.1 Restrictions for Hardware Deliverables, Parts, Products, Chemicals, Substances, and Preparations

Table 1 lists restrictions for categories of substances which must not be contained in Deliverables, Parts, Products, Chemicals, Substances, and Preparations. The scope of restrictions varies by substance category. Details of the restrictions for each category are provided in Table 1 along with some applicable regulatory references. Please note the regulatory references are only examples, and are not intended to impact or alter the IBM restrictions set forth in this specification. Restrictions on chemicals used in manufacturing of Deliverables are also included (**bold entry in table**). Expanded listings of relevant substances in each of the categories are available in the Annexes referenced in Table 1. **If a substance is found in several entries (Tables 1, 2, 3, 4, 5, and/or the Annexes) due to multiple laws and chemical classifications, verify the stated requirements for the application of concern and use the more restrictive level.**

Please note certain substances subject to EU RoHS Directive 2011/65/EU are already restricted by other regulations at concentration levels that are more stringent than those associated with EU RoHS compliance. Table 1 presents the requirements for these substances as defined by certain existing legislation and/or IBM requirements.

Compliance of Deliverables to all the criteria of the EU Directive on RoHS is not solely governed by ES 46G3772. Only those restrictions on RoHS substances which must be met in ES 46G3772 are listed in Table 1. Other IBM specifications are used to apply EU RoHS compliance requirements to Deliverables. See print notes, Part specifications, purchase contracts, purchase orders, or contact your IBM procurement representative to determine if IBM's RoHS specifications apply in addition to ES 46G3772.

In addition to the prohibited substances in Table 1, IBM prohibits the use of the following substances in system enclosures:

- Polyvinyl chloride (CAS 9002-86-2). Prohibited by IBM for use in system enclosures for IBM designed Products with an IBM logo and OEM designed Products with an IBM logo. System enclosures include cover sets enclosing an entire product, including enclosures for monitors, servers, workstations, storage systems, and kiosks. This does not include mice, keyboards, cables, or bezels for subcomponents. Bezels for Storage products (e.g., Tape libraries, tape and CD/DVD drives) must meet this requirement and not use PVC. This prohibition includes blends of resins which include PVC in whole or part of the composition.
- Monomer tetrabromobisphenol-A (TBBA) (CAS 79-94-7). Prohibited by IBM for use as an additive flame retardant in system enclosures for IBM designed Products with an IBM logo and OEM designed Products with an IBM logo. System enclosures include housing parts enclosing an entire product such as monitors, servers, workstations, storage systems and kiosks. This does not include mice, keyboards, and bezels for subcomponents such as tape and DVD drives. The non-reactive form only is prohibited. (Note: TBBA used in polycarbonate resin is generally in a reactive form, not additive.)

Notes for Table 1

1: A list of representative regulatory references is included after Table 1. This list is not all-inclusive; it is provided for example purposes only. Where the reference of "IBM Requirement" is made, this means the requirement in that line is required by IBM and may or may not be also required by a regulation or law.
2: Bold font indicates substances are also prohibited from use in manufacturing of the Deliverable. The substance may also be restricted in Deliverables, please refer to the "Details of Restriction" column.
3: The referenced Annexes include lists of example compounds and Chemical Abstracts Service (CAS) numbers. The Annexes are not all inclusive unless stated.

Table 1. Prohibited from Use in Hardware Deliverables, Parts, Products, Chemicals, Mixtures, Substances, and Preparations		
Chemical Substance Category	**Details of Restriction**	**Sample Regulatory References**
Acids generated from chromium trioxide and their oligomers. Group containing: Chromic acid (CAS 7738-94-5); dichromic acid (CAS 13530-68-2); oligomers of chromic acid and dichromic acid (CAS not yet assigned)	Prohibited at or above 0.1% weight by weight of the Article.	1
Acrylamide (CAS 79-06-1)	Shall not be used as a Substance or constituent of Mixtures in a concentration equal to or greater than 0.1% by weight for grouting applications.	1
Ammonium dichromate (CAS 7789-09-5)	Prohibited at or above 0.1% weight by weight of the Article.	1
Arsenic and compounds (Annex U)	Prohibited in wood products and paints. Applications other than for wood or paint are reportable on the PCD; see Table 4 for reporting details for other applications.	1, 2
Asbestos (Annex A)	Prohibited.	1, 2, 3, 12, IBM Requirement
Azo colorants (Annex B)	Azodyes which may release one or more aromatic amines (listed in Annex B (1)) are prohibited in detectable concentrations, e.g., above 30 mg/kg (ppm) in textile and leather articles which may come into direct and prolonged contact with human skin. (Please note Benzidine has further restrictions, see entry in this Table for Benzidine.) 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).	1, 2
Benzenamine, N-phenyl-, reaction products with styrene and 2,4,4-trimethylpentene (CAS 68921-45-9)	Prohibited except as an additive in rubber. Tires are excluded from the rubber exemption.	15
Benzidine (CAS 92-87-5), and compounds (Annex QQ)	Prohibited. (Note benzidine is also listed in Annex B. The more restrictive level applies, which is this entry.)	1, 2, 12, 15, 43
Benzo[a]pyrene (CAS 50-32-8)	Prohibited in wood based materials in excess of 0.5 milligrams per kilogram of dry matter.	2
Benzyl butyl phthalate (or Butyl benzyl phthalate) (BBP) (CAS 85-68-7) Please note this substance is prohibited elsewhere on this table at a more restrictive level.	Prohibited at or above 0.1% weight by weight of the Article. Prohibited at or above 0.1% by weight (or 1000ppm) in homogeneous materials.	1 44
Biocidal product as defined in EU Regulation 528/2012 concerning the making available on the market and use of biocidal products	Prohibited on or in Deliverables, for example, prohibited for use as a treatment on Deliverables where the biocidal product is expected to remain on the IBM Deliverable. This restriction shall not apply to treated articles where the sole treatment undertaken was the fumigation or disinfection of premises or containers used for storage or transport and where no residues are expected to remain from such treatment on the IBM Deliverable.	41
Bis (2-ethylhexyl) phthalate (DEHP) (CAS 117-81-7) Please note this substance is prohibited elsewhere on this table at a more restrictive level.	Prohibited at or above 0.1% weight by weight of the Article. Prohibited at or above 0.1% by weight (or 1000ppm) in homogeneous materials.	1 44
2-(2-butoxyethoxy)ethanol (DEGBE) (CAS 112-34-5)	Prohibited in spray paints, paints intended to be sprayed or in spray cleaners in concentrations equal to or greater than 3% by weight.	1

Table 1. Prohibited from Use in Hardware Deliverables, Parts, Products, Chemicals, Mixtures, Substances, and Preparations

Chemical Substance Category	Details of Restriction	Sample Regulatory References
Cadmium/Cadmium Compounds (Annex C) *	Cadmium is prohibited in concentrations above 100 ppm or 0.01% by weight when used in a paint, varnish, color pigment, dye, stabilizer, plastic, resins, epoxy resins, or in alloy applications. Shall not be used in brazing fillers in concentrations equal to or greater than 0.01% by weight. All cadmium use in plating or in a surface coating containing cadmium is prohibited. For restrictions in battery applications, see Table 8. Cadmium is prohibited in wood based materials in excess of 2 milligrams per kilogram of dry matter. Prohibited in Substances and Preparations	1, 2, 12, 28 40
Chromium trioxide (CAS 1333-82-0)	Prohibited at or above 0.1% weight by weight of the Article.	1
Creosote, coal tar, tar oils, and anthracene substances (Annex FF)	Prohibited for the treatment of wood.	1, 2
Decabromo diphenyl ether (CAS 1163-19-5) *	Prohibited in Deliverables, Parts, and Products. Prohibited in Substances and Preparations at levels at and above 0.1% by weight. IBM prohibits the Intentional Addition of Decabromo diphenyl ether in any Homogeneous Material.	19, 23, 31 22, 33 IBM Requirement
4,4'-Diaminodiphenylmethane (MDA) (CAS 101-77-9)	Prohibited at or above 0.1% weight by weight of the Article.	1
Diarsenic pentaoxide (CAS 1303-28-2) (synonym - arsenic pentoxide)	Prohibited at or above 0.1% weight by weight of the Article.	1
Diarsenic trioxide (CAS 1327-53-3)	Prohibited at or above 0.1% weight by weight of the Article.	1
Dibutyl phthalate (DBP) (CAS 84-74-2) Please note this substance is prohibited elsewhere on this table at a more restrictive level.	Prohibited at or above 0.1% weight by weight of the Article. Prohibited at or above 0.1% by weight (or 1000ppm) in homogeneous materials.	1 44
Dibutyltin (DBT) compounds (Annex KK)	Prohibited in Mixtures and Articles where the concentration in the Mixture or Article, or part thereof, is greater than the equivalent of 0.1% by weight of tin.	1
Diisobutyl phthalate (DIBP) (CAS 84-69-5) Please note this substance is prohibited elsewhere on this table at a more restrictive level.	Prohibited at or above 0.1% weight by weight of the Article. Prohibited at or above 0.1% by weight (or 1000ppm) in homogeneous materials.	1 44
Dimethylfumarate (CAS 624-49-7)	Prohibited in Articles, Products, Parts, and Deliverable greater than 0.1 mg/kg of the weight of the Article, Product, Part or Deliverable. Prohibited in pouches (e.g., desiccants) and in chemicals, Substances, and Preparations.	1, 30
2,4-Dinitrotoluene (CAS 121-14-2)	Prohibited at or above 0.1% weight by weight of the Article.	1
Dioctylin (DOT) compounds (e.g., dioctyltin oxide CAS 870-08-6 and dioctyltin dilaurate CAS 3648-18-8)	Prohibited in concentrations greater than the equivalent of 0.1% by weight of tin in: 1.Textile articles intended to come into contact with skin, and 2.Two-component room temperature vulcanization molding kits (RTV-2 molding kits).	1
Fluorinated ethers and alcohols (Annex OO)	Prohibited.	32

Table 1. Prohibited from Use in Hardware Deliverables, Parts, Products, Chemicals, Mixtures, Substances, and Preparations

Chemical Substance Category	Details of Restriction	Sample Regulatory References
Formaldehyde (CAS 50-00-0)	1. Materials capable of releasing formaldehyde into the air, under reasonably foreseeable conditions of use at concentrations reaching or exceeding 0.1 ppm are prohibited. 2. The use of formaldehyde in textiles intended for skin contact is prohibited (e.g., Wrist straps and headphones) above 75 mg/kg formaldehyde. The use of formaldehyde in textiles not intended for skin contact is prohibited above 300 mg/kg. 3. The use of formaldehyde in wood applications may not be used if the formaldehyde emission caused by the wooden materials exceeds 0.1 ml/m^3 (ppm) in the air of a test chamber. Formaldehyde emission standards in Composite Wood must not exceed the following limits (see Section 2.11 for more details): Hardwood Plywood Veneer Core - 0.05 ppm Hardwood Plywood Composite Core - 0.05 ppm Particleboard - 0.09 ppm Medium Density Fiberboard - 0.11 ppm Thin Medium Density Fiberboard - 0.13 ppm.	25 11, 29 20, 21 24
Halogenated aromatic substances (Annex D)	Prohibited from use in capacitors and transformers above 500 ppm for monohalogenated or 50 ppm for polyhalogenated aromatic substances in materials of the component. (Please note PCBs have further restrictions, see entry in this Table for PCBs.)	1, 2
Halogenated diphenyl methanes (Annex E)	Prohibited from use and in Preparations and products containing it.	1, 12
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (alpha HBCDD, beta HBCDD, gamma HBCDD) (CAS 25637-99-4, 3194-55-6, 134237-50-6, 134237-51-7, 134237-52-8)	Prohibited at or above 0.1% weight by weight of the Article.	1
Hexachlorobenzene (CAS 118-74-1	Prohibited except if incidentally present.	15, 40
Hexachlorobutadiene (CAS 87-68-3)	Prohibited.	10, 15, 37
Hexachloroethane (Annex F)	**Prohibited in manufacturing or processing of nonferrous metals.** Prohibited in Substances, Mixtures, and Preparations.	**1, 2, 12,** 40
Hexavalent Chromium/ Hexavalent Chromium Compounds (Annex G) *	Intentional Addition is prohibited by IBM in paints and plastic resins. Prohibited in leather articles or articles containing leather parts coming into contact with skin in concentrations equal to or greater than 3 mg/kg (0.0003% by weight) of the total dry weight of the leather.	IBM Requirement 1
Hydrofluorocarbons (Annex JJ)	Prohibited in non-refillable containers, foams, and non-confined, direct evaporation systems containing refrigerants. Prohibited in new products and applications from October 2014.	32
Lead chromate (CAS 7758-97-6) (Please note hexavalent chromium and lead are prohibited for use in Deliverables; see IBM RoHS specifications and other entries in this table.) *	Prohibited at or above 0.1% weight by weight of the Article.	1

Table 1. Prohibited from Use in Hardware Deliverables, Parts, Products, Chemicals, Mixtures, Substances, and Preparations		
Chemical Substance Category	**Details of Restriction**	**Sample Regulatory References**
Lead chromate molybdate sulphate red (Color Index Pigment Red 104) (CAS 12656-85-8)) (Please note hexavalent chromium and lead are prohibited for use in Deliverables; see IBM RoHS specifications and other entries in this table.) *	Prohibited at or above 0.1% weight by weight of the Article.	1
Lead/ Lead Compounds (Annex H) *	1. Lead carbonates (CAS 598-63-0 and 1319-46-6) and lead sulfates (CAS 7446-14-2 and 15739-80-7) may not be used as substances and constituents of Preparations intended for use as paints. 2. Paints and varnishes shall not have lead or lead compounds with a lead content of 0.01% or more by mass. 3. Lead is prohibited in wood based materials in excess of 90 milligrams per kilogram of dry matter. 4. The lead content of the surface layer of cables and cords for Frequently Handled Cables (e.g., Mouse cables) must be below 300 ppm. See Definitions Section for examples of Frequently Handled Cables. A lab analysis will be required to document the lead content for these types of cables. See Section 2.3.1 for details about the analysis. 5. For restrictions in battery applications see Table 8. 6. Lead as an ingredient in the manufacturing of paints, enamels, coatings and inks is prohibited when the total lead content of 600 ppm or greater in the non-volatile part of the product or a dry film of the product.	1, 12 2 14 39, 42
Lead sulfochromate yellow (Color Index Pigment Yellow 34) (CAS 1344-37-2, see Annex II for deleted CAS numbers.) (Please note hexavalent chromium and lead are prohibited for use in Deliverables, see IBM RoHS specifications and other entries in this table.) *	Prohibited at or above 0.1% weight by weight of the Article.	1
Mercury/ Mercury Compounds (Annex I) *	Prohibited in Deliverables except as unavoidable impurity at levels below 10ppm. Please note, there may be existing products with cold cathode fluorescent lamps (CCFLs), released prior to October 2014. No new products may use mercury containing CCFLs as of October 2014. Mercury use in cold cathode fluorescent lamps, for previously released parts, has multiple requirements including labeling (see section 2.6). When present in an approved application, IBM must be supplied with a data sheet on mercury content. For additional mercury restrictions in batteries, see Table 8.	1, 2, 8, 9, 12, 13, 17, 18, 45, 47
2-methoxyethanol (CAS 109-86-4)	Prohibited except for use in semiconductor manufacturing processes.	15
2-(2-methoxyethoxy)ethanol (DEGME) (CAS 111-77-3)	Prohibited in paints, paint strippers, cleaning agents, and self-shining emulsions in concentrations equal to or greater than 0.1% by weight.	1
Monomethyl- dibromo-diphenyl methane bromobenzylbromo-toluene, mixture of isomers (Trade name DBBT) (CAS 99688-47-8)	Prohibited in Substances, Mixtures, Preparations and Articles.	1, 40, IBM Requirement

Table 1. Prohibited from Use in Hardware Deliverables, Parts, Products, Chemicals, Mixtures, Substances, and Preparations		
Chemical Substance Category	**Details of Restriction**	**Sample Regulatory References**
Monomethyl-dichloro- diphenyl methane (Trade names Ugilec 121 and Ugilec 21) (CAS 81161-70-8)	Prohibited in Substances, Mixtures, Preparations and Articles	1, 40, IBM Requirement
Monomethyl-tetrachlorodiphenyl methane (Trade name Ugilec 141) (CAS 76253-60-6)	Prohibited in Substances, Mixtures, Preparations, and Articles.	1, 40, IBM Requirement
Nanomaterials. Substance produced in nanoparticular state: a substance containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for 50 % or more of the particles in the number size distribution, one or more external dimensions is in the size range of 1 nanometer (nm) to 100 nm, with the exception of natural, non-chemically modified substances and the substances of which the fraction between one nanometer and one hundred nanometers is a by-product of human activity. Fullerenes, graphene flakes and single and multi-walled carbon nanotubes with one or more external dimensions below 1 nm shall be deemed to be substances produced in nanoparticular state. Other common nanomaterials include silver nanoparticles, iron nanoparticles, titanium dioxide, aluminum oxide, cerium oxide, zinc oxide, silicon dioxide and dendrimers with external dimensions listed above.	Prohibited in Articles and complex objects (an object consisting of a set of Articles) where a fraction of at least one of the substances produced in nanoparticular state exceeding 0.1 % of the mass originally contained in the Article or complex object is released.	48
Nickel and compounds (Annex J)	Nickel finishes are prohibited on surfaces that are designed to be in prolonged contact with skin. Examples of relevant applications in the electronics industry include wrist straps, mice, keyboards, headphones, and portable electronic products designed to be frequently handled. Contact your IBM representative for questions about use of the Deliverable in an IBM application which may or may not be in prolonged contact with skin.	1
Nitrogen trifluoride (CAS 7783-54-2)	Prohibited in Preparations and Articles.	2, 32
Nonylphenol ethoxylates (Annex VV)	Prohibited in textile articles in concentrations equal to or greater than 0.01% by weight of the textile article or of each part of the textile article. Prohibited in Substances, Mixtures, and Preparations.	1 40

Table 1. Prohibited from Use in Hardware Deliverables, Parts, Products, Chemicals, Mixtures, Substances, and Preparations		
Chemical Substance Category	**Details of Restriction**	**Sample Regulatory References**
Ozone-Depleting Substances (CFCs, HCFCs, HBFCs, carbon tetrachloride, etc.) (Annex K)	**Prohibited in Deliverables and Deliverables may not be manufactured with these substances.**	**2, 5, 6, 7, 12,** IBM Requirement
Pentachlorobenzene (CAS 608-93-5)	Prohibited.	10, 15, 40
Pentachlorophenol (CAS 87-86-5) and its salts and esters (Annex HH)	Prohibited in the treatment of wood. Prohibited in wood based materials in excess of 3 milligrams per kilogram of dry matter. Prohibited in textiles and leather articles.	1 2
Perfluorinated compounds (Annex TT has a complete list of regulated substances)	Prohibited.	32
Perfluorocarbons (PFC) (Annex L)	Must not be contained in Products or Parts as a gas. Prohibited in non-refillable containers, foams, and non-confined direct evaporation systems containing refrigerants.	4, 27, 32
Perfluorooctane sulfonates (PFOS) and salts, $C_8F_{17}SO_2X$ (X=OH, metal salt, halide, amide and other derivatives including polymers), or Compounds that contain $C_8F_{17}SO_2$, $C_8F_{17}SO_3$ or $C_8F_{17}SO_2N$, (for a list of PFOS CAS numbers see OECD Annex 1 at http://search.oecd.org/officialdocuments/displaydocumentpdf/?cote=env/jm/mono%282006%2915&doclanguage=en) (Please note this includes CAS numbers 1763-23-1, 2795-39-3, 29457-72-5, 29081-56-9, 70225-14-8, 56773-42-3, 251099-16-8, 4151-50-2, 31506-32-8, 1691-99-2, 24448-09-7, and 307-35-7 in addition to all PFOS and salts as cited by the OECD document)	1. Prohibited in Substances, in Mixtures or as a constituent of Preparations in a concentration higher than-10mg/kg (0.001% by weight). (See Table 2 for more restrictive requirements for IBM Field Use Materials, Chemical Product Supplies, Substances, Mixtures and Preparations.) 2. Prohibited in products or parts when PFOS is equal to or higher than 0.1% by weight. If a PFOS substance is present in concentrations below 0.1%, then it may only be incidentally present and not intentionally added. 3. Prohibited in textiles when PFOS is equal to or higher than 1 ug/m^2. If a PFOS substance is present in concentrations below 1 ug/m^2, then it may only be incidentally present and not intentionally added. Refer to the referenced regulations for more details on these requirements and exemptions.	1, 2, 10, 15, 36, 40

Table 1. Prohibited from Use in Hardware Deliverables, Parts, Products, Chemicals, Mixtures, Substances, and Preparations		
Chemical Substance Category	**Details of Restriction**	**Sample Regulatory References**
Perfluorooctanoic acid (PFOA CAS 335-67-1) including its salts and any other substance having linear or branched perfluoroheptyl derivatives with the formula C7F15- as a structural element, including its salts except those derivatives with the formula C7F15-X, where X= F, Cl, Br and any other substance having linear or branched perfluorooctyl derivatives with the formula C8F17- as a structural element, including its salts, except those derivatives with the formula C8F17-X, where X= F, Cl, Br or, C8F17-SO2X', C8F17-C(=O)OH or C8F17-CF2-X' (where X'=any group, including salts) (Annex Z and for a more extensive list of PFOA CAS numbers see OECD Annex 3 at http://search.oecd.org/officialdocuments/displaydocumentpdf/?cote=env/jm/mono%282006%2915&doclanguage=en)	Prohibited as a Substance, as constituents of other substances in concentrations equal or above 2 ppb of a single substance, in a mixture in concentrations equal or above 2 ppb of a single substance. Prohibited in Articles or any parts thereof containing one of the substances in concentrations equal to or greater than 2 ppb of a single substance. This prohibition for Articles applies to newly releasing IBM part numbers effective July 1, 2015.	1
Phenol, 2- (2H-benzotriazol -2-yl)- 4,6-bis (1,1- dimethylethyl) (CAS 3846-71-7)	Prohibited in decorative laminate, adhesives, paints, printing inks, inked ribbon, and molded plastic products.	10
Phthalates: Benzyl butyl phthalate (BBP) (CAS 85-68-7), Bis (2-ethylhexyl) phthalate (DEHP) (CAS 117-81-7), Dibutyl phthalate (DBP) (CAS 84-74-2), Diisobutyl phthalate (DIBP) (CAS 84-69-5)	Prohibited, when summed together, at or above 1000ppm in a homogeneous material. (Please note these substances are prohibited elsewhere in this specification. The more restrictive level applies, which will generally be this entry.)	1
Polybrominated Biphenyls (PBBs) (Annex M) *	Prohibited in Deliverables.	1, 2, 12, 10, 15, 36, 40, IBM Requirement
Polybrominated Diphenyl ethers (PBDEs); also known as Polybrominated Biphenyl ethers (PBBEs) or Polybrominated Biphenyl Oxides (PBBOs); except Decabromo diphenyl ether (see this substance in separate entry) (See Annex N for a limited list.) *	Prohibited in Deliverables.	10, 16, 36, 40, IBM Requirement
Polychlorinated biphenyls (PCBs) (Annex O)	Prohibited. (Please note PCBs are prohibited by other regulations; see halogenated aromatic substances in Table 1 and Annex O.)	1, 10, 12, 36, 37, 40,IBM Requirement

Table 1. Prohibited from Use in Hardware Deliverables, Parts, Products, Chemicals, Mixtures, Substances, and Preparations		
Chemical Substance Category	**Details of Restriction**	**Sample Regulatory References**
Polychlorinated naphthalenes, $C_{10}H_{8-n}Cl_n$ where "n" is greater than 1 (Annex R)	Prohibited ~~except if incidentally present~~. Prohibited in Field Use Materials, Substances, Preparations, Mixtures, and Chemical Product Supplies.	10, 15, 37
Polychlorinated terphenyls (PCTs) (e.g., CAS 61788-33-8)	Prohibited.	1, 12, 15
Polycyclic aromatic hydrocarbons (Annex LL)	Prohibited in Articles at and above 1 mg/kg by weight, if any rubber or plastic component comes in to direct and prolonged or short-term repetitive contact with skin or oral cavity under normal or reasonable foreseeable conditions of use.	1
Potassium chromate (CAS 7789-00-6)	Prohibited at or above 0.1% weight by weight of the Article.	1
Potassium dichromate (CAS 7778-50-9)	Prohibited at or above 0.1% weight by weight of the Article.	1
Shortchain Chlorinated Paraffins (C_{10-13}) (also referred to as Short-chain Chlorinated Alkanes) (Annex P)	Prohibited above 0.1 % by weight in products, Substances, and Preparations. If present below 0.1% by weight of the product, it must be only incidentally present.	1, 2, 12, 37 15
Sodium chromate (CAS 7775-11-3)	Prohibited at or above 0.1% weight by weight of the Article.	1
Sodium dichromate (CAS 7789-12-0 and 10588-01-9)	Prohibited at or above 0.1% weight by weight of the Article.	1
Substances subject to REACH Authorization found in Annex XIV of REACH regulation and amendments (Annex OO in this specification lists current authorized substances as of date of this specification)	Prohibited at or above 0.1% weight by weight of the Article.	1
Sulphur hexafluoride (CAS 2551-62-4)	Prohibited in Preparations and Articles. Prohibited in foams and non-refillable containers.	2, 27, 32
Tetrachlorobenzenes (CAS numbers included in Annex D)	Prohibited	15
Trichloroethylene (CAS 79-01-6)	Prohibited at or above 0.1% weight by weight of the Article.	1
Tris-(aziridinyl) – phosphineoxide (CAS 545-55-1)	Prohibited from use in textile articles intended to come into contact with skin, e.g., Wrist straps and headphones. Prohibited in Substances and Preparations.	1, 12 40
Tris (2,3 dibromopropyl) phosphate (CAS 126-72-7)	Prohibited from use in textile articles intended to come into contact with skin, e.g., Wrist straps and headphones. Prohibited in Substances and Preparations.	1, 12, 35 40
Tris(2-chloroethyl) phosphate (CAS 115-96-8)	Prohibited at or above 0.1% weight by weight of the Article.	1
Tri-substituted organostannic compounds, e.g., tributyltin (TBT) (Annex EE) and triphenyltin (TPT) (Annex EE)	Prohibited in Articles, or part thereof, where the concentration in the article is greater than the equivalent of 0.1% by weight of tin.	1, 15

* For further IBM EU RoHS requirements, see specifications 53P6233 or 97P3864. These two specifications ban the use of RoHS substances (exemptions allowed), including hexavalent chromium and compounds in finishing processes for sheet steel, aluminized, electroless nickel and die cast parts, fasteners and heat sinks. Hexavalent chromium and its compounds must not be used prior to painting or in other surface treatments for metal parts. These specifications apply to Deliverables where the specifications are cited on the print, contract, Statement of Work or other procurement documentation.

Sample regulatory references for Table 1

1) EU Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH).

2) Switzerland Ordinance on Risk Reduction related to the Use of certain particularly dangerous Substances, Preparations and Articles (Ordinance on Risk Reduction related to Chemical Products (ORRChem) of 18 May 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. 1005/2009 on Substances that deplete the ozone layer.
6) United States Clean Air Act Section 611 of the 1990 amendments; 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 Act on the Evaluation of chemical substances and Regulation of Their Manufacture, etc. (Act No. 117 of October 16, 1973, last revised October 30, 2009.)
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.
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, with 2009 amendment Public Law Chap 121 Section 17 38 MRSA 1609 Sub 5.
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, Authorization and Restriction of Chemicals (REACH).
27) Austria Ordinance on bans and restrictions of partly fluorinated and fully fluorinated hydrocarbons and of sulfur hexafluoride 447/2002, with amendments 246/2005, 86/2006 and 139/2007.
28) Sweden. The Chemical Products Ordinance 1998:944 to 2009:14.
29) Lithuanian Hygiene Norm HN 96:2000.
30) EU Commission Decision 2009/251/EC Products containing the biocide dimethylfumarate.
31) Oregon SB 596 Relating to decabrominated diphenyl ether amending ORS 453.005, 453.025 and 453.085.
32) EU Regulation (EC) No 517/2014 on fluorinated greenhouse gases
33) Maryland Act concerning Environment – Decabrominated Diphenyl Ether – Prohibitions.
34) Canadian Environmental Protection Act, 2-butoxyethanol regulations SOR/2006-347.
35) Canada Hazardous Products Act.
36) EU Commission Regulation 757/2010 of 24 August 2010 amending Regulation No 850/2004 of the European Parliament and of the Council on persistent organic pollutants as regards Annexes I and III.
37) EU Regulation No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC and subsequent amendments.
38) France Decree no. 2012-232 concerning the annual declaration of substances with nanoparticle status.
39) NORMA Oficial Mexicana NOM-004-SSA1-2013 Environmental Health. Limitations and sanitation specification for the use of lead compounds.
40) EU Regulation No 649/2012 of 4 July 2012 concerning the export and import of hazardous chemicals.
41) EU Regulation No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products.
42) NOM-003-SSA1-2006 Health Environmental. Health requirement to be met by the labeling of paints, inks, varnishes, lacquers and enamels.
43) USA 40 CFR Part 721.1660 Benzidine-based chemical substances.
44) EU Commission Delegated Directive 2015/863 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances (RoHS).
45) Canada Products Containing Mercury SOR/2014-1244.
46) California Consumer Products Regulations - Regulation for Reducing Emissions from Consumer Products.
47) Japan Act on Preventing Environmental Pollution of Mercury.
48) Belgium Royal Decree concerning the placing on the market of substances produced in nanoparticular state.

2.1.2 Additional Restrictions and Requirements for Substances, Mixtures, Preparations, Field Use Materials, and Chemical Product Supplies

Substances, Preparations, IBM Field Use Materials (FUMs), and Chemical Product Supplies must meet the applicable restrictions in Section 2.1.1 and Table 1 as well as the additional requirements in this section. This section applies to:

PN 46G3772 Page 17 of 120	EC 899569 04NOV93	EC 899773 07DEC94	EC F15040 25AUG97	EC F73298 02SEP99	EC F74336 05SEP00	EC F72950 23JAN02	EC H64064 13MAY03	EC H17205 29JUL03
EC J85151 13MAY05	EC G32590 08FEB06	EC L04925B 11JAN07	EC L04925M 01AUG07	EC L04925N 19FEB08	EC L05962X 08AUG08	EC L79598 25FEB09	EC N24534E 02OCT09	EC L79598A 22FEB10
EC L79598B 22SEPT10	EC L79598C 27APR2011	EC L79598D 6SEPT2011	EC N31517Y 26MAR2012	ECN31946T 19APR2013	ECN33076 5DEC2013	ECN33076A 16MAY2014	ECN46883 17OCT2014	ECP02692 26MAY2015
ECO P02838 15OCT2015								

- Substances or Preparations used on or in a Deliverable or to maintain or service hardware Deliverables, Parts or Products, e.g., adhesives, cleaning solvents or solutions, lubricants, water cooling solutions, and refrigerant gas.
- Substances or Preparations used to operate a hardware Part or Product and which is consumed during the operation of the Part or Product and/or must be periodically replaced to maintain the Part or Product. Examples include toner, toner cartridges, ink, and ribbon cartridges.
- Substances or Preparations contained in a Part, Product, or assembly which is not normally consumed but may require replacement of the chemical to maintain operation of a Part, Product or assembly. Examples include refrigerants, lubricants, biocides, or corrosion inhibitors in a closed looped water cooling system.

The individual container or individual protective packaging of the Substance, Preparation, Field Use Material, or Chemical Product Supply 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, IBM may designate the responsible party), and
- Appropriate hazard warnings as applicable.

The label must be provided in English at a minimum. The label must have text in other languages and format as required by law or regulation in countries outside the U.S. For example, the label must meet requirements for content, format, and language translation for the EU Classification, Labeling, and Packaging Regulation. In some cases, IBM may specify the label and its contents.

A Material Safety Data Sheet (MSDS) must be supplied to the IBM procurement representative or other IBM designated representative. The MSDS must be provided in English at a minimum and comply with legal requirements for information content and format. For example, MSDSs must be provided which meet the requirements of the EU REACH Regulation for format, content, and language translation. 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 IBM chemical representative through the IBM procurement representative to ensure proper format, information content, and translation requirements. In some cases, IBM may specify the language and format of an MSDS. Full chemical disclosure for all Substances and Preparations is required.

Substances, Mixtures, Preparations, Field Use Materials, and Chemical Product Supplies must comply with chemical registration and premanufacture notification requirements in countries which require this type of notification in order to permit import, export, and sale of the Deliverable in that country.

The following are prohibited in Substances, Mixtures, Preparations, Field Use Materials, and Chemical Product Supplies. The applicable restriction is listed in the column entitled “Details of Restriction.” The cited regulation can be found after Table 1.

Table 2. Prohibited in Substances, Mixtures, Preparations, Field Use Materials, and Chemical Product Supplies

Substance	Details of Restriction	Example legal citations (See Table 1)
4-aminobiphenyl xenylamine and its salts (e.g., CAS 92-67-1, 2113-61-3)	Prohibited from use in concentrations equal to or greater than 0.1% by mass in Substances or Preparations.	1, 2, 12, 40
Benzene (CAS 71-43-2)	Prohibited in concentrations equal to or greater than 0.1% by mass in Substances or Preparations.	1, 2, 12, 40
2-Butoxyethanol (CAS 111-76-2)	Prohibited in paint stripper or thinner at 0.5 % (w/w). Prohibited in aerosol cleaners at 5 % (w/w). Prohibited in non-aerosol cleaners at 6 % (w/w). Prohibited in aerosol paint and coating at 0.1% (w/w). Prohibited in non-aerosol paint or coating at 0.5% (w/w).	34
Chlorinated Solvents (see specific list in Annex Q)	Prohibited in concentrations equal to or greater than 0.1% by weight in Substances and Preparations.	1, 2, 12

Table 2. Prohibited in Substances, Mixtures, Preparations, Field Use Materials, and Chemical Product Supplies		
Substance	**Details of Restriction**	**Example legal citations (See Table 1)**
Cyclohexane (CAS 110-82-7)	Prohibited as a constituent of neoprene-based contact adhesives in concentrations equal to or greater than 0.1% by weight in package sizes greater than 350 g. If the package size is less than 350 g, then the package must be labeled in accordance to the EU REACH Regulation.	1
Dichloromethane (Methylene chloride) (CAS 75-09-2)	Prohibited in Substances, Mixtures, Preparations, Field Use Materials, and Chemical Product Supplies.	IBM requirement, 28
Ethylene based glycol ethers (Annex GG)	Prohibited in Field Use Materials and Chemical Product Supplies.	IBM requirement
Formaldehyde (CAS 50-00-0)	Mixtures or solutions composed of greater than 0.1% formaldehyde are prohibited.	25
Hazardous chemicals subject to export notification, chemicals qualifying for Prior Informed Consent (PIC) notification, and/ or chemicals subject to the PIC procedure. Chemical list located at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:201:0060:0106:en:PDF	Prohibited	40
Isopropyl alcohol (CAS 67-63-0)	Prohibited in concentrations above 75% volatile organic compounds content in electronic cleaners. This includes cleaning wipes.	46
Methylenediphenyl diisocyanate (MDI) (Annex PP)	Prohibited as a constituent in a Mixture in concentrations equal to or greater than 0.1% by weight.	1
2-naphthylamine and its salts (e.g., CAS 91-59-8, 553-00-4, 612-52-2)	Prohibited in concentrations equal to or greater than 0.1% by weight in Substances and Preparations.	1, 2, 12, 40
4-nitrobiphenyl (CAS 92 -93-3)	Prohibited in concentrations equal to or greater than 0.1% by mass in Substances or Preparations.	1, 2, 12, 40
Nonylphenols (Annex RR)	Prohibited in Substances and Preparations	40
Perfluoroalkyl sulfonates (PFASs); see OECD Annex 2 http://search.oecd.org/officialdocuments/displaydocumentpdf/?cote=env/jm/mono%282006%2915&doclanguage=en for CAS numbers	Prohibited in Field Use Materials and Chemical Product Supplies.	IBM requirement
Perfluorooctanoic acids (PFOAs); see OECD Annex 3 http://search.oecd.org/officialdocuments/displaydocumentpdf/?cote=env/jm/mono%282006%2915&doclanguage=en for CAS numbers	Prohibited in Field Use Materials and Chemical Product Supplies.	IBM requirement
Perfluorooctyl sulfonates (PFOSs); see OECD Annex 1 http://search.oecd.org/officialdocuments/displaydocumentpdf/?cote=env/jm/mono%282006%2915&doclanguage=en for CAS numbers	Prohibited in Field Use Materials and Chemical Product Supplies.	IBM requirement, 10, 40
Substances which are classified (in Part 3 of Annex VI to EU Regulation 1272/2008 on Classification, Labeling, and Packaging of Substances and Mixtures) as: i)Carcinogen Category 1A or 1B or carcinogen category 1 or 2; ii)Germ cell mutagen category 1A or 1B or mutagen category 1 or 2; iii)Toxic to reproduction category 1A or 1B or toxic to reproduction category 1 or 2. For more information about this restriction see EU REACH Regulation Annex XVII and amendments.	Prohibited in Substances, constituents of Substances, or in Mixtures.	1

Table 2. Prohibited in Substances, Mixtures, Preparations, Field Use Materials, and Chemical Product Supplies		
Substance	**Details of Restriction**	**Example legal citations (See Table 1)**
Substances with nanoparticle status (intentionally manufactured on a nanometric scale and containing particles, unbound or as an aggregate or agglomerate, of which a minimum proportion, in the number sizes distribution, has one or more external dimensions in the size range 1 nm and 100 nm); Substance produced in nanoparticular state: a substance containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for 50 % or more of the particles in the number size distribution, one or more external dimensions is in the size range of one nanometer to one hundred nanometers, with the exception of natural, non-chemically modified substances and the substances of which the fraction between one nanometer and one hundred nanometers is a by-product of human activity. Fullerenes, graphene flakes and single wall carbon nanotubes with one or more external dimensions below one nanometer shall be deemed to be substances produced in nanoparticular state.	Prohibited in Field Use Materials, Substances, Mixtures, Preparations, and Chemical Products	38, 48
Tetrachloroethylene (perchloroethylene) CAS 127-18-4	Prohibited in Field Use Materials, Substances, Mixture, Preparations, and Chemical Product Supplies, including but not limited to adhesives, paints, and cleaning agents.	IBM requirement, 10, 28
Tetraethyl lead (CAS 78-00-2)	Prohibited in Substances and Preparations	40
Tetramethyl lead (CAS 75-74-1)	Prohibited in Substances and Preparations	40
Toluene (CAS 108-88-3)	Prohibited as a Substance or in Mixtures in concentrations equal to or greater than 0.1% by mass in adhesives and spray paints. Spray paint includes paint designed or intended to be sprayed on.	1
Tributyl tin oxide (TBTO) (Annex S)	Prohibited in Field Use Materials, Substances, Preparations, Mixtures, and Chemical Product Supplies.	10, 40
Trichlorobenzene (CAS 120-82-1)	Prohibited as a Substance or in Mixtures in concentrations equal to or greater than 0.1% by weight. Exemptions allowed: as intermediate of synthesis, process solvent in closed chemical applications for chlorination reactions and manufacture of TATB. See EU Regulation for details.	1
Trichloroethylene (CAS 79-01-6)	Prohibited in Substances, Mixtures, Preparations, Field Use Materials, and Chemical Product Supplies, including but not limited to adhesives, paints, and cleaning agents.	IBM requirement, 10, 28
2,4,6-Tri-tert-butylphenol (CAS 732-26-3)	Prohibited in lubricating oils.	10

Chemicals regulated by transportation regulations must be packaged and labeled according to IBM Engineering Specification P/N 92F6933 "Packaging Requirements for Dangerous Goods." Contact the IBM Hazardous Materials Transportation Coordinator for more details on packaging requirements.

2.2 Product Content Declarations

IBM documents the presence of certain categories of substances in Deliverables to meet regulatory reporting requirements and customer requirements for Product content disclosures. Suppliers are required to complete a

Product Content Declaration (PCD), IBM Part Number 46C3484, for Deliverables sold to IBM. Some parts, commodities and Products, such as batteries, cables, connectors, and Vendor Logo Products may require additional information. The PCDs must be completed and forwarded to IBM upon request or by the submission deadline indicated by an IBM Procurement representative or IBM contracted vendor. IBM Procurement or vendor will supply details for completion of the declaration. Suppliers are required to keep documentation and/or test data that demonstrates procedures and actions taken by the supplier and the results to verify compliance of the Deliverable for 10 years from the end of production and make available to IBM upon request. This includes documentation and data maintained by the supplier from their respective supply chain and supplier's own records on the material content of the product. See Section 2.14 for additional documentation requirements. When laboratory sampling is completed for testing the RoHS substances in Table 3, the test method must be in accordance with the latest version of IEC 62321 Electrotechnical products - Determination of levels of six regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers) as referred to in EN50581:2012, Technical Documentation for the Assessment of Electrical and Electronic Products with Respect to the Restriction of Hazardous Substances.

2.2.1 RoHS Reporting

In certain markets and products the presence of RoHS substances in Deliverables must be quantified and reported (e.g., California Electronic Waste Recycling Act). To meet this and other reporting obligations and requests, IBM requires that RoHS substances in the Supplier's Deliverables must be quantified and reported to IBM when such substances are present in permissible applications (such permissible applications do not include those listed in Table 1) and when they exceed the concentrations listed in Table 3 in any Homogeneous Materials. If the Supplier determines that substances in Table 3 are present above their respective specified thresholds, then **the absolute weight in grams of the substance (e.g., cadmium) present in the Deliverable shall be reported to IBM**. Absolute weights, rather than weight percentages or ppm, shall be reported. Suppliers shall contact their IBM representative to verify the reporting process for material content (e.g., declaration) data. PCDs are available at IBM Procurement Information for Suppliers web site.

Table 3. Thresholds for reporting of RoHS substances

RoHS substance	Threshold for reporting in non-restricted applications* (ppm of the substance in any Homogeneous Material)
Cadmium use in plating and surface coating applications.	Any detectable level must be reported.*
Cadmium, all applications except plating and surface coating applications.	100
Hexavalent chromium (CrVI) **	1,000
Lead ***	1,000
Mercury	Any detectable level must be reported, except unavoidable impurities at levels below 10ppm.
Polybrominated biphenyl (PBB) flame retardants	Any detectable level must be reported. ****
Polybrominated diphenyl ether (PBDE) flame retardants. Note this reporting category includes Deca BDE.	Any detectable level must be reported. ****
Bis (2-ethylhexyl) phthalate (DEHP)*****	1,000
Butyl benzyl phthalate (BBP) *****	1,000
Dibutyl phthalate (DBP) *****	1,000
Diisobutyl phthalate (DIBP) *****	1,000

* Restricted applications are defined in Table 1. Concentrations of these substances above the levels referenced in Table 1 are prohibited.

** IBM prohibits intentional addition of hexavalent chromium in paints and plastic resins. See Table 1. For EU RoHS requirements, see specifications 53P6233 or 97P3864. These two IBM EU RoHS specifications ban the use of hexavalent chromium and compounds in finishing processes for sheet steel, aluminized, electroless nickel and die cast parts, fasteners and heatsinks. Hexavalent chromium and its compounds must not be used prior to painting or in other surface treatments for metal parts. These two RoHS specifications apply to Deliverables where the specifications are cited on the print, contract, Statement of Work or other procurement documentation.

*** There are restrictions for lead use at levels lower than 1000ppm. See Table 1 for details.

****While listed here for completeness of the list of RoHS substances, PBB and PBDE flame retardants are banned by IBM per Section 2.1.1 and Table 1 of this specification. There are no permissible applications which can be reported.

***** While listed here for completeness of the list of RoHS substances, Table 1 has more restrictive levels for these 4 phthalates than the levels cited on this table.

2.2.2 Other Reportable Substances

IBM requires additional substances be quantified and reported by Suppliers if they are present in a Supplier's Deliverables at concentrations greater than the specified thresholds per Table 4 in any individual part in the Deliverable supplied to IBM. If the Supplier determines that substances in Table 4 are present in any constituent parts of the Deliverable above their respective specified thresholds, **then the absolute weight in grams of the substance present in each part of the Deliverable supplied to IBM shall be reported to IBM**. Absolute weights, rather than weight percentages or ppm, shall be reported to allow aggregation of the data with that from other parts in other Deliverables that comprise a final Product. Please note, the underlined text above emphasizes the need to report on the PCD substances and their weights present in the Deliverable to IBM, which may be different from the weight of the substances in the raw material used.

For example, if the Deliverable supplied to IBM is a power supply, then the substances in Table 4 should be reported to IBM if they occur above the specified thresholds in any of the constituent parts of the power supply.
Example #1: If a device or part in a power supply contains a tin-antimony solder and the concentration of antimony is above the threshold limit of 1000 ppm in the device or part, then the total weight of the antimony must be reported on the PCD for the power supply.
Example #2: If antimony trioxide is used as part of the flame retardant system of several devices and plastic components in a power supply and the amount of antimony trioxide is above 1000 ppm in its respective homogeneous material (e.g., resin), then the weight of antimony trioxide used in each material in the power supply must be totaled and stated on the PCD.

Note: for products qualifying for the EPEAT Standard for Computer Servers, the test methodology in European Standard EN 14582 should be used to determine the bromine and chlorine levels if the product contains any plastic parts exceeding 25 grams with greater than 1000 ppm chlorine or greater than 1000 ppm bromine.

Suppliers shall contact their IBM representative to verify the reporting process for material content data. Product Content Declaration forms are available at the IBM Procurement Information for Suppliers web site.

Table 4. Other Reporting Requirements

Reportable Substance	Threshold for Reporting is at the "Part" level unless otherwise noted.	Examples of Industry Uses / Comments
Antimony/Antimony Compounds (Annex T) Please note antimony trioxide should not be reported in this category, antimony trioxide has a separate entry on this table.	1000 ppm (0.1%)	Solder alloy CRT glass
Antimony trioxide (CAS 1309-64-4)	1000 ppm (0.1%) in a homogeneous material	Flame retardant, e.g., in plastic housings and chip encapsulant. Often used in combination with brominated flame retardants. Opacifying agent for glass, ceramics and enamels Pigments Catalyst for polyethylene terephthalate and vulcanization of rubber
Arsenic/Arsenic Compounds (Annex U) Please note some applications of arsenic are prohibited in Table 1 and reportable in Table 5 as an SVHC. Reporting here is for other applications and/or concentrations. Arsenic pentoxide and arsenic trioxide should not be reported with this entry but in each of their respective entries on this table.	1000 ppm (0.1%)	Dopant in semiconductor manufacture Gallium arsenide is used as semiconductor substrate

Table 4. Other Reporting Requirements		
Reportable Substance	**Threshold for Reporting is at the "Part" level unless otherwise noted.**	**Examples of Industry Uses / Comments**
2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350) (CAS 36437-37-3)	At or above 0.1% weight by weight of the Article	UV stabilizer for plastics, polyurethanes and rubber. UV protection agent in coatings.
Beryllium metal (CAS 7440-41-7) Please note, this substance should not be reported under the entry of Beryllium compounds in this Table but rather here in this entry.	1000 ppm (0.1%) in a homogeneous material	Heat transport and heat sinking applications, gears, and cogs.
Beryllium Compounds (Annex V) Please note this entry does not include beryllium, beryllium oxide and beryllium copper alloys. These beryllium substances have their own entry for reporting on this table.	200 ppm (0.02%)	Substrate for integrated circuits Lightweight housings
Beryllium copper alloys. Please note, this substance should not be reported under the entry of Beryllium compounds in this Table but rather here in this entry.	1000 ppm (0.1%) in a homogeneous material	Connectors Electrical contacts and springs
Beryllium oxide (CAS 1304-56-9)	1000 ppm (0.1%)	Insulator Structural ceramic
Bis(2-ethylhexyl)tetrabromophthalate (TBPH or BEHTBP) (CAS 26040-51-7)	1000 ppm (0.1%) in a homogeneous material	Flame retardant in polyurethane foam Plasticizer for PVC Adhesives
Bismuth/Bismuth Compounds (also alloys) (Annex W)	1000 ppm (0.1%)	Solder alloy
Bisphenol A (CAS 80-05-7)	1000 ppm (0.1%) in a homogeneous material	Used in synthesis of epoxy and plastic resins, e.g., polycarbonate, polyesters Antioxidant in some plasticizers Polymerization inhibitor in PVC Precursor for the flame retardant tetrabromobisphenol A Color developer in thermal paper Carbonless paper
Brominated Flame Retardants (other than PBBs, PBDEs or other brominated flame retardants specifically called out in this Table) in all applications except printed wiring board laminates. Please provide CAS number on the PCD. (Annex X)	1000 ppm (0.1%) in a homogeneous material	Flame retardant
Brominated Flame Retardants (other than PBBs or PBDEs) in printed wiring board laminates. Please provide CAS number on the PCD.	900 ppm (0.09%) in a homogeneous material in printed wiring board laminate	Flame retardant
2-Butanone oxime (CAS 96-29-7)	1000 ppm (0.1%) in a homogeneous material	Paints, varnishes, stains and coatings Wood preservatives Adhesives, silicone sealants and printing inks Corrosion inhibitors Urethane polymers
n-Butyl glycidyl ether (CAS 2426-08-6)	1000 ppm (0.1%) in a homogeneous material	Epoxy resin formulations for coatings, adhesives, binders, sealants, fillers and resins

Table 4. Other Reporting Requirements		
Reportable Substance	**Threshold for Reporting is at the "Part" level unless otherwise noted.**	**Examples of Industry Uses / Comments**
Chlorinated Flame Retardants in all applications except printed wiring board laminates (Please provide CAS number on the PCD.)	1000 ppm (0.1%) in a homogeneous material	Flame retardant
Chlorinated Flame Retardants in printed wiring board laminates only (Please provide CAS number on the PCD.)	900 ppm (0.09%) in a homogeneous material in printed wiring board laminate	Flame retardant
Cobalt dichloride (CAS 7646-79-9) Please note this substance is also listed in Table 5 for reporting. This entry requires reporting of a lower concentration level than Table 5.	1000 ppm (0.1%) in a homogeneous material	Cobalt plating and cobalt based pigments and drier compounds (desiccants). Pneumatic panels for indicating water contamination.
Cobalt metal (CAS 7440-48-4)	1000 ppm (0.1%) in a homogeneous material	Electroplating
Cobalt sulfate (CAS 10124-43-3; 13455-64-0 monohydrate; 10026-24-1 heptahydrate)	1000 ppm (0.1%) in a homogeneous material	Preparation of pigments for glass and porcelain Used in storage batteries Electroplating baths Use in sympathetic ink
2, 3-Dibromo-1-propanol (CAS 96-13-9) Please note, this substance should not be reported under the entry of Brominated Flame Retardants in this Table but rather here in this entry.	1000 ppm (0.1%) in a homogeneous material	Flame retardant
Dibromoneopentyl glycol (CAS 3296-90-0) Please note this substance is not to be included in the Brominated Flame Retardant entry in this table, but rather as its own separate entry here.	1000 ppm (0.1%) in a homogeneous material	Flame retardant in unsaturated polyester resins, in molded products, and in rigid polyurethane foam.
P-Dichlorobenzene (CAS 106-46-7) Please note this substance has a restricted application in Table 1 under Halogenated aromatic substances and Annex D. Reporting for this table is for applications which are not restricted.	1000 ppm (0.1%) in a homogeneous material	Precursor to the high performance polymer poly (p-phenylene sulfide). Disinfectant
Dicyclohexyl phthalate (CAS 84-61-7)	At or above 0.1% weight by weight of the Article.	Plasticizer in plastisol, PVC, rubber and plastics.
Diethyl phthalate (DEP) (CAS 84-66-2). Please note this phthalate compound should not be reported in the general phthalate category in this table, but rather here in this entry.	1000 ppm (0.1%) in a homogeneous material	Plasticizer
Diisodecyl phthalate (DIDP) (CAS 26761-40-0 and 68515-49-1) Please note this phthalate compound should not be reported in the general phthalate category in this table, but rather here in this entry.	1000 ppm (0.1%) in a homogeneous material	Plasticizer (e.g., for PVC) Paints, sealing compounds, and textile inks
Diisononyl phthalate (DINP) (CAS 28553-12-0 and 68515-48-0) Please note this phthalate compound should not be reported in the general phthalate category in this table, but rather here in this entry.	1000 ppm (0.1%) in a homogeneous material	Plasticizer (e.g., for PVC)
Di-n-hexyl phthalate (DNHP) (CAS 84-75-3) Please note this phthalate compound should not be reported in the general phthalate category in this table and is also reportable in Table 5 as a REACH SVHC when present at or above 0.1% by weight.	1000 ppm (0.1%) in a homogeneous material	Plasticizer

Table 4. Other Reporting Requirements		
Reportable Substance	**Threshold for Reporting is at the "Part" level unless otherwise noted.**	**Examples of Industry Uses / Comments**
Di-*n*-octyl phthalate (DnOP) (CAS 117-84-0) Please note this phthalate compound should not be reported in the general phthalate category in this table.	1000 ppm (0.1%) in a homogeneous material	Constituent of phthalate mixtures
Di-*n*-pentyl phthalate (DnPP) (CAS 131-18-0) Please note this phthalate compound should not be reported in the general phthalate category in this table.	1000 ppm (0.1%) in a homogeneous material	Plasticizer
Dioctyltin (DOT) compounds (e.g., dioctyltin oxide CAS 870-08-6 and dioctyltin dilaurate CAS 3648-18-8) Please note Table 1 prohibits DOT in some applications. This entry is for reporting of all other non-restricted applications.	Reportable in Articles where the concentration in the Article, or a part therof, is greater than 0.1% by weight of tin.	Textiles Vulcanization molding kits
2,4-di-tert-butyl-6-(5- chloro benzotriazol -2-yl) phenol (UV-327) (CAS 3864-99-1)	At or above 0.1% weight by weight of the Article.	UV stabilizer in rubber, polycarbonates, acrylic polymers, polyester, styrene mono- and copolymers, polyvinyl chloride, polyolefin, polyvinylbutyle and polyurethanes.
2-Ethylhexyl-2,3,4,5-tetrabromobenzoate (TBB) (CAS 183658-27-7) Please note TBB is not to be included in the Brominated Flame Retardant entry in this table, but rather as its own separate entry here.	1000 ppm (0.1%) in a homogeneous material	Flame retardant in polyurethane foam
Formaldehyde (CAS 50-00-0) Please note this substance has prohibited applications listed in Table 1. This entry is for reporting of all other non-restricted applications.	1000 ppm (0.1%) in a homogeneous material	Wood Textiles
Hexabromocyclododecane (HBCDD), (e.g., CAS 25637-99-4, 3194-55-6, 134237-50-6, 134237-51-7, 134237-52-8.) Please note this substance has a restricted level listed in Table 1. This entry is for reporting at lower levels.	50 ppm (0.005%)in a homogeneous material	Flame retardant in extruded and expanded polystyrene and flexible polyurethane foam
Hexamethylene diacrylate (CAS 13048-33-4)	At or above 0.1% weight by weight of the Article	Coatings, inks, and adhesives. Use in polymerization process for resins, rubbers and polymers.
n-Hexane (CAS 110-54-3)	1000 ppm (0.1%) in a homogeneous material	Used as solvents in cleaning agents in the printing and textile industry. Used in glues for the leather industry. Used in quick-drying glues and rubber cement.
Indium phosphide (CAS 22398-80-7)	1000 ppm (0.1%) in a homogeneous material	Semiconductor
Lead/ Lead compounds Please note, lead /lead compound are restricted on Tables 1 and 3, this entry is for levels of lead either below those restricted levels or for lead acid batteries only.	300ppm to 1000ppm in surface coating materials for cables/ cords with thermoset or thermoplastic coatings; Lead acid batteries	Stabilizer
Long chain chlorinated paraffins (LCCP; generally C $_{18\text{-}28}$) (also referred to as Long-chain chlorinated alkanes) Annex WW	1000 ppm (0.1%) in a homogeneous material	Metal working applications Plasticizer Leather Paints and coatings Sealants Rubber applications

Table 4. Other Reporting Requirements		
Reportable Substance	**Threshold for Reporting is at the "Part" level unless otherwise noted.**	**Examples of Industry Uses / Comments**
Magnesium/Magnesium Alloys (Annex Y)	1000 ppm (0.1%)	Surface coating Computer casings
Medium chain chlorinated paraffins (C 14-17 alkyl chain) (MCCPs) (e.g., CAS 85535-85-9) (also referred to as Medium-chain chlorinated alkanes)	1000 ppm (0.1%) in a homogeneous material	Flame retardant Plasticizer
Nickel sulfamate (CAS 13770-89-3)	1000 ppm (0.1%) in a homogeneous material	Nickel plating
Nickel sulphate CAS 7786-81-4 (anhydrous), 10101-97-0 (hexahydrate), 10101-98-1 (heptahydrate)	1000 ppm (0.1%) in a homogeneous material	Nickel plating
Nonylphenols (Annex RR) (Note: Table 2 prohibits these substances in Preparations and Substances. This entry is for noting the presence in Articles.)	1000 ppm (0.1%) in a homogeneous material	Lubrication oil additive Emulsifier Wetting and dispersing agent Antistatic agent Demulsifier and solubiliser
Perchlorates (Annex MM)	6ppb in a material	Coin cell batteries Acoustic foam
Perfluoro carboxylic acid and related compounds (PFCAs) for a list of PFCA CAS numbers see OECD Annex 4 at http://search.oecd.org/officialdocuments/displaydocumentpdf/?cote=env/jm/mono%282006%2915&doclanguage=en	1000 ppm (0.1% by mass) in Deliverables	Water, oil and grease repellant Surfactant Spreading/ wetting agent.
Perfluoroalkyl sulfonates (PFASs) (for a list of PFAS CAS numbers see OECD Annex 2 at http://search.oecd.org/officialdocuments/displaydocumentpdf/?cote=env/jm/mono%282006%2915&doclanguage=en	1000 ppm (0.1% by mass) in Deliverables	Semiconductor applications Flame retardant in resins
Perfluorononan-1-oic acid (2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-heptadecafluorononanoic acid and its sodium and ammonium salts (CAS 375-95-1, 21049-39-8, 4149-60-4)	At or above 0.1% weight by weight of the Article	Lubricating oil additive, cleaning agent, liquid crystal display panels, polishing surfactant, waterproofing agents and textile antifouling finishing agent.
Phthalates (Annex AA) Please note several phthalates have separate entries on this Table and should not be included for reporting in this general phthalate category. Several phthalates are restricted, see Table 1.	1000 ppm (0.1%)	Plasticizer in plastics (e.g., PVC) PVC electrical cables Solder paste Sealants, varnishes, paper coating, inks, resins and adhesives.
Polycyclic aromatic hydrocarbons (PAHs (Annex LL) Please note this substance grouping has prohibited applications listed in Table 1. This entry is for reporting of all other non-restricted applications or levels below the restricted amount	1000 ppm (0.1%) in a homogeneous material	Dyes, plastics, coal tars, and creosote.
Polyvinyl chloride (PVC) (Annex BB)	1000 ppm (0.1%) in a homogeneous material	Plastic Insulator Windows on cell phones Housings for IT equipment Electrical cables Flexible CD jackets

Table 4. Other Reporting Requirements		
Reportable Substance	**Threshold for Reporting is at the "Part" level unless otherwise noted.**	**Examples of Industry Uses / Comments**
Postconsumer recycled material - Plastic (see definitions in Section 1.2)	Report only the amount of postconsumer recycled material - plastic (not the amount of pre-consumer or new plastic) in grams for parts equal to or greater than 25 grams.	Bezels, fillers, enclosure covers
1,3-propanesultone (CAS 1120-71-4)	At or above 0.1% weight by weight of the Article	Lithium ion batteries
Radioactive Substances (Annex CC)	Any Intentional Addition	Promethium 147 as an over-voltage device Measuring devices Gauges Detectors Optical properties (e.g., thorium)
Refractory Ceramic Fibres; Special Purpose Fibres, [Man-made vitreous (silicate) fibres with random orientation with alkaline oxide and alkali earth oxide (Na2O+K2O+CaO+ MgO+ BaO)	Content less than or equal to 18 % by weight	Insulation material in high temperature applications
Recyclable Materials – glass in Covered Electronic Devices only, e.g., monitors with a screen size greater than 4 inches (measured diagonally) with a liquid crystal display or cathode ray tube, as defined by California Electronic Waste Recycling Act	Report the amount of glass (in grams) in a Covered Electronic Devices which are recyclable.	In Covered Electronic Devices, as defined by the California Electronic Waste Recycling Act: http://www.dtsc.ca.gov/HazardousWaste/EWaste/MoreInfo.cfm#Covered_Electronic_Devices_CEDs
Recyclable Materials – metals in Covered Electronic Devices only, e.g., monitors with a screen size greater than 4 inches (measured diagonally) with a liquid crystal display or cathode ray tube, as defined by California Electronic Waste Recycling Act	Report the amount of metals (in grams) in a Covered Electronic Devices which are recyclable.	In Covered Electronic Devices, as defined by the California Electronic Waste Recycling Act: http://www.dtsc.ca.gov/HazardousWaste/EWaste/MoreInfo.cfm#Covered_Electronic_Devices_CEDs
Recyclable Materials – plastics in Covered Electronic Devices only, e.g., monitors with a screen size greater than 4 inches (measured diagonally) with a liquid crystal display or cathode ray tube, as defined by California Electronic Waste Recycling Act	Report the amount of plastics (in grams) in a Covered Electronic Devices which are recyclable.	In Covered Electronic Devices, as defined by the California Electronic Waste Recycling Act: http://www.dtsc.ca.gov/HazardousWaste/EWaste/MoreInfo.cfm#Covered_Electronic_Devices_CEDs
Selenium/Selenium Compounds (Annex DD)	1000 ppm (0.1%)	Diodes and light detectors (lead selenide) Historically used as photoelectric coating
Tetrabromobisphenol A (CAS 79-94-7) Please note TBBA is not to be included in the Brominated Flame Retardant entry in this table, but rather as its own separate entry here.	1000 ppm (0.1%) in a homogeneous material	Flame retardant Epoxy resins in printed circuit boards
Tetrabutyltin (TTBT) (CAS 1461-25-2)	1000 ppm (0.1%) in a homogeneous material	Stabilizer for PVC
Toluene (CAS 108-88-3)	1000 ppm (Please note that in Table 2 toluene is prohibited as a Substance or constituent of Preparations in concentrations equal to or greater than 0.1% by mass in adhesives and spray paints.)	Adhesive Paints/varnishes Coatings Silicon sealants

Table 4. Other Reporting Requirements		
Reportable Substance	**Threshold for Reporting is at the "Part" level unless otherwise noted.**	**Examples of Industry Uses / Comments**
Toluene Diisocyanates (see Annex UU for all inclusive list of CAS numbers)	1000 ppm (0.1%) in a homogeneous material	Chemical intermediate in the production of polyurethane
Tributyltin (TBT) and tributyltin compounds (Annex EE) Please note this substance has restrictions in Table 1 under the entry for tri-substituted organostannic compounds. This reporting is for lower concentration levels.	Any Intentional Addition in chemical products	Antibacterial and antifungal agents, antifoulant Paint, pigment, and stabilizer
1, 2, 3-Trichlorobenzene (CAS 87-61-6) Please note this entry has a prohibited application listed in Table 1 for Halogenated aromatic substances. This entry is for reporting of all other non-restricted applications.	1000 ppm (0.1%) in a homogeneous material	Solvent Dye carrier Heat transfer medium
1, 2, 4-Trichlorobenzene (CAS 120-82-1) Please note this entry has a prohibited application listed in Table 1 for Halogenated aromatic substances. This entry is for reporting of all other non-restricted applications.	1000 ppm (0.1%) in a homogeneous material	Solvent Dielectric fluid Dye carrier Synthetic transformer oil Lubricant Heat transfer medium Wood preservatives
Triphenyltin (TPT) and triphenyltin compounds (Annex EE) Please note this substance has restrictions in Table 1 under the entry for "Tri-substituted organostannic compounds". This reporting is for lower concentration levels.	Any Intentional Addition in chemical products	Antiseptic and antifungal agent Paint, pigment, and stabilizer
Tris (2-chloro-1-methylethyl) phosphate (TCPP) (CAS 13674-84-5)	1000 ppm (0.1%) in a homogeneous material	Flame retardant, e.g., for polyurethane
Tris (1,3-dichloro-2-propyl) phosphate (TDCPP) (CAS 13674-87-8)	1000 ppm (0.1%) in a homogeneous material	Flame retardant, e.g., in textiles and polyurethane foam.
Vinyl chloride (CAS 75-01-4)	1000 ppm (0.1%) in a homogeneous material	Chemical intermediate used in production of polyvinyl chloride

2.2.3Substances of Very High Concern (SVHC) in Articles - Reporting Requirements

The current candidate list of REACH SVHC as published by the European Chemicals Agency is located at: Http://echa.europa.eu/chem_data/candidate_list_table_en.asp. Annex NN in this specification also has the list of SVHC Candidate Substances as of the date of this document. Please check the web site for updates since this list is subject to change. Annex OO is the list of substances subject to REACH Authorization (current as of the date of this specification) and which are prohibited at or above 0.1% weight by weight of an Article.

IBM requires suppliers to identify if any substances on the SVHC Candidate list are present in an Article 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 Product Content Declaration (PCD) for the Deliverable. The European Court of Justice on September 10, 2015 ruled that a complex Article can have one or more constituent Articles and that the 0.1% weight by weight of SVHCs applies to the constituent Articles of a more complex Article. The table in this section has a list of SVHC Candidate substances which may potentially be present in Information Technology (IT) equipment. Some of the SVHC substances are not included on this table for various reasons such as they are already restricted by other laws or are unlikely to be present in IT equipment. Annex NN has the list of SVHC, as of the date of this document, including those with a potential to be in IT equipment. Please note, the underlined text above emphasizes the need to report on the PCD substances and their weights present in the Article to IBM, which may be different from the weight of the substances in the raw material used.

If an SVHC is present in an Article at or above the reporting concentrations, report it on the PCD. The drop down screen on the PCD will have the chemicals found in Table 5. There is a row in the drop down menu of the PCD for "Other" which can be used for reporting SVHC substances not in Table 5.

If an SVHC in Table 5 or Annex NN is present in an Article at or above the reporting concentrations, the Supplier must provide a customer communication to IBM meeting the requirements of Article 33 of the EU REACH Regulation when the Article is procured by IBM in the European Union. Please provide a copy of this communication to the author of this specification. Information about REACH can be found at the European Chemicals Agency website www.echa.europa.eu.

See Annex NN for a full list of SVHCs at the time of this release of 46G3772.

Table 5. Reporting of Substances of Very High Concern

SVHC (from proposed Candidate List)	CAS Number	Reporting Concentration	Examples of industry uses
Acrylamide	79-06-1	At or above 0.1% weight by weight of the Article	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 Article	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 Article	Processing aid in the production of fluoropolymers and fluoroelastomers and other surfactant uses.
Anthracene	120-12-7	At or above 0.1% weight by weight of the Article	Scintillator for radiation detection. Radiation therapy dosimetry. Used to make dyes, plastics, and pesticides.
1,2-Benzenedicarboxylic acid, di-C $_{6-8}$- branched alkyl esters, C_7-rich (Diisoheptyl phthalate) (DIHP)	71888-89-6	At or above 0.1% weight by weight of the Article	Plasticizer in PVC, sealants, and printing inks.
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 Article	Plasticizer and lubricant. Use in adhesives, coatings, cable compounding, polymer foils, and PVC compounds.
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 Article	Plasticizer
1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	At or above 0.1% weight by weight of the Article	Plasticizer in PVC, rubbers, inks, and lacquers.
2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)	3846-71-7	At or above 0.1% weight by weight of the Article	UV stabilizer.
2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)	25973-55-1	At or above 0.1% weight by weight of the Article	UV stabilizer in coatings, ABS resin, epoxy resin, fiber resin, propylene and polyvinyl chloride.
Bis(2-methoxyethyl) phthalate	117-82-8	At or above 0.1% weight by weight of the Article	Plasticizer for nitrocellulose, acetyl cellulose, polyvinyl acetate, polyvinyl chloride and polyvinylidene chloride. Enameled wire, film, high-strength varnish and adhesive.

Table 5. Reporting of Substances of Very High Concern			
SVHC (from proposed Candidate List)	**CAS Number**	**Reporting Concentration**	**Examples of industry uses**
Bis(tributyltin)oxide (TBTO)	56-35-9	At or above 0.1% weight by weight of the Article	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 Article	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 Article	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. Please note, most of these applications are prohibited by the EU RoHS Directive.
Cadmium chloride	10108-64-2	At or above 0.1% weight by weight of the Article	Applications include electroplating and electrogalvanizing, manufacture of solar cells
Cadmium fluoride	7790-79-6	At or above 0.1% weight by weight of the Article	Can be used in certain phosphorus for luminescent screens. Manufacture of glass, high- temperature dry film lubricant, and optical applications. Active component in fluxes for soldering of aluminum and its alloys.
Cadmium oxide	1306-19-0	At or above 0.1% weight by weight of the Article	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. Please note, most of these applications are prohibited by the EU RoHS Directive.
Cadmium sulphate	10124-36-4; 31119-53-6	At or above 0.1% weight by weight of the Article	Metal surface coating. Additive to increase performance of lead acid batteries.
Cadmium sulphide	1306-23-6	At or above 0.1% weight by weight of the Article	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 Article	Used as an intermediate in the hydrometallurgical purification of cobalt from its ores, as an inorganic pigment, and as a precursor to catalysts.
Cobalt (II) diacetate	71-48-7	At or above 0.1% weight by weight of the Article	Used in production of intermediate chemicals, surface treatments, and adhesion improvement between rubber and steel.

Table 5. Reporting of Substances of Very High Concern			
SVHC (from proposed Candidate List)	**CAS Number**	**Reporting Concentration**	**Examples of industry uses**
Cobalt dichloride	7646-79-9	At or above 0.1% weight by weight of the Article	Cobalt plating and cobalt based pigments and drier compounds (desiccants). Pneumatic panels for indicating water contamination.
Cobalt (II) dinitrate	10141-05-6	At or above 0.1% weight by weight of the Article	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 Article	Used in production of intermediate chemicals, surface treatment, corrosion prevention, batteries, preparation of pigments, manufacture of drier in lithographic inks.
Diboron trioxide (Please note, report this substance only if it is present in a Deliverable in its pure original form, do not report if the substance is incorporated into a glass or bonded chemical structure).	1303-86-2	At or above 0.1% weight by weight of the Article	Glass
Diisopentylphthalate	605-50-5	At or above 0.1% weight by weight of the Article	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 Article	Plasticizer
1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)	110-71-4	At or above 0.1% weight by weight of the Article	Possible use in batteries
Dipentyl phthalate (DPP)	131-18-0	At or above 0.1% weight by weight of the Article	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 Article	Wood preservative. Biocide. Electrolytic capacitors.
2-Ethoxyethanol	110-80-5	At or above 0.1% weight by weight of the Article	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 Article	Solvent. Used in formulations of paints, lacquers and varnishes for industrial uses.
2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5 – dithia -4 – stannatetra decanoate (DOTE)	15571-58-1	At or above 0.1% weight by weight of the Article	Use in manufacture of rubber and plastic products. Heat stabilizer in PVC. Coloring agent.
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
Hydrazine	7803-57-8; 302-01-2	At or above 0.1% weight by weight of the Article	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.

Table 5. Reporting of Substances of Very High Concern			
SVHC (from proposed Candidate List)	**CAS Number**	**Reporting Concentration**	**Examples of industry uses**
Lead hydrogen arsenate Please note Table 1 of this specification and IBM RoHS Specifications 53P6233/ 97P3864 already restrict lead levels in many applications.	7784-40-9	At or above 0.1% weight by weight of the Article	Biocide for wood.
Lead monoxide (lead oxide) trioxide (Please note, report this substance only if it is present in a Deliverable in its pure original form, do not report if the substance is incorporated into a glass or bonded chemical structure).	1317-36-8	At or above 0.1% weight by weight of the Article	Potential use in lead acid batteries Glass
Lead oxide sulphate	12036-76-9	At or above 0.1% weight by weight of the Article	Potential use in lead acid batteries
Lead titanium trioxide	12060-00-3	At or above 0.1% weight by weight of the Article	Ceramics
2-Methoxyethanol	109-86-4	At or above 0.1% weight by weight of the Article	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 Article	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.
Orange lead (lead tetroxide)	1314-41-6	At or above 0.1% weight by weight of the Article	Potential use in lead acid batteries
Pentadecafluorooctanoic acid (PFOA)	335-67-1	At or above 0.1% weight by weight of the Article	Surfactant in emulsion polymerization of fluoropolymers
[Phthalate (2-)]dioxotrilead	69011-06-9	At or above 0.1% weight by weight of the Article	Potential plasticizer in cable jacketing
Pyrochlore, antimony lead yellow	8012-00-8	At or above 0.1% weight by weight of the Article	Potential pigment in paints and inks
Reaction mass of 2-ethyl hexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate and 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylheyxl)oxy]- 2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE and MOTE)	Not Available	At or above 0.1% weight by weight of the Article	Heat stabilizer in PVC.
Tetraboron disodium heptaoxide, hydrate	12267-73-1	At or above 0.1% weight by weight of the Article	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 Article	Potential stabilizer in PVC
1,2,3-Trichloropropane	96-18-4	At or above 0.1% weight by weight of the Article	Paint and varnish remover. Solvent for oils, fats, waxes, rubber, and resins. Degreasing agent.

Table 5. Reporting of Substances of Very High Concern			
SVHC (from proposed Candidate List)	**CAS Number**	**Reporting Concentration**	**Examples of industry uses**
Triethyl arsenate	15606-95-8	At or above 0.1% weight by weight of the Article	Biocide for wood.
Zirconia Aluminosilicate, Refractory Ceramic Fibers	Not available	At or above 0.1% weight by weight of the Article	High temperature insulating fiber for industrial furnaces, pipes, ducts, cables, and high-temp test equipment. Fire protection equipment such as heat shields. Used for brake pads, catalytic converters, metal reinforcement, and air bags

2.3 Marking of Products and Parts

2.3.1 Product/Part

Logo and Compliance Identification Number

A mark, such as a logo, identifying the producer of a Product must be permanently affixed and clearly displayed on the Product. Examples of Products requiring a logo include, but are not limited to printers, servers, workstations, storage products, external drives, Uninterruptible Power Supplies, monitors including both standalone and monitors embedded in a system, laptops including those embedded in a system, keyboards, mice, kiosks, external power supplies, racks, power distribution units, and modems.

Products must have a compliance identification number, e.g., batch or serial number allowing identification of the product. Examples of this identification include machine type, machine type model, feature code, or part number. This information must be located on the product. It may be located on the agency label. Where the size or nature of the product does not allow it, the required information must be provided on the packaging or in a document accompanying the EEE. The compliance identification number must match the Declaration of Conformity (DoC) required for RoHS and EU Energy Related Products (ERP) regulations. See Sections 2.12 and 2.14 for additional details about DoCs.

California Safe Drinking Water and Toxic Enforcement Act

A warning, compliant to the requirements of the California Safe Drinking Water and Toxic Enforcement Act of 1986, must be placed on Deliverables containing a substance listed on the California list of Chemicals Known to the State to Cause Cancer or Reproductive Toxicity when these substances are incorporated in a manner to expose any individual to the chemical. The list of substances and the warning information can be found at: http://www.oehha.org/prop65/law/P65law72003.html

For use of lead in Frequently Handled Cables, see Table 1. Lead concentrations below 300 ppm in Frequently Handled Cables do not require a warning label as described above. IBM Procurement will request a laboratory analysis to document the level of lead in the cable jacketing of Frequently Handled Cables. The test report must use a method of sufficient sensitivity to establish a limit of quantification of less than 300 ppm. Frequently handled cables include but are not limited to:

- Computer mouse cords,
- Computer peripheral wires and cables designed to plug into front of system (e.g. USB cords),
- Computer peripheral AC adapter cord and I/F cable for portable computers or portable peripheral devices,
- Computer peripheral PCMCIA card cord for portable computers,
- Computer peripheral wires and cables for portable computers,
- Computer speaker cords used with portable computers,
- Desktop computer power/patch/pin cords designed to plug into front of computer,
- External CD/DVD and tape drives for portable computers,

- Mobile PC computer cords,
- Computer joystick,
- Audio or video adapter cords for portable products,
- Audio or video cable for portable products,
- Audio/Video/Computer/telecommunications cables packaged individually for retail sales,
- Portable digital imaging equipment,
- Portable DVD player,
- Portable power adapters, AC adapters for foreign outlets and other voltage converters,
- Portable ZIP drives,
- Scanners for portable computers, and
- USB, firewire cords.

For more information about Frequently Handled cables see IBM Supplier Notification ISN-CAP65 at:
http://www-03.ibm.com/procurement/proweb.nsf/ContentDocsByTitle/United+States~Information+for+suppliers

California Best Management Practices for Perchlorate Materials

Deliverables with 6 parts per billion (ppb) or greater of perchlorate materials (see Annex MM for a list of some perchlorate substances) must include the following information with the Deliverable when shipping to a customer:

"For California: Perchlorate Material - special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate. The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33 Best Management Practices for Perchlorate Materials."
This requirement may be fulfilled by IBM via customer notices, please contact your IBM representative for more information. The following may be used to fulfill this requirement:

a. IBM label part number 15R7482, or
b. IBM flyer part number 42R6959, or
c. IBM Environmental Notices and User Guide, either hardcopy or CD, pdf file located at:
ftp://public.dhe.ibm.com/systems/support/warranty/envnotices/environmental_notices_and_user_guide.pdf

CE Mark for European Union and other jurisdictions

See Sections 2.12 and 2.14 for CE marking requirements for Energy Related Products (ERP) and RoHS regulations.

Engineering prototypes, which are put on display at trade fairs, exhibitions and demonstrations in the EU or other jurisdictions requiring a CE mark to indicate compliance to RoHS or ERP requirements, must be visibly labeled stating that the product may not be placed on the market and/or put into service until conformity is obtained. Please contact the author of this document for more information. Example wording for the label applied on the product may include "This device is an engineering prototype that has not obtained required agency authorizations. This device is not, and may not be offered for sale or lease, or sold or leased until authorization has been obtained. This device is the property of IBM and is not for resale."

The CE marking is the only marking that may be placed on the product to indicate the product or part is in conformance with an EU CE marking legislation. Other marks may be present on the part or product, but they must have a different function from that of demonstrating conformity to an EU CE marking legislation.

C Mark for the Republic of Srpska
See Section 2.14 for details**.**

2.3.2 Plastic Part Marking

This section applies only to IBM logo Products and to Deliverables when those Deliverables are incorporated or integrated within an IBM logo Product. If a supplier has questions about whether this section applies to a particular Deliverable, they should consult their IBM Procurement representative.

PN 46G3772 Page 34 of 120	EC 899569 04NOV93	EC 899773 07DEC94	EC F15040 25AUG97	EC F73298 02SEP99	EC F74336 05SEP00	EC F72950 23JAN02	EC H64064 13MAY03	EC H17205 29JUL03
EC J85151 13MAY05	EC G32590 08FEB06	EC L04925B 11JAN07	EC L04925M 01AUG07	EC L04925N 19FEB08	EC L05962X 08AUG08	EC L79598 25FEB09	EC N24534E 02OCT09	EC L79598A 22FEB10
EC L79598B 22SEPT10	EC L79598C 27APR2011	EC L79598D 6SEPT2011	EC N31517Y 26MAR2012	ECN31946T 19APR2013	ECN33076 5DEC2013	ECN33076A 16MAY2014	ECN46883 17OCT2014	ECP02692 26MAY2015
ECO P02838 15OCT2015								

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 "Plastics- Generic identification and marking of plastics products." The marking convention of ISO 11469 is outlined in the following sections. Marking is optional for plastic Parts weighing less than 25 grams, however, all plastic Parts having adequate surface area for coding should be marked. **Marking requirements do not apply to cable and cable assemblies, experimental tooling or to plastic Parts without adequate surface area for coding.** Marking of protective packaging materials is not in the scope of this specification. See Section 1.5 for information concerning the location of packaging specifications.

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 plastic Part, identification of the actual resin used for fabrication is required.
2) If the plastic 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.

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. Marking with these symbols indicates that the Material which makes up the Part is recyclable. Note: The size of the symbol is optional as long as it is clearly legible.

Resin Generic Identification

Resin identification will be marked on plastic 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 entitled "Commonly Used Resins" for typical examples.

Table 6. 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 below for examples.

Table 7. Examples of Completed Plastic Part Markings

Example	Marking

Table 7. Examples of Completed Plastic Part Markings	
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) <

Additives identification shall be marked on plastic 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

All batteries contained in Deliverables covered by ES 46G3772 shall meet the requirements of the table below.

Table 8. Battery Content Restrictions	
Battery Type	**Restrictions**
All Battery Types, including accumulators. (Some battery types have more restrictive substance levels; see following entries on this table.)	• No intentionally-introduced mercury • ≤ 0.0005% mercury by weight in homogeneous materials[1, 11] • ≤ 0.001% cadmium by weight (Note the lower cadmium restrictions for some battery types below.)[1] • 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. Refer to IBM Engineering Specification 92F6933 for these requirements or contact the IBM Hazardous Materials Transportation Coordinator.
Nonremovable batteries or accumulators, unless the battery is nonremovable due to user safety or other principal purpose of the Deliverable	• ≤ 0.0005% cadmium by weight [5] • ≤ 0.1% lead by weight [5] • ≤ 0.0005% mercury by weight [5]
Alkaline zinc manganese dioxide	• ≤ 0.001% cadmium [4, 6] • ≤ 0.004% lead [2, 6, 9] • ≤ 0.0001% mercury [2, 6, 9]
Alkaline manganese button cell battery with mercury added	Prohibited. [7]
Lead Acid, Sealed	Must be classified as non-spillable and meet the requirements of US Code of Federal Regulation, 49 CFR 173.159a and IATA Special Provision A67.
Mercuric oxide button cell battery	Prohibited [7]
Nickel Cadmium (Ni-Cd)	Prohibited. [1]
Silver oxide mercury added button cell batteries, including silver oxide button cell batteries designated SR357, SR364, R371, SR377 and SR395	Prohibited. [7]
Zinc-air button cell battery with mercury added	Prohibited. [7, 8]
Zinc carbon	• ≤ 0.200% lead by weight [2] • ≤ 0.001% cadmium by weight [4] (R6, R14 and R20) • ≤ 0.0001% mercury by weight [3]
Zinc silver oxide, zinc air and zinc manganese dioxide button batteries	Prohibited [12] < 0.005 mg/g mercury [10]
Non-alkaline zinc manganese dioxide	• ≤ 0.001% cadmium [4, 6, 9] • ≤ 0.100% lead [2, 6] • ≤ 0.0001% mercury [2, 6]

Note - the regulations cited below are only a sample of the regulations pertaining to batteries. They are provided for example purposes only.
[1] 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.
[2] Argentina National Legislature Act 26.184 on the manufacturing, assembly and importing of batteries.
[3] New York Battery Reduction and Elimination. New York State Consolidated Laws. Environmental Conservation
[4] 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.
[5] Switzerland Ordinance on Risk Reduction related to the Use of certain particularly dangerous Substances, Preparations and Articles.
[6] Brazil Resolution Number 401 of November 4, 2008 Batteries.
[7] Maine Act Concerning Mercury-added Button Cell Batteries.
[8] 2011 Wisconsin Act 201 relating to zinc air button cell batteries
[9] GB 24427-2009 Limitation of mercury, cadmium and lead contents for alkaline and non-alkaline zinc manganese dioxide batteries. National Standards of the People's Republic of China
[10] GB 24428-2009 Limitation of mercury contents for zinc silver oxide, zinc air and zinc manganese dioxide button batteries. National Standards of the People's Republic of China
[11] Canada Products Containing Mercury Regulations SOR/2014-254
[12] Japan Act on Preventing Environmental Pollution of Mercury

2.4.2 Product Design, Management Plans, and Labeling Requirements for Batteries

All batteries contained in Deliverables covered by ES 46G3772 shall be designed for easy identification and removal. Batteries must be classified as nonhazardous (for purposes of transport) by all modes of transport as required by IBM Engineering Specification 92F6933. Data (safety data sheets for all batteries, plus UN38.3 test reports for lithium batteries) used to classify batteries as nonhazardous in transport must be supplied to IBM upon request. For further information on this, please contact the IBM Hazardous Materials Transportation Coordinator.

Suppliers of Deliverables with lead acid batteries must provide IBM with a Material Safety Data Sheet (MSDS) which is current, e.g., less than 3 years old, and conforms to US Occupational Safety and Health Administration requirements in 29 Code of Federal Register 1910. A copy of this MSDS must accompany lead acid batteries which ship to an IBM customer, including end use customers, Business Partners, and OEM customers. The MSDS must also be available upon request in Spanish.

Battery manufacturers must comply with Battery Management Plans as required by multiple jurisdictions, including, but not limited to those listed in the Table below. IBM Procurement may request written documentation from a Supplier verifying compliance and upon such request; Supplier must provide this compliance documentation. The table below briefly outlines some battery management plan requirements by jurisdiction for batteries sold for commercial, industrial or business applications. The list is not all-inclusive.

Table 9. Limited Summary of Battery Management Plan Requirements by Jurisdiction

Jurisdiction	Battery type requiring management plan
Brazil	Lead acid, nickel cadmium, mercury oxide, alkaline manganese and zinc manganese.
Ecuador	Primary batteries: mercury –oxide batteries Secondary batteries: nickel-cadmium, nickel-metal hydride, nickel-iron, and lithium-ion batteries
EU Countries, as well as Israel and Turkey	All.
Florida	Rechargeable nickel-cadmium or sealed lead-acid batteries, weighing less than 25 pounds excluding those used for memory backup.
Maine	Mercuric oxide, nickel-cadmium or sealed lead acid battery.
Maryland	Nickel-cadmium or lead acid batteries.
Minnesota	Rechargeable batteries. Mercuric oxide, silver oxide, nickel cadmium or sealed lead acid batteries.
New Jersey	Mercuric oxide, nickel cadmium, sealed lead rechargeable, alkaline manganese, lithium, silver oxide, zinc-air, and zinc-carbon batteries. Any button, coin, cylindrical, rectangular or other shaped battery consisting of two or more cells composed of lead, lithium, manganese, mercury, mercuric oxide, silver oxide, cadmium, zinc, copper, or other metals.
Vermont	Mercuric oxide, nickel-cadmium, or sealed lead acid.

Note: The list of requirements in this table is not all inclusive of all legally mandated Battery Management Plan requirements.

All Batteries shall have appropriate labels affixed, including but not limited to:

1. Battery type and chemistry (IEC standard name is acceptable for button cells, e.g., CR2032, BR1225, see IEC 60086-2),
2. Manufacturer name,
3. Capacity rating on all batteries with the exception of coin cell
   a. All batteries must have capacity displayed in Ah on a label with a minimum size of 1 mm x 5 mm,
   b. Lithium ion batteries also require the specific marking format of Wh, see IBM ES 92F6933, and
4. Other markings, hazard warnings, and information as required by applicable laws and regulations.

Battery labels or markings must be printed visibly, legibly and indelibly. The battery marking shall be located on or adjacent to each battery unless otherwise noted in this Section. Deliverables 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.

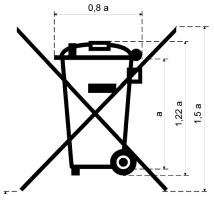
Batteries and batteries in Deliverables must meet the requirements in this and the following sections. These requirements must be met irrespective of the jurisdiction where the Deliverable is transferred to IBM.

Requirements for the EU, Brazil, Macedonian, Turkey, and multiple other jurisdictions

Instructions must be provided in the Product or Part hardware publications, showing how batteries can be removed safely by either the customer or a qualified professional and informing the customer of the type of battery in the Deliverable. These instructions must accompany the product, if not, a reference to the web location of the removal instructions must accompany the product.

A mark indicating separate collection must be printed on all batteries or accumulators see the figure in this section. The mark must (1) consist of a crossed-out wheeled bin container; (2) cover at least 3% of the area of the largest side of the battery, accumulator or battery pack, up to a maximum size of 5 cm x 5 cm; (3) for cylindrical cells, the symbol should cover at least 1.5% of the surface area of the battery or accumulator, and shall have a maximum size of 5 cm x 5 cm; and (4) where the mark would be smaller than 0.5 cm x 0.5 cm, the battery, accumulator or battery pack need not be marked but a symbol measuring at least 1 cm x 1 cm must be printed on the package. Refer to IBM Engineering Specification 5897661 "Recyclable Packaging Materials" for more details about the marking on the packaging if required.

In addition to the above, 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 cover an area at least 1/4 of the size of the symbol.



Pb

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

See previous section for capacity rating labeling requirements.

Batteries shall be tested as required in Turkey Announcement 2009/15 by a Turkey accredited laboratory. The analysis shall show compliance of the battery to the substance restrictions in the Turkey Regulation for Used Batteries and Accumulators, Number 25569 for mercury and cadmium. The analysis shall be completed and dated within six months of submittal to IBM.

Requirements for the United States

In the United States, the Mercury-Containing and Rechargeable Battery Management Act (Public Law 104-142) establishes national, uniform labeling requirements for rechargeable batteries, such as nickel-cadmium, nickel metal hydride, lithium ion, 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 the table below 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 below.

Figure 2. Three chasing arrows symbol from the U.S. Battery Management 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 10. Text for Battery Marking for the U.S. Battery Management 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."

* Nickel cadmium batteries are prohibited from use in Deliverables covered by this specification. See Table 8.

California - In California, certain coin or button cell lithium manganese dioxide batteries may require a label or flyer. Lithium manganese dioxide batteries containing perchlorate substances must either be:
1. Clearly labeled on the exterior of the shipping package, or
2. Have included with the Deliverable a shipping document or package insert.

The label or the insert must have the following statements, "Perchlorate Material - special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/." The following must also be included on the label or insert for IBM logo Products or Deliverables incorporated within an IBM logo Product, "The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part includes a lithium manganese dioxide battery which contains a perchlorate substance."

Wisconsin – Manufacturers of zinc air button cell batteries must certify to the State of Wisconsin that the battery contains no mercury that was intentionally introduced.

Requirements for China

The China Regulation on Mercury Content Limitation for Batteries requires all domestically manufactured and imported alkaline zinc-manganese and zinc-manganese 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).

China Management Methods for Controlling Pollution by Electronic Information Products, Ministry of Information Industry (MII) Order #39 requires a Mark logo on all batteries except lead acid batteries and on batteries where due to size and function the battery may not be able to be labeled. Button and coin cell batteries are examples of batteries which may not be able to be labeled with a Mark logo. See Section 2.9 for more information in regard to labeling batteries with a China Mark logo. In the case where batteries cannot be labeled due to size or function restrictions, the battery must be listed on the Hazardous Substance Table, see Section 2.9 for details. An example China Mark logo for a battery can be found in the following Figure.

Figure 3. Example of China Mark Logo for batteries.

Requirements for Taiwan

All dry cell batteries sold in Taiwan are required to have the “Four-in-One” recycling symbol and the words, in Chinese characters, which interpreted mean “Please recycle batteries.” See Figure below. 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 and words should be placed in one of the following locations only, using this order of priority: 1) on the battery, 2) as close to the battery as possible, 3) on the cardboard packaging of the field replaceable unit (FRU), 4) on a flyer that goes with the battery, 5) on the Product containing the battery, or 6) the symbol and words should appear in hardware manuals.

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

Requirements for Japan

Rechargeable sealed lead acid, nickel cadmium, nickel metal hydride, and lithium ion batteries sold inside Japan shall be labeled according to 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). 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.

Table 11. Battery Label Requirements for Japan

Class of the Specified Labeled Product	***Form****
Sealed lead storage batteries not covered by using plastic or other materials and sealed lead storage batteries covered by using plastic or other materials with height of less than 10mm	Form 1
Sealed lead storage batteries covered by using plastic or other materials with height of 10mm or more	Form 2
Sealed alkaline storage batteries (limited to sealed nickel-cadmium storage batteries. The same will apply in this item and the next item.) not covered by using plastic or other materials and sealed alkaline storage batteries covered by using plastic or other materials with height of less than 10mm	Form 3
Sealed alkaline storage batteries covered by using plastic or other materials with height of 10mm or more	Form 4

Table 11. Battery Label Requirements for Japan	
Class of the Specified Labeled Product	***Form****
Sealed alkaline storage batteries (limited to sealed nickel-hydrogen storage batteries. The same will apply in this item and the next item.) not covered by using plastic or other materials and sealed alkaline storage batteries covered by using plastic or other materials with height of less than 10mm	Form 5
Sealed alkaline storage batteries covered by using plastic or other materials with height of 10mm or more	Form 6
Lithium storage batteries not covered by using plastic or other materials and lithium storage batteries covered by using plastic or other materials with height of less than 10mm	Form 7
Sealed lithium storage batteries covered by using plastic or other materials with height of 10mm or more	Form 8

* Forms appear on the following pages.

Form 1

Characters

Pb

(Remarks)

The letter size shall be 4.5 point type or bigger as provided in Japanese Industrial Standard (JIS) Z 8305.

Form 3

Characters

Ni-Cd

(Remarks)

The letter size shall be 4.5 point type or bigger as provided in Japanese Industrial Standard (JIS) Z 8305.

Form 2

Characters

Pb b

Symbols

(Remarks)

a: Length of one side of symbol

s: Surface area of symbol (a x a)

w: Width of line (0.1 mm or more)

b: Height of character (1/5 of a or more)

Surface area (S) of labeled symbol shall be 9 square millimeters or more, and 3 % or more of surface area of labeling surface of the said sealed storage batteries or 25 square centimeters or more.

The letter size shall be 6 point type or bigger as provided in Japanese Industrial Standard (JIS) Z 8305.

Form 4

Characters

Ni-Cd b

Symbols

(Remarks)

a: Length of one side of symbol

s: Surface area of symbol (a x a)

w: Width of line (0.1 mm or more)

b: Height of character (1/5 of a or more)

Surface area (S) of labeled symbol shall be 9 square millimeters or more, and 3 % or more of surface area of labeling surface of the said sealed storage batteries or 25 square centimeters or more.

The letter size shall be 6 point type or bigger as provided in Japanese Industrial Standard (JIS) Z 8305.

Form 5

Characters

Ni-MH

(Remarks)

The letter size shall be 4.5 point type or bigger as provided in Japanese Industrial Standard (JIS) Z 8305.

Form 7

Characters

Li-ion

(Remarks)

The letter size shall be 4.5 point type or bigger as provided in Japanese Industrial Standard (JIS) Z 8305.

Form 6

Characters

Ni-MH

Symbols

(Remarks)

a: Length of one side of symbol

s: Surface area of symbol (a x a)

w: Width of line (0.1 mm or more)

b: Height of character (1/5 of a or more)

Surface area (S) of labeled symbol shall be 9 square millimeters or more, and 3 % or more of surface area of labeling surface of the said sealed storage batteries or 25 square centimeters or more.

The letter size shall be 6 point type or bigger as provided in Japanese Industrial Standard (JIS) Z 8305.

Form 8

Characters

Li-ion

Symbols

(Remarks)

a: Length of one side of symbol

s: Surface area of symbol (a x a)

w: Width of line (0.1 mm or more)

b: Height of character (1/5 of a or more)

Surface area (S) of labeled symbol shall be 9 square millimeters or more, and 3 % or more of surface area of labeling surface of the said sealed storage batteries or 25 square centimeters or more.

The letter size shall be 6 point type or bigger as provided in Japanese Industrial Standard (JIS) Z 8305.

Requirements for Brazil

Lead acid, nickel cadmium, mercury oxide, alkaline manganese, and zinc manganese batteries or accumulators shall be labeled in accordance to the requirements for the European Union, see previous section for the EU. In addition, these batteries must be clearly and indelibly labeled in Brazilian Portuguese with the following information:

- Identification of the importer and manufacturer,
- Warning about risks to human health and the environment, and

- Requirement to return the battery, after use, to the reseller, manufacturer, or importer.

IBM logo products may use label part number 46T8771 for this requirement. If there is insufficient space on the batteries to put the above information then this information must be on the packaging and in the product manual. Shipping the latest version of the IBM Environmental Notices and User Guide (ENUG), Z125-5823, with the product or part with the battery will meet the product manual requirements. See Section 2.10 for additional information about the ENUG.

The manufacturer of these batteries must:

- Register in the Brazil Federal Technical Register of Activities that are Potentially Contaminating or that Use Environmental Resources.
- Test the batteries in accordance to Chapter 1, Section 3 of Brazil Resolution Number 401 of November 4, 2008 (and Article 3 of Brazil Normative Instruction (NI) No. 8) at an in-country (Brazil) INMETRO accredited laboratory. The testing results must be submitted annually to IBM, the Brazil National Institute of Metrology and Standards (INMETRO), and the Brazil Institute of the Environment and Renewable Natural Resources (IBAMS). Please note this testing requirement applies only to lead acid, zinc manganese and alkaline manganese batteries and accumulators only. (This testing also applies to nickel cadmium and mercury oxide batteries which are not allowed in IBM products.)
- Submit a battery management plan to the required Brazil environmental agency (IBAMA).
- Include in the packaging, in Brazilian Portuguese, information about the symbols, warnings on the risks to human health and the environment, and the necessity to return the battery after use to the reseller, manufacturer or importer.

Requirements for Ecuador

Mercuric-oxide, nickel-cadmium, nickel-metal hydride and nickel-iron batteries shipping individually, not incorporated into a product or part, must be labeled with the following:

"ADVERTENCIA
La pila usada es un desecho peligroso para la salud y el ambiente.
La pilas usadas deberán devolverse al momento de adquirir una nueva."

This translates to "WARNING Waste batteries are a hazardous waste for the health and environment. Waste batteries shall be returned at the time to buy new ones." IBM may request usage of IBM label part number 00FX701 for this warning. The label may be on the battery itself or on the packaging.

Requirements for alkaline and non-alkaline zinc manganese dioxide batteries

Requirements for the People's Republic of China
Reference
GB 24427-2009 National Standards of the People's Republic of China. Limitation of mercury, cadmium, and lead contents for alkaline and non-alkaline zinc manganese dioxide batteries.

Alkaline and non-alkaline zinc manganese dioxide batteries (excluding button batteries) must be labeled with the following:

a. Model type;
b. Production year and month and validation, or recommended time of expiration;
c. Positive and negative contact;
d. Nominal voltage;
e. Name and address of the manufacturer or supplier;
f. Trade mark;
g. Code number of the standard followed;
h. Notification of safe use (warning notice);
i. Mercury content ("low mercury" or "mercury free"), in Chinese characters.

B, e, g, h and i above can be marked on the package.

Method GB/T 20155-2006 is used to determine mercury, cadmium, and lead content in these batteries.

Reference
GB 24427-2009 National Standards of the People's Republic of China. Limitation of mercury contents for zinc silver oxide, zinc air and zinc manganese dioxide button batteries.

Zinc silver oxide, zinc air and zinc manganese dioxide button batteries must be labeled with the following:
a. Model type;
b. Production year and month and validation, or recommended time of expiration;
c. Positive and negative contact;
d. Nominal voltage;
e. Name and address of the manufacturer or supplier;
f. Trade mark;
g. Code number of the standard followed;
h. Notification of safe use (warning notice);
i. Caution of preventing accidental swallowing;
j. Mercury content ("low mercury" or "mercury free"), in Chinese characters.
A and c above must be marked on the battery. B, d, e, g, h, i and j above can be marked on the package.

Method GB/T 20155-2006 is used to determine mercury, cadmium, and lead content in these batteries.

2.5 Requirement for Decorative Metal Finishing

This section applies only to IBM logo Products and Deliverables when those Deliverables are incorporated or integrated within an IBM logo Product. If a Supplier has questions about whether this section applies to a particular Deliverable, they should consult their IBM Procurement representative.

The decorative metal finishing of IBM logo hardware Products is required to be achieved using powder coatings. Decorative metal Parts and OEM Products with decorative metal housings must use powder coating. Exceptions to this requirement are applications where production volumes do not 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 for the finishing of plastic parts. To identify IBM approved powder materials by manufacturers' designations for color and geographic region, refer to the IBM Materials Code Directory.

2.6 Requirements for Parts and Products Containing Mercury

Mercury containing components are prohibited in IBM Deliverables. New parts or products releasing after October 2014 can no longer have mercury containing Cold Cathode Fluorescent Lamps (CCFLs) (e.g., in Liquid Crystal Displays (LCDs)). For parts or products released before that date, the use of a mercury-containing CCFL must be reported to your IBM procurement representative to ensure that the applicable legal requirements are met for Products containing mercury in CCFLs. IBM Procurement will request information about the length of the fluorescent tube, as this determines the level of mercury allowed. All Parts or Products containing mercury and the packaging for the Part or Product must be labeled in English and/or French Canadian for certain U.S. State and Canada laws which require appropriate text indicating that mercury is present in the Part or Product and that the item must be disposed of in accordance with local regulations and requirements. This label must also be on any replacement parts and the packaging for the replacement parts which contain these mercury-containing components. Additionally, appropriate text must be added to user and service manuals for mercury-added Products indicating which Product components contain mercury and directing the Product owner to dispose of the Product per local regulations.

The table below provides a list of typical Information Technology (IT) Product categories that were known to contain mercury, and provides requirements for label wording, label font size, and user manual text. Labels and manual text for Product categories not listed in the table below must be reviewed and approved by your IBM procurement representative.

Table 12. Mercury Added Product Labeling Information - US

Product Type	Mercury Location	Mercury Amount	Product and Part Label Requirements *	Product and Replacement Part Package Label Requirements *	User / Service Manual Requirements
Flat Panel Display	Fluorescent lamp in display module	Displays range from 15 to 20 inches. Varies with the number of bulbs. Each bulb has ≤ 3.5 mg of mercury. Mercury amount per product ranges from less than 10 mg to less than 30 mg. See Table 1 for mercury restrictions per lamp.	• Label Wording - "This product contains a cathode fluorescent lamp which contains mercury. Please refer to user manual or follow local ordinances or regulations for disposal of this machine." • Label Location - rear panel of product. • Label Construction - Per requirements of UL 969 Standard, "Marking and Labeling Systems." • Minimum Capital Letter Text Height - 3.53mm.**	• Label Wording - This product contains a cathode fluorescent lamp which contains mercury. Please refer to user manual or follow local ordinances or regulations for disposal of this machine (or product). • Label Construction - Per requirements of UL 969 Standard, "Marking and Labeling Systems." • Minimum Capital Letter Text Height - 3.53mm. **	Statement Wording - "The fluorescent lamp in the liquid crystal display contains mercury. Dispose of it as required by local ordinances and regulations."
Tape Library	Fluorescent lamp in display module	Less than 4.0 mg per product. See Table 1 for mercury restrictions per lamp.	• Label Wording - "This product contains a cathode fluorescent lamp which contains mercury. Please refer to user manual or follow local ordinances or regulations for disposal of this machine." • Label Location - rear panel of product • Label Construction - Per requirements of UL 969 Standard, "Marking and Labeling Systems." • Minimum Capital Letter Text Height - 3.53mm.**	• Label Wording - This product contains a cathode fluorescent lamp which contains mercury. Please refer to user manual or follow local ordinances or regulations for disposal of this machine (or product). • Label Construction - Per requirements of UL 969 Standard, "Marking and Labeling Systems." • Minimum Capital Letter Text Height - 3.53mm. **	Statement Wording - "The fluorescent lamp in the liquid crystal display contains mercury. Dispose of it as required by local ordinances and regulations."

* The labels must also be on the replacement part or product, such as a service part and the packaging for the replacement part.
**The State of Vermont requires a 10 point font which equates to a height of 3.53mm. If the text on the Product or Part label is not able to meet this height requirement, then an Alternative Labeling Plan must be submitted to and approved by the State of Vermont. IBM may request documentation from Supplier of an approved Alternative Labeling Plan. The label for the packaging must meet the 10 point font requirement.

For Canada, the following information is required in a readily visible location on the product and package:

a. The statement "Contains mercury / Contient du mercure"
b. Safe handling procedures and the measures to be taken in case of accidental breakage, the address of a website where that information is available, or contact information for a person who can provide that information;
c. The options available for the disposal and recycling of the product in accordance with the laws of the jurisdiction where the disposal or recycling is to take place, the address of a website where that information is available, or contact information for a person who can provide that information;
d. A statement that the product should be disposed of or recycled in accordance with the applicable laws; and
e. Symbol "Hg" in a font size of at least 10 points with characters that are at least 3 mm in height or within a pictogram of a least 7 mm in height.

The above information for Canada, must be in both English and French Canadian; in a font size of at least 10 points with characters that are at least 3mm in height, that are legible and indelible and that are impressed, embossed or in a color that contrasts with the label's background or the color of the product; be enclosed by a border, and be easily distinguishable from other graphic material on the product or its package. See the Canada regulation for further details if the product or package is too small, or there is no package to accommodate the information. Annual reporting and a permit is required to import mercury containing products into Canada after November 7, 2015.

In some jurisdictions, at the point of sale of a Product containing mercury, notification must be given to the customer that the product contains mercury. Contact your IBM representative for more details or requirements.

2.7 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 IBM logo 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)) or the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Product chemical emissions requirements are delineated in ECMA 328: Detection and Measurement of Chemical Emissions from Electronic Equipment.

2.8 WEEE Marking

2.8.1 Affected Products and Jurisdictions

References (limited list of jurisdictions with WEEE requirements)
EU Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE) (recast).
European Standard EN 50419 Marking of electrical and electronic equipment.

Electrical and electronic equipment (EEE) which is put on the market in the European Union after August 13, 2005, and is listed in Annex II of EU Directive 2012/19/EU 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 this Annex of the WEEE Directive, stand-alone options that operate external to the products listed (e.g., keyboards, monitors, external power supplies, mice, external drives, racks, power distribution units) should also be marked. Components and internal parts of the stand-alone equipment listed in Annex II do not need to be marked. Please note that external power supplies, adapters and electronic tools require a WEEE label. This requirement is also required for several other jurisdictions, e.g., Buenos Aires, Argentina, Bosnia-Herzegovina, India, Jordan, Macedonia, Nigeria, Peru (recommended for Peru, not required), Serbia, and Turkey.

2.8.2 WEEE Marking Elements, including Date of Manufacture

The marking of EEE, in order to meet requirements in all jurisdictions, must have the following:

1. The crossed-out wheeled bin symbol, including the black bar, in accordance with Annex IX of the WEEE Directive per Article 14(4). (Please note, the symbol of the crossed-out wheeled bin, without the underlying black bar, is the same as required for the battery collection mark in the EU, see Figure 5.)
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,
3. The date of manufacture/put on the market, and
4. A product identification number (compliance ID number) and serial number (for Nigeria).

The date of manufacture or date put on the market must be in un-coded text in accordance with EN 28601 (this European standard is equivalent to ISO 8601) or other coded text. If coded text is used, the code definition must be made available for treatment facilities and must be provided to IBM. The preferred DOM format is YYYYMMDD. See Section 2.9.2 for additional DOM requirements for China requirements. The specific placement of these markings is not prescribed other than for the relationship of the solid bar to the crossed-out wheeled bin.

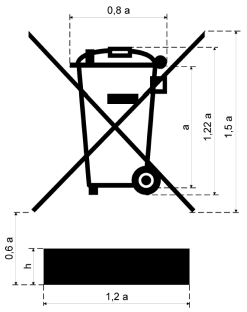


Figure 5. The WEEE Mark

The markings must be visible, accessible, durable, legible, and indelible. The height of the solid bar shall be the greater of 0.3a or 1mm. Each marking element must be located on a permanent portion of the EEE 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. When the size or function of the product does not allow a label, the marking shall be printed on the packaging, on the instructions for use, and in the warranty of the product.

European Standard 50419:2005 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, then after this test they shall not show curling.

2.9 Electrical and Electronic Products and Electronics Information Products Mark and Table

2.9.1 People's Republic of China

Scope

This section specifies the requirements for the People's Republic of China Management Methods for Controlling Pollution by Electronic Information Products, Ministry of Information Industry Order #39 and Standard SJ/T 11364-2014 Marking for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products (EEP).

Deliverables for which this section applies to include but may not be limited to:
1. Systems, e.g., servers, printers, and storage products including racks.
2. Standalone products which are located external to an IBM system, e.g., monitors/displays, laptops, keyboards, mice, tape autoloaders, bridge boxes, modems, routers, uninterruptible power supplies, and external disk drives.

Refer to the People's Republic of China Ministry of Information Industry (MII) List of Electronic Information Products Classification and Explanations for a comprehensive list of EIP and/or EEP.

3. Parts, assemblies, or products which are sold commercially not for use in IBM equipment or IBM designed OEM equipment, e.g., hard disk drives, switches, circuit cards, and storage media. Refer to the MII List of Electronic Information Products Classification and Explanations for a comprehensive list of EIP and/or EEP.
4. Electronic measuring equipment, e.g., Voltage measuring apparatus, oscillographs, frequency measuring instruments, testers, voltage power supplies, and power meters. Refer to the MII List of Electronic Information Products Classification and Explanations for a comprehensive list of EIP and/or EEP.

This section does not apply to:

1. Non-electrical tools (e.g., hammers, screwdrivers, ladders),
2. Electrical tools for use with IBM equipment, e.g., Power hand tools such as drills, (note - electrical tools which are used in the production of mold and gear as specified in MII's EIP and/or EEP List are included in the MII's regulations for EIP and/or EEP),
3. Customer instruction manuals and publications, both hardcopy and softcopy (Note: this section does apply to manuals and publications on floppy disks),
4. Software and firmware updates, this includes recorded storage media such as CDs and DVDs (Note: this section does apply to software and firmware updates on floppy disks), and
5. Product packaging materials (e.g., cardboard and wood pallets). IBM packaging requirements are located in IBM Engineering Specification 5897661 - Recyclable Packaging Materials, Selection and Identification.

Section 2.9.2 on EEP Pollution Control Logos does not apply to the following, but these parts must be included in the Toxic and Hazardous Substance Table outlined in Section 2.9.2:

1. Production parts and assemblies internal to IBM systems, including line cords,
2. Spare parts, parts for upgrade, maintenance or repair when the parts are used internal to an IBM system, and
3. Coin cell batteries where there is no functional space to place an EEP Pollution Control logo.

Definitions

Contain – Per SJ/T 11364-2014 – Refers to cases that the content of hazardous substances is in excess of the concentration limits specified in GB/T 26572-2011 Requirements for Concentration Limits for Certain Restricted Substances in Electronic and Electrical Products or the product contains one of these substances to an exemption allowed pursuant to the EU RoHS Directive. See reference table below for applicable Concentration Limits (CL).

Table 13. Hazardous Substances and Concentration Limits for China EEP Regulation

Hazardous Substance	CLs in a Homogeneous Material- % by weight or (ppm)
Lead (Pb)	0.1% or 1,000 ppm
Mercury (Hg)	0.1% or 1,000 ppm
Cadmium (Cd)	0.01% or 100 ppm
Hexavalent chromium (Cr^{VI})	0.1% or 1,000 ppm
Polybrominated biphenyl (PBB) flame retardants *	0.1% or 1,000 ppm
Polybrominated diphenyl ether (PBDE) flame retardants*	0.1% or 1,000 ppm

* See Annexes for limited lists of PBBs and PBDEs.

Electronic Information Products (EIP) - Per MII Order No. 39 - Products and their accessories that are manufactured by utilizing electronic information technologies including:

1.Electronic radar products
2.Electronic communications products
3.Radio and television products
4.Computer products
5.Home electronic products
6.Electronic instrument measuring products
7.Specialized electronic products
8.Electronic components and parts
9.Electronic applications
10.Electronic materials

11.Software products and their accessories

Electrical and Electronic Product (EEP) - Per SJ/T 11364-2014 - Refers to equipment and supportive products which rely on electric current or electromagnetic field to operate, or are intended to generate, transmit and measure electric current or electromagnetic field, with the rated operating voltage not exceeding 1500V for DC, or 1000V for AC.

Environmental Protection Use Period (EPUP) - A period of time measured in years defined in SJ/T 11364-2014 as the period when hazardous substances contained in electrical and electronic products, will not lead or change abruptly, the use of such products will not cause severe environmental pollution or cause severe harm to the life or property of the users. The EPUP starts with the Date of Manufacture of the product.

Homogeneous Materials - For purposes of this section, this is defined in Standard GB/T 26572-2011 as materials formed of one or more substances, which are homogeneous throughout its various parts.

Hazardous Substances - Per SJ/T 11364-2014 - Lead and its compounds, mercury and its compounds, cadmium and its compounds, hexavalent chromium and its compounds, polybrominated biphenyl (PBB), and polybrominated diphenylether (PBDE) contained in electrical and electronic products. (See Table 1 for restrictions on these substances and applicable RoHS specification.)

Requirements

EEP Pollution Control Logos

Electrical and electronic products shall be marked with either a Mark I or a Mark II logo, also referred to as the EEP pollution control logo. The logos must meet the requirements in standard SJ/T 11364 2014 - Marking for the Restriction of Hazardous Substances in electrical and Electronic Products.

The logo shall be clear, distinguishable, visible, resistant to color fading, and difficult to remove. The logo shall not be smaller than 5 mm x 5 mm. The logo may be applied on the product by molding, spray coating, sticking, or printing. The “e” in Mark I is an image, not a character. The font of the EPUP number in the Mark II logo is “Impact”.

If it is not possible to mark the EEP because of size, irregular shape or function restrictions, then the Mark logo shall be included in the product hardware instructions or in a flyer or insert, which must accompany the EEP. Cables are an example of an irregular shaped product. If the EEP has a maximum surface area less than $5x10^3$ mm^2, then the Mark logo must be included in the product hardware instructions, in a flyer or insert or included with the Toxic and Hazardous Substance Table, see details further in this section. If the operating instructions and the packaging of the product are integrated then the mark may be placed on the packaging.

The pollution control logo is to be marked in a prominent location on the EEP, such as the front, side or back of the product where function keys are located. If restricted by function and appearance, the logo shall be located at another visible location easily visible by consumers. The logo may be placed on the chassis.

Mark I

A Mark I logo (see Figure below) must be used if the product does not contain toxic and hazardous substances or elements above the CLs in any material or application including those exempt from the requirements of the EU RoHS Directive. It is suggested by the standard that the logo be colored green and color match to - C: 85, M: 30, Y: 85, K: 20. If the marking does not look sufficiently clear because the color of the EEP is close to the suggested color, the color may be altered to any other prominent color. Molded in marking can be the same color as that of the product. IBM Procurement or Development may direct or authorize use of IBM part number 42R7561 which is the Mark I label.

Figure 6. Mark I

This symbol is included as reference only. For the actual image refer either to the China Labeling Standard or the MII web site.

Mark II

A Mark II logo (see Figure below) must be placed on products which have one or more toxic and hazardous substances exceeding the CLs regardless of whether the toxic or hazardous substance is used in an application which is exempt from the EU RoHS Directive. See IBM Engineering Specifications 53P6233 and / or 97P3864 for a list of EU RoHS Directive exemptions which may apply to IBM products.

Figure 7. Example of Mark II.

This symbol is included as reference only. For the actual image refer to the China Labeling Standard or the MII web site.

It is suggested by the Chinese standard that the Mark II label be orange. The SJ/T 11364-2014 standard references the color match as C: 0, M: 75, Y: 100, K: 0. If the logo does not look sufficiently clear because the color of the EEP is close to the suggested color, the color may be altered to any other prominent color. Molded in marking can be the same color as that of the product.

IBM Procurement or Development may direct or authorize use of IBM part numbers which are the Mark II labels. While the Supplier is responsible for determining the EPUP for its parts and products, IBM intends to use the following EPUPs for IBM logo parts and products manufactured by IBM. The corresponding IBM label part number is listed.

Table 14. Sample IBM EPUPs and Corresponding Label Part Numbers

EEP	EPUP	IBM Label Part Number
Professional computers, including servers, racks, high performance workstations (Unix based), high end storage systems and high end printers	30	42R7646
Workstations (Intel based) and mid to low end General Office Printers	15	42R7645
Displays, Input/ Output devices, (e.g., keyboards, mice), low end external drives (e.g., floppy disk drives, CD drives, low end storage drives), compact discs, storage media*, cables, and LCDs with fluorescent lamps.	10	42R7644
Batteries** (except lead acid)	5	42R7643
Electronic measurement instrument products	40	None available at this time.

Please note while the Supplier is responsible for determining the appropriate EPUP for its parts and products, (a) if the Supplier of an IBM logo product intends to use a different EPUP number for an IBM logo product, then the Supplier must inform IBM in writing of its intent, and such EPUP number must be approved by the IBM product environmental focal point in STG for the product brand, and (b) if the Supplier of a non-IBM logo product intends to use a different EPUP number for a non-IBM logo product to be distributed by IBM, then the Supplier must inform IBM in writing of its intent.

*Storage media, such as CDs, DVDs, and tape cartridges when sold commercially or at retail for use in non IBM logo systems, must have a Mark logo. If a Mark II logo is used then a Toxic and Hazardous Substances or Elements Table must accompany the parts or products. This applies to blank storage media. Note: CDs, DVDS and tape cartridges with IBM software and firmware for IBM Products do not require a Mark logo, whereas floppy disks with IBM software and firmware do require a Mark logo and HST table.

** IBM does not require a Mark symbol for coin and button cell batteries, if located inside another product. Battery packs, such as nickel metal hydride battery packs and lithium ion batteries must be labeled with a Mark logo. Batteries and battery packs must be listed in the Toxic and Hazardous Substance Table, (see Section 2.9.2) if the product is labeled with a Mark II logo. Note: lead acid batteries do not require a Mark label.

As required by the China Regulations on Product Marking and Labeling, products labeled with Mark II must also be labeled with a Date of Manufacturing (DOM). The DOM may be on the product or the packaging. The DOM may be in any of the following formats: YY, WW-YY, MM-YY, DD-MM-YY or by way of other widely accepted product marking method containing manufacture date such as product serial number and bar code. See Section 2.8 for other DOM requirements. Labeling methods such as serial numbers and bar codes that contain the date of the

products may also be used, but the manufacturer or importer must provide necessary manufacturing date identification services for consumers and regulatory authorities.

Toxic and Hazardous Substances or Elements Table (HST)

When a Mark II symbol is used on a Product a Toxic and Hazardous Substance Table must accompany the shipment of the Product. The table below outlines the format IBM requires for the HST table and provides examples of completed lines. All text must be translated into Simplified Chinese. English may remain on the table next to the Simplified Chinese text. When electronic versions (e.g., removable laser disk) of product instructions or descriptions are shipped with the product rather than hardcopy paper versions, then the HST Table may be included on the electronic version of the product information rather than in hardcopy version. The latest version of IBM Environmental Notices and User Guide, Z125-5823, has the required China HST table in it and may be used to fulfill this notification requirement.

Table 15. Format and Example of a Toxic and Hazardous Substances or Elements Table

Names and Contents of Hazardous Substances in the Product						
Part Name	**Hazardous Substance**					
	Lead (Pb)	**Mercury (Hg)**	**Cadmium (Cd)**	**Hexavalent Chromium (Cr(VI))**	**Polybrominated biphenyl (PBB)**	**Polybrominated diphenylether (PBDE)**
Server	X	O	O	O	O	O
Chassis	O	O	O	O	O	O
Power Supply	X	O	O	O	O	O
Battery Pack	X	O	O	O	O	O

This table is prepared according to SJ/T 11364.
○: Indicates that this hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.
×: Indicates that this hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in GB/T 26572.

Note in the table above, the “X” is a cross (the two lines are perpendicular) and the “O” is a circle. The height of the Chinese characters must not be less than 1.8mm.

The first column must be completed with the part names found in the product or part. The columns under the Toxic and Hazardous Substances or Elements must be filled in with either a cross or a circle to indicate the presence or absence of the Toxic and Hazardous Substances or Elements in the part. Presence of a substance is determined if the concentration of the substance is above the CL including when used in an application which is exempt from the EU RoHS Directive. Absence is determined if the concentration of the substance is below the CL and is not used in an application which is allowed under an EU RoHS Directive exemption. See IBM Specification 53P6233 or 97P 3864 for a list of EU RoHS Directive exemptions which may apply to IBM Products and Parts for a listing of allowable exemptions. For IBM logo Products or Parts, see table below for a list of Part names which can be used for the column in the table listing Part names.

Table 16. Part Names for use in a Toxic and Hazardous Substances or Elements Table for IBM Logo Products and Parts.

Accessor control	Drum	LCD Monitor	Oiler roll	Sensor
Acousto-optic modulator	Duplex unit	LCD Touch screen	Operator interface unit	Server
Air moving devices	ECAT assemblies	LED display panel	Optical cable	Signature capture device
Batteries	Emergency power off switch	LED Monitor	Other mechanical parts	Speaker
Battery pack assembly	External covers	Light	Paper drawer	Stacker unit

Table 16. Part Names for use in a Toxic and Hazardous Substances or Elements Table for IBM Logo Products and Parts.				
Cable assemblies	Fiber Optic Transceiver	Light bulb	Payment device	Static brush
Cages or enclosures	Filter	Line cord	Pinion shaft	Storage device
Cash-handling device	Fluorescent lamp	Logic modules	Point of sale device	Tape drive
Casters	Frame assemblies	Mechanical assemblies	Power Distribution Unit	Toner cartridge
Chassis	Fuser unit	Memory modules	Power supply	UPS
Circuit card with mechanicals	Grid	MICR head	Printer	Urge unit
Circuit card without mechanicals	Ground strap	Mirror motor assembly	Printer cartridge	Vacuum plenum
Conveyor	IO station	Modem	Printhead	Water cooling assembly
Cooling assembly	JAG I/O station	Monitor	Processor modules	Wrap plug
Corona housing	Keyboard	Mouse	Refrigeration assembly	X axis assembly
Corona wire	Lamp	Multi-function printer	Roll	X Rail assembly
Developer unit	Laser	Oil damper	Scale	Y axis assembly
Disk drive	Laser spot size tool	Oiler belt	Scanner	

IBM requires that the following additional text, in Simplified Chinese, be added to the bottom of the table for IBM logo Products or Parts:
"Environmental Protection Use Period (EPUP) Disclaimer: The number provided as the EPUP is provided solely to comply with applicable laws of the People's Republic of China. It does not create any warranties or liabilities on behalf of IBM to customers. The EPUP assumes that the product will be used under normal conditions in accordance with the IBM operating manual. Certain assemblies inside this product (for example, assemblies that contain a battery) may have an EPUP which is lower than the EPUP on this product."

Example of China HST for IBM Logo Products

The HST below is provided in English for reference, the table must be translated into Simplified Chinese.

For China: Names and Contents of Hazardous Substances in the Product

	Hazardous Substance					
Part Name	**Pb**	**Hg**	**Cd**	**Cr (VI)**	**PBB**	**PBDE**
frame assemblies	x	o	o	o	o	o
external covers	x	o	o	o	o	o
mechanical assemblies	x	o	o	o	o	o
cooling assembly	x	o	o	o	o	o
air moving devices	x	o	o	o	o	o
battery pack assembly	x	o	o	o	o	o
batteries	x	o	o	o	o	o
cable assemblies	x	o	o	o	o	o
wrap plug	x	o	o	o	o	o
fiber optic transceiver	x	o	o	o	o	o
keyboard	x	o	o	o	o	o
mouse	x	o	o	o	o	o
modem	x	o	o	o	o	o
LED Display Panel	x	o	o	o	o	o
LCD monitor - CCFL	x	x	o	o	o	o
LED monitor	x	o	o	o	o	o
storage device	x	o	o	o	o	o
ECAT assemblies	x	o	o	o	o	o
emergency power off switch	x	o	x	o	o	o
power supply	x	o	x	o	o	o
power distribution unit	x	o	x	o	o	o
uninterruptible power supply	x	o	x	o	o	o

This table is prepared according to SJ/T 11364.

o Indicates that this hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.

x Indicates that this hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in GB/T 26572.

Environmental Protection Use Period (EPUP) Disclaimer: The number provided as the EPUP is provided solely to comply with applicable laws of the People's Republic of China. It does not create any warranties or liabilities on behalf of IBM to customers. The EPUP assumes that the product will be used under normal conditions in accordance with the IBM operating manual. Certain assemblies inside this product (for example, assemblies that contain a battery) may have an EPUP which is lower than the EPUP on this product.

2.10 Environmental Notifications for Customer Hardware Publications

The latest release of IBM publication Z125-5823, Environmental Notices and User Guide, must ship with products, as well as some repair or spare parts (e.g., whole unit replacement parts, parts with batteries, LCDs, and chemical cooling systems) including beta systems, prototypes, etc. Whole unit replacement parts include products which stand-alone outside the server or storage product, such as monitors, keyboards, mice, laptops, external power supplies, racks, power distribution units, smart card readers, switches (e.g., with an incorporated power supply), routers (e.g., with an incorporated power supply), battery chargers, fill and drain tools, and external drives. The requirement for repair or spare parts also applies for vendor-logo repair or spare parts and whole unit replacement parts. For parts and / or products coming from a supplier, IBM will direct supplier to include these notices where needed, e.g., via an Engineering Change or print notice.

A hardcopy notice for WEEE product take back programs in Croatia is required for Finished Product shipments to this country. A definition of Finished Product is found in Section 2.14.2. Flyer part number 46T8818 or label part number 46T8783 may be used for IBM logo products. IBM will direct suppliers to include these notices where needed.

2.11 Removed

2.12 Product Energy Requirements

The following sections summarize requirements for selected jurisdictions. The relevant Deliverables must meet all of these requirements irrespective of the jurisdiction where the Deliverable is transferred to IBM.

2.12.1 Monitors

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, including, but not limited to cathode ray tubes, liquid crystal displays and light emitting diode displays when used for computers as a computer monitor using normal electrical network voltages and to display equipment with modulator/receivers mainly used for computers. This requirement also includes rack mount monitors. Monitors must meet at least the minimum efficiency standards for Grade 2. See table in this section for requirements for Grade 2.

China Energy Efficiency Grades for 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 on 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 and 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.

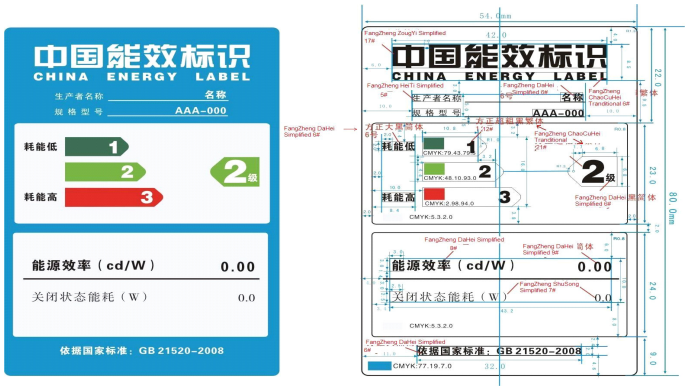


Figure 8. Example of a China Energy Label

Requirements for Korea

Definitions

Monitor - Commercially available, electronic product with a display screen and its associated electronics encased in a single housing that is capable of displaying output information from a computer via one or more inputs, such as VGA and DVI with nameplate output power of power supply less than or equal to 1,000W. Includes computer monitors (i.e., focusing on computer monitor as the primary function) or as dual function computer monitors and televisions. Excludes monitor – main body integrated computers, network computers, monitors with VoIP and other special embedded functions, monitors for broadcasting and medical purposes. Monitors used for a rack mounted monitoring system installed in a rack system used in conjunction with other highly specialized equipment, rated Class A for EMC purposes, would not be in scope of this definition.

Requirements

Monitors must be labeled according to Annex V 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 table:

Monitor low power mode performance				
Classification	**Product Type**	**On Mode Power consumption**	**Sleep Mode Power Consumption**	**Off Mode Power Consumption**
Products without Automatic Brightness Control	Diagonal Screen Size <76cm ≤ 1.1MP screen resolution	Po=6×(MP)+0.00775×(A)+3	≤ 2.0W	≤ 0.5W
	Diagonal Screen Size <76cm Screen resolution> 1.1MP	Po=9×(MP)+0.00775×(A)+3		
	Diagonal Screen Size 76 ~ 153 cm; All screen resolutions	Po=0.04185×(A)+8		
Products with Automatic Brightness Control	Each screen size and screen resolution	Po1=(0.8×Ph)+(0.2×Pl)		

(Note) Po = on mode power consumption
MP = the screen resolution (megapixels)
A = viewable screen area (cm ²)
Po1 = on mode average value of power consumption
Ph = on mode power consumption of high ambient lighting conditions.
Pl = on mode power consumption of the low ambient lighting conditions

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 or on the nameplate of the product where it is visually easy to find. The logo may be monochrome, the predominant color of the product's surface, or in the colors suggested by the Korean e-Standby Regulation. English is provided in the Figure below only as a reference.

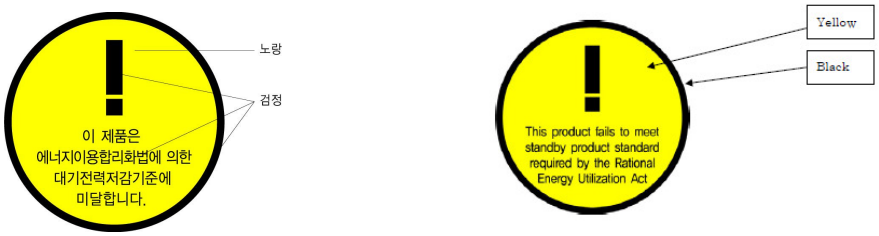


Figure 9. Example of a warning logo

The manufacturer of the monitor shall provide IBM with a test report issued by one of the designated testing institutes in Annex IV of the regulation (e.g., Korea Testing Laboratory, Korea Electric Testing Institute, Korea Electrotechnology Research Institute, EMC Research Institute, Telecommunications Technology Association, and/or Korea Electronics Technology Institute) in order for IBM to submit Form A (found in the regulation) along with the issued test report to the Korea Energy Management Corporation (KEMCO).

Requirements for the EU, Switzerland, Liechtenstein, Norway, Turkey, Israel, Jordan, and other jurisdictions

References

EU Regulation 1275/2008 for ecodesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment

EU Commission Regulation No 801/2013 of 22 August 2013 amending Regulation (EC) No 1275/2008 with regard to ecodesign requirements for standby, off mode electric power consumption of electrical and electronic household and office equipment

EU Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products

Jordan JSNO 2109/2013 Technical Regulation on eco-design requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment

See Section 2.12.14 for energy requirements for EMC Class B (in accordance with EN55022:2006+A1:2007 or EN55022:2010) equipment, including monitors.

Requirements for Australia and New Zealand

References

Australia Greenhouse and Energy Minimum Standards Act 2012

Australia Greenhouse and Energy Minimum Standards (Computer Monitors) Determination 2013

Additional information for this program can be found at http://www.energyrating.gov.au/.

Definitions

Computer monitor – A commercially available product with a display screen and associated electronics, encased in a single housing that as its primary function displays visual information from a computer, workstation or server, including via a wireless connection. This includes LCD, LED, CRT, and plasma display panels (PDP).

Computer monitors must meet the minimum energy performance standards (MEPS) and energy rating label requirements as found in AS/NZS 5815.1:2013 and AS/NZS 5815.2:2013. There are multiple displays which these standards do not apply to, for example, specialized electronic displays intended for use primarily in commercial and professional fields, not intended for sale to the general public. Also excluded are displays which are built-in or have

integrated networking functionality, the circuitry for which cannot be physically separated or switched independently from the electronic display component. Rack mount monitors are excluded from these requirements.

Computer monitors are required to have the six star or ten star label affixed to the product, as outlined in Section 26 of the Greenhouse and Energy Minimum Standards Act 2012 and section 7 of the Greenhouse and Energy Minimum Standards (Computer Monitors) determination 2013. The label may also be placed on the packaging. The format of the labels is in Schedule 1 and Schedule 2 of the Greenhouse and Energy Minimum Standards (Computer Monitors) Determination 2013.

Suppliers are required to supply IBM a copy of the test report and a confirmation the product has been registered in Australia and New Zealand.

Requirements for Vietnam
Computer monitors must meet the minimum energy performance standard as required in Vietnam Decision 51/2011/QD-TTg and Vietnam standard TCVN 9508: 2012 Computer monitor energy efficiency.

2.12.2 External Power Supplies and Adapters

References
Australia/New Zealand Minimum Energy Performance Requirements for External Power Supplies
http://www.energyrating.gov.au/regulations/legislation/legislation-for-e3-under-gems/
http://www.energyrating.gov.au/regulations
United States Federal Energy Conservation Program: Energy Conservation Standards for External Power Supplies Standards: http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx?productid=23
United States CA Code of Regulations, Title 20 Section 1601-1608
United States Oregon Minimum Energy Efficiency Standards for State-regulated appliances and equipment
Canada Energy Efficiency Act, Energy Efficiency Regulations
Jordan JSNO 2111/2013 Technical Regulation on eco-design requirements for no-load condition electric power consumption and average active efficiency of external power supplies; JSNO 2090/2013 Technical Regulation on eco-design requirements for energy related Products
Korea - Korean Regulation on Energy Efficiency Labeling and Standards, July 31, 2008.
European Union Commission Regulation EC No 278/2009 of 6 April 2009 implementing Directive 2005/32/EC with regard to ecodesign requirements for no-load condition electric power consumption and average active efficiency of external power supplies

Definitions
Australia/ New Zealand
"**Single output external power supply**" means an appliance that is designed to supply power to other appliances and that:

(a) has an input from **mains** supply; *Note:* This input is usually 110 volts, 60 hertz; 230 volts, 50 hertz; 240 volts, 50 hertz or a range including some or all of these input conditions.
(b) has one extra low voltage output (either alternating current or direct current) that is either at a fixed voltage or a user selectable voltage through a selector switch;
(c) is sold with, or intended to be used with, a separate end-use product that constitutes the primary load on the power supply; *Note:* These units are often used to power/re-charge laptop computers, mobile telephones, portable stereo units and other portable household devices. It is immaterial whether or not the power supply and end use product are packaged separately or together.
(d) is contained in a separate physical enclosure from the end-use product; *Note* these units cannot be built into the equipment being powered and hence are 'external' to the device being powered. The housings of the EPS and its associated end use product are different. Designs covered include units with an integral mains plug, 'in-line' units and units with provision for equipment to sit in a cradle whilst being used.
(e) is connected to the end-use product via a hard-wired or removable male/female electrical connection, cable, cord or other wiring;

(f) does not have batteries, or battery packs, that physically attach directly to the power supply unit (either permanently or only for the purpose of charging); *Note* This includes batteries that are removable from the power supply unit. For example, a battery pack for a portable electric drill; and

(g)Does not have either: a battery chemistry, or type selector, switch; or an indicator light or state of charge meter.

For Australia/New Zealand, external power supplies used only internal to a rack system are out of scope.

United States - Federal and California

External power supply – an external power supply circuit that is used to convert **household** electric current into DC current or lower voltage AC current to operate a consumer product

Class A external power supply – a device that:

(1)is designed to convert line voltage AC input into lower voltage AC or DC output;

(2)is able to convert to only 1 AC or DC output voltage at a time;

(3)is sold with, or intended to be used with, a separate end-use product that constitutes the primary load;

(4)is contained in a separate physical enclosure from the end-use product;

(5)is connected to the end-use product via a removable or hard-wired male/female electrical connection, cable, cord, or other wiring; and

(6)Has nameplate output power that is less than or equal to 250 watts.

Class A EPS does not include any device that –

- Requires Federal Food and Drug Administration listing and approval as a medical device in accordance with section 513 of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 360c); or
- Powers the charge of a detachable battery pack or charges the battery or a product that is fully or primarily motor operated.

Single-voltage external AC-DC power supply means an external power supply that is designed to convert line voltage AC into lower-voltage DC output and is able to convert to only one DC output voltage at a time.

Single-voltage external AC-AC power supply means an external power supply that is designed to convert line voltage AC into lower-voltage AC output and is able to convert to only one AC output voltage at a time.

Multiple-voltage external power supply means an external power supply that is designed to convert line voltage AC input into more than one simultaneous lower-voltage output.

Low-voltage external power supply means an external power supply with a nameplate output voltage less than 6 volts and nameplate output current greater than or equal to 550 milliamps. Basic-voltage external power supply means an external power supply that is not a low-voltage power supply.

Basic-voltage external power supply means an external power supply that is not a low-voltage external power supply.

Direct operation external power supply means an external power supply that can operate a consumer product that is not a battery charger without the assistance of a battery.

Indirect operation external power supply means an external power supply that cannot operate a consumer product that is not a battery charger without the assistance of a battery.

California

Consumer product means any article, other than an automobile, as defined in 49 U.S.C. section 32901(a) (3):
(1) of a type which in operation consumes, or is designed to consume, energy or, with respect to showerheads, faucets, water closets, and urinals, water; and which, to any significant extent, is distributed in commerce for personal use or consumption by individuals;
(2) without regard to whether such article of such type is in fact distributed in commerce for personal use or consumption by an individual, except that such term includes fluorescent lamp ballasts, general service fluorescent lamps, incandescent reflector lamps, showerheads, faucets, water closets, and urinals distributed in commerce for personal or commercial use or consumption.

As listed in the US Department of Energy EPS Frequently Asked Questions, any external power supply that is of a type capable of operating a consumer product would be considered a covered product, without regard to whether that external power supply was in fact distributed in U.S. commerce to operate a consumer product. Only external power supplies that have identifiable design characteristics that would make them incapable of operating a consumer

product would be considered to not meet EPCA's definition of external power supply. For IBM Systems' Products, an EPS offered with a NEMA 5-15P or 5-20P wall plug would be considered a consumer product.

United States - California, Oregon, Rhode Island, New York, Arizona, Washington, Connecticut
"**State-regulated external power supply**" or "**single voltage external AC to DC power supply**" means a single-voltage external AC to DC or AC to AC power supply that:

(1) Is designed to convert line voltage AC input into lower voltage DC or AC output;
(2) Is able to convert to only one DC or AC output voltage at a time;
(3) Is sold with, or intended to be used with, a separate end-use product that constitutes the primary load;
(4) Is contained within a separate physical enclosure from the end-use product;
(5) Is connected to the end-use product via a removable or hard-wired male/female electrical connection, cable, cord, or other wiring;
(6) Does not have batteries or battery packs that physically attach directly (including those that are removable) to the power supply unit;
(7) does not have a battery chemistry or type selector switch and an indicator light; or, does not have a battery chemistry or type selector switch and a state of charge meter;
(8) Has a nameplate output power less than or equal to 250 watts.

Canada
External Power Supply (EPS) means a power supply device that

a. is designed to convert line voltage AC input to a lower voltage DC or AC output,
b. is able to convert to only one DC or AC output voltage at a time,
c. is designed to be used with a **household or office** end-use product that constitutes the primary load,
d. is encased in an enclosure separated from that end-use product and is connected to that product by an electrical connection, and
e. Has a nominal output power of 250 W or less.

An EPS does not include a device

a. that powers the charger of a detachable battery pack of an end-use product,
b. that charges the battery of an end-use product that is fully or primarily motor operated,
c. that is an accessory to a medical device as defined in section 1 of Canada Medical Devices Regulations, or
d. That is a power sourcing equipment as defined in IEEE 802.3-2008 Standard for Information Technology – Telecommunications and Information Exchange between Systems.

This scope is limited to EPSs designed for household and office end use. External power supplies used only internal to a rack system are out of scope.

Replacement External Power Supply means an external power supply that

a. is marked for replacement of a specified end-use product that was manufactured before July 1, 2010, and
b. Is imported or shipped in quantities of less than fifty units.

Korea
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.

EU, Switzerland, Liechtenstein, Norway, Jordan, and Turkey
External power supply – a device connected to an EMC classification of **Class B device** or a computer (as defined by EU Regulation 617/2013) 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) or with computers as defined in EU Regulation 617/2013.

For these countries, external power supplies used only internal to a rack system are out of scope.

Requirements by Jurisdiction

Jurisdiction	Marking	Efficiency[1] Requirements	Test Method[2]	Certification	Information required by IBM
Australia and New Zealand	Manufacturer name Model Number Date of Manufacture International Efficiency Marking Protocol, IV or higher, on product and packaging	Tier 2	AS/NZS 4665	Registration with government	A/NZ Test Report Copy of registration with government
United States, Federal regulations	Manufacturer name Model number Date of manufacture International Efficiency Marking Protocol on product, packaging or accompanying documentation	Tier 2 Beginning February 10, 2016 for Direct Operation External Power Supply: See efficiency section.	US EPA	Certified by manufacturer to US Department of Energy with test results and compliance statement	US Test Report Copy of certification
United States, state regulations	Manufacturer name Model number Date of Manufacture International Efficiency Marking Protocol (see Marking section) on product, packaging or accompanying documentation[5].	Tier 2 Beginning Feb 10, 2016 for Direct Operation External Power Supply: See efficiency section.	US EPA	Requirements vary by state, but typically include registration with the energy efficiency test report to verify IV mark	Energy Efficiency Test Report
Canada	Model number Mark of a Standards Council of Canada (SCC) accredited certification body or International Efficiency Marking Protocol IV or higher	See Efficiency Requirements section	CSA C381.1-08	Certification by accredited certification body[3]	Certification statement from accredited certification body Test results

Korea	Unique to Korea; see Marking section below	See Efficiency Requirements section	Unique to Korea; see Test Method section	Certification by accredited certification body[4]	Test report issued by one of the designated independent testing laboratories listed for Adapter/ Charger in Annex 4 of the regulation
EU, Jordan	CE mark, at least 5 mm high on the product, see Figure 10 Brand name Single Point of Contact address	See Efficiency Requirements section	EN 50563:2011 /A1: 2013	Self-certification	Technical documentation (dated and signed EPS test report) Declaration of Conformity See Required Documentation section below for more information

[1] See Efficiency Requirements section for more information.
[2] See Test Method section for more information.
[3] The manufacturer or the dealer of the External Power Supply must submit to Natural Resources Canada an energy efficiency report, which must include: product name, manufacturer name, brand name, model number, nominal output, in volts, at highest and lowest output setting, nominal output, in watts, at highest and lowest output setting, if applicable, whether the output is AC or DC, the average efficiency at highest and lowest output setting, no load power in watts, whether it is a replacement external power supply or a security EPS, if a replacement EPS or a security EPS, the end-use equipment and the brand and model number of that equipment, roman numeral mark, if applicable, whether the product bears a verification mark, name of the certification body associated with verifying the Roman numeral mark or that authorized the verification mark that appears on the product.
[4] e.g., Korea Testing Laboratory, EMC Research Institute, Telecommunications Technology Association or Korea Electric Testing Institute.
[5] Some states may require the mark to be on the product, with no allowance for the mark to be on the packaging. IBM recommends the mark be placed on the EPS product.

Efficiency Requirements

Tier 2 Efficiency requirements, see above table under Requirements by Jurisdiction

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

Korea
Adapters (external power supply without charging)

Minimum Energy Performance Standards for Adapters			
Minimum Energy Performance Standards (MEPS)			
Output power on name plate (P_{no})	**Running Efficiency (On mode energy efficiency)**	**Output power on name plate (P_{no})**	**Maximum Standby Power (Power consumption on No-Load Mode)**
$0<P_{no}\leq 1W$	$\geq 0.49 \times P_{no}$	$0<P_{no}<10W$	$\leq 0.5W$
$1W<P_{no}\leq 49W$	$\geq [0.09 \times \text{Ln}(P_{no})] + 0.49$		
$49W<P_{no}\leq 150W$	≥ 0.84	$10W\leq P_{no}<150W$	$\leq 0.75W$

Chargers (external power supply with charging function to charge Li Ion Battery)

Minimum Energy Performance Standards for Chargers	
Minimum Energy Performance Standards (MEPS)	
Measured Input Power(P_{in})	**Maximum Standby Power Power consumption on No-Load Mode**
$0<P_{in}<10W$	$\leq$0.5W
$10W\leq P_{in}\leq 20W$	$\leq$0.75W

Canada

Energy efficiency standard

External Power Supply Energy Efficiency Standard (not applicable to replacement EPS manufactured before July 1, 2013)		
Nameplate output (nominal power Ln)	**Minimum average efficiency in active mode** (decimal equivalent of a percentage)	**Maximum power in no-load mode** (not applicable to security EPS)
<1 watt	0.5 *Ln (nameplate output)	0.5 watt
≥1 watt and ≤51 watts	0.09*Ln (nameplate output) + 0.5	0.5 watt
>51 watts	0.85	0.5 watt

Where: Ln (nameplate output) = natural logarithm of the nameplate output, nameplate output is expressed in watts

EU

Newly releasing external power supplies (and previously released EPSs by April 6, 2011) must meet the following requirements:

1. The no-load condition power consumption shall not exceed the following limits:

	AC-AC EPSs, except low voltage EPSs	**AC-DC EPSs except low voltage EPSs**	**Low voltage EPSs**
$P_O \leq 51.0$ 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**
$P_O \leq 1.0$ W	$0.480 \cdot P_O + 0.140$	$0.497 \cdot P_O + 0.067$
1.0 W < $P_O \leq 51.0$ W	$0.063 \cdot \ln(P_O) + 0.622$	$0.075 \cdot \ln(P_O) + 0.561$
$P_O > 51.0$ W	0.870	0.860

United States – Federal and California

Beginning February 10, 2016: for **Direct Operation External Power Supply** Efficiency Standards

Single-voltage External AC-DC Power Supply, Basic Voltage		
Nameplate Output Power (Pout)	**Minimum Average Efficiency in Active Mode** ***(expressed as a decimal)***	**Maximum Power in No-Load Mode [W**
$P_{out} \leq 1$ W	$\geq 0.5 \times P_{out} + 0.16$	≤ 0.100
1 W < $P_{out} \leq$ 49 W	$\geq 0.071 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.67$	≤ 0.100
49 W < $P_{out} \leq$ 250 W	≥ 0.880	≤ 0.210
$P_{out} > 250$ W	≥ 0.875	≤ 0.500
Single-Voltage External AC-DC Power Supply, Low-Voltage		
Nameplate Output Power (Pout)	**Minimum Average Efficiency in Active Mode** ***(expressed as a decimal)***	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.087$	≤ 0.100
1 W < $P_{out} \leq$ 49 W	$\geq 0.0834 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.609$	≤ 0.100
49 W < $P_{out} \leq$ 250 W	≥ 0.870	≤ 0.210
$P_{out} > 250$ W	≥ 0.875	≤ 0.500

Single-Voltage External AC-AC Power Supply, Basic-Voltage		
Nameplate Output Power (Pout)	**Minimum Average Efficiency in Active Mode** ***(expressed as a decimal)***	**Maximum Power in No-Load Mode [W**
$P_{out} \leq 1$ W	$\geq 0.5 \times P_{out} + 0.16$	≤ 0.100
1 W < $P_{out} \leq$ 49 W	$\geq 0.071 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.67$	≤ 0.100
49 W < $P_{out} \leq$ 250 W	≥ 0.880	≤ 0.210
P_{out} > 250 W	≥ 0.875	≤ 0.500
Single-Voltage External AC-AC Power Supply, Low-Voltage		
Nameplate Output Power (Pout)	**Minimum Average Efficiency in Active Mode** ***(expressed as a decimal)***	**Maximum Power in No-Load Mode [W**
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.087$	≤ 0.100
1 W < $P_{out} \leq$ 49 W	$\geq 0.0834 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.609$	≤ 0.100
49 W < $P_{out} \leq$ 250 W	≥ 0.870	≤ 0.210
P_{out} > 250 W	≥ 0.875	≤ 0.500
Multiple-Voltage External Power Supply		
Nameplate Output Power (Pout)	**Minimum Average Efficiency in Active Mode** ***(expressed as a decimal)***	**Maximum Power in No-Load Mode [W**
$P_{out} \leq 1$ W	$\geq 0.497 \times P_{out} + 0.067$	≤ 0.300
1 W < $P_{out} \leq$ 49 W	$\geq 0.075 \times \ln(P_{out}) + 0.561$	≤ 0.300
$P_{out} \geq$ 49 W	≥ 0.860	≤ 0.300

Marking

United States Federal and California

Through February 9, 2016: Class A EPSs must have IV mark or higher, see International Efficiency Marking Protocol below.

Beginning February 10, 2016: US Federal EPS Marking Requirements by Product Class are:

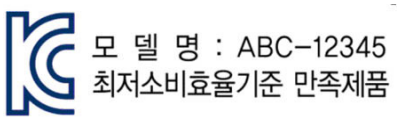
Class ID	Product Class	Marking Requirement
B	Direct Operation, AC-DC, Basic-Voltage	Roman numeral VI
C	Direct Operation, AC-DC, Low-Voltage	Roman numeral VI
D	Direct Operation, AC-AC, Basic-Voltage	Roman numeral VI
E	Direct Operation, AC-AC, Low-Voltage	Roman numeral VI
X	Direct Operation, Multiple-Voltage	Roman numeral VI
H	Direct Operation, High-Power	Roman numeral VI
N	Indirect Operation	Class A: Roman numeral IV or higher. Non-Class A: No marking requirement.

International Efficiency Marking Protocol

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. See International Efficiency Marking Protocol for further information: http://www.regulations.gov/#!documentDetail;D=EERE-2008-BT-STD-0005-0218.

Korea

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.



Korea Energy Label for Adapters and Chargers

Test Methods

US EPA "Test Method for Calculating the Energy Efficiency of Single-Voltage External AC-DC and AC-AC Power Supplies" dated August 11, 2004, except that the test voltage specified in Section 4(d) of the test method shall be only 115 volts, 60 Hz.

Korea Regulation on Energy Efficiency Labeling and Standards, Annex I, section 13.

EU Regulation EC No 278/2009, Annex I

Additional required documentation
EU, Jordan
The following documents must be provided to IBM in English, Romanian, and Turkish as well as other available languages:

1. Declaration of Conformity (DoC) to EU Regulations 1275/2008 and 278/2009 as required by EU Directive 2009/125/EC and Declaration of Conformity as required by JSNO 2111/2013 Technical Regulation on eco-design requirements for no-load condition electric power consumption and average active efficiency of external power supplies. The DoC must include:
   (1)Name and address of the manufacturer or of its authorized representative;
   (2)A description of the model sufficient for unambiguous identification;
   (3)Where appropriate, the references of the harmonized standards applied;
   (4)Where appropriate, the other technical standards and specifications used;
   (5)Where appropriate, the reference to other EU Community legislation providing for the affixing of the CE mark that is applied; and
   (6)Identification and signature of the person empowered to bind the manufacturer or its authorized representative.
2. The technical documentation (including a dated and signed test report) 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. This documentation must include a general description of the product and its intended use. In addition, the following is an example of the format of the technical documentation specifically for EPSs, from EU Commission Regulation No 278/2009:

Reported Quantity	Description
Root mean square (Rms) output current (mA)	Measured at load conditions 1-4
Rms output voltage (V)	
Active output power (W)	
Rms input voltage (V)	Measured at load conditions 1-5
Rms input power (W)	
Total harmonic distortion (THD)	
True power factor	
Power consumed (W)	Calculated at load condition 1-4, measured at load condition 5
Efficiency	Calculated at load conditions 1-4
Average efficiency	Arithmetic average of efficiency at load conditions 1-4

Percentage of nameplate output current	
Load condition 1	100 % ± 2 %
Load condition 2	75 % ± 2 %
Load condition 3	50 % ± 2 %

Load condition 4	25 % ± 2 %
Load condition 5	0 % (no-load condition)

Exemptions

Australia/New Zealand

An external power supply made available by a manufacturer directly to a consumer or service or repair facility after and separate from the original sale of the product requiring the EPS as a service part of spare part shall be exempt from meeting EMSP requirements until 5 years after implementation of the MEPS requirements.

United States

Class A EPSs must meet the energy requirements in the Tier 2 table above. Exceptions to this include EPSs which were:

- Manufactured during the period beginning on July 1, 2008, and ending on June 30, 2015; and
- Made available by the manufacturer as a service part or a spare part for an end-use product –
  - That constitutes the primary load; and
  - Was manufactured before July 1, 2008.

Canada

Replacement EPSs, which meet the definition above are exempt from MEPS until July 1, 2013, however, they must be registered prior to and reported at the time of import. Initial registration does not need to include an efficiency report, or any of the electrical parameters that would be required for production hardware. See the reporting requirements above for EPSs, the required elements for Replacement EPSs would include items (a) through (d) and (i) through (k). See reporting requirements as referenced in the Canada Energy Efficiency Regulations.

2.12.3 Laptops

Requirements for the EU, Switzerland, Liechtenstein, Norway, Jordan, Turkey, and other jurisdictions as applicable

References

EU Commission Regulation No 801/2013 of 22 August 2013 amending Regulation (EC) No 1275/2008 with regard to ecodesign requirements for standby, off mode electric power consumption of electrical and electronic household and office equipment

EU Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products

Jordan JSNO 2090/2013 Technical Regulation on eco-design requirements for energy related products

Jordan JSNO 2109/2013 Technical Regulation on eco-design requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment

See Section 2.12.14 for energy requirements for EMC Class B (in accordance with EN55022:2006+A1:2007 or EN55022:2010) equipment including external laptops.

2.12.4 Workstations

Requirements for the EU, Switzerland, Liechtenstein, Norway, Jordan, Turkey, and other jurisdictions as applicable

References

EU Commission Regulation No 801/2013 of 22 August 2013 amending Regulation (EC) No 1275/2008 with regard to ecodesign requirements for standby, off mode electric power consumption of electrical and electronic household and office equipment

EU Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products

Jordan JSNO 2090/2013 Technical Regulation on eco-design requirements for energy related products

Jordan JSNO 2109/2013 Technical Regulation on eco-design requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment

See Section 2.12.14 for energy requirements for EMC Class B (in accordance with EN55022:2006+A1:2007 or EN55022:2010) equipment including workstations.

2.12.5 Switches

Requirements for Japan

These requirements are from Japan Ordinance No. 39 of the Ministry of Economy, Trade and Industry (METI) amending the Japan Enforcement Regulation of the Law Concerning the Rational Use of Energy. English translation is not yet available from the Japan Ministry.

Definitions

Switch – Switching apparatus specified by a Cabinet Order set forth in Paragraph 1 of Article 78 of the Law shall be defined in Article 21 in Enforcement Ordinance of the Law Concerning the Rational Use of Energy as below:

(xxiii) Switching apparatus (referring to apparatus which transmit and receive telecommunication signals and are capable of selecting, in the transmission of telecommunication signals, such a path as is provided for in the preceding item (i) for each destination from among a plurality of paths through which the said apparatus may transmit telecommunication signals and of transmitting telecommunication signals to each destination through the said path selected (limited to such apparatus used exclusively for telecommunications via the Internet, excluding those capable of wireless communications and other matters specified by an Ordinance of the METI)).

The exclusion from application for switching apparatus prescribed by an Ordinance of the METI as set forth in Article 21, item (xxiii) of the Enforcement Order shall be as follows:

(i) Those which do not transmit or exchange any Ethernet frames;
(ii) Those which transmit and exchange Internet Protocol packets;
(iii) Those with connection ports for transmitting and/or receiving telecommunications signals, half or more of which use a two-wire connection mode;
(iv) Those designed to be capable of being incorporated into items such as a housing or computer;
(v) Those intended to control a device that wirelessly relays telecommunication signals;
(vi) Those intended mainly for use as a power supply, as specified by the Minister of Economy, Trade and Industry.

Requirements

Switch suppliers must provide to IBM the following information with respect to the energy efficiency ratio of an applicable Switch in order to meet the Japanese Energy Savings law:

(a) Product names, including manufacturer's name,
(b) Category letter and the Standard Energy Efficiency Ration,
(c) Line speed for a port during measurement and the number of ports per line speed,
(d) Maximum effective transmission speed at a frame length of 1,518 bytes,
(e) Maximum supply capability achieved by Power over Ethernet (limited to Switches with the Power over Ethernet function), and
(f) Energy efficiency ratio.

The above information must be included in a prominent location in a product catalog where either the performance of the Switch is indicated or in a document used for the selection of a Switch.

Requirements for the EU and other CE Marking jurisdictions

References

EU Commission Regulation No 801/2013 of 22 August 2013 amending Regulation (EC) No 1275/2008 with regard to ecodesign requirements for standby, off mode electric power consumption of electrical and electronic household and office equipment

EU Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products

Jordan JSNO 2090/2013 Technical Regulation on eco-design requirements for energy related products

Jordan JSNO 2109/2013 Technical Regulation on eco-design requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment

See Section 2.12.14 for further requirements for EMC Class B switches and routers which are not rack mounted.

2.12.6 Routers

Requirements for Japan
These requirements are from Japan Ordinance No. 39 of the METI amending the Japan Enforcement Regulation of the Law Concerning the Rational Use of Energy. English translation is not yet available from the Japan Ministry.

Definitions
Router – Router apparatus specified by a Cabinet Order set forth in Paragraph 1 of Article 78 of the Law shall be defined in Article 21 in Enforcement Ordinance of the Law Concerning the Rational Use of Energy as below:

(xxii) Routing apparatus (referring to apparatus which transmit and receive telecommunication signals and are capable of identifying, in the transmission of telecommunication signals, the path that is the most appropriate of the existing plurality of paths to the destination apparatus according to circumstances such as the conditions of the said paths, and of transmitting the said telecommunication signals through the said path identified as being the most appropriate (limited to such apparatus used exclusively for telecommunications transmission via the Internet, excluding those used for connecting a communication terminal to the Internet via a telephone line for the purpose of telephoning an Internet-access service provider to connect the said communication terminal to the Internet, and other matters specified by an Ordinance of the METI.))

Exclusions from application for the Routing apparatus prescribed by an Enforcement Regulation of the METI as set forth in Article 48, item (20) of the Enforcement regulations shall be as follows:
(i) Those which do not transmit or exchange Internet Protocol packets;
(ii) Those which transmit Internet Protocol packets at a speed, in terms of the maximum sum of signal bits of the said packets transmitted per unit time, in excess of 200 megabits per second (excluding those listed in item (vi));
(iii) Those equipped with a device intended for the use of Asynchronous Transfer Mode that cannot be easily removed;
(iv) Those with the capability to superimpose a high-frequency current of 10 kilohertz or higher upon a power line;
(v) Those with connection ports for transmitting and/or receiving telecommunication signals, at least three of which (excluding such connection ports which use Internet Protocol) are intended for transmitting and/or receiving audio signals;
(vi) Those which wirelessly transmit Internet Protocol packets at a speed, in terms of the maximum sum of signal bits of the said packets transmitted per unit time, in excess of 100 megabits per second;
(vii) Those with the capability to use an artificial satellite;
(viii) Those with the capability to multiplex and then transmit 53 subcarriers or more by an orthogonal frequency division multiplex system;
(ix) Those with the capability to set up a virtual closed network;
(x) Those designed to be capable of being incorporated into items such as a computer.

Requirements
Router suppliers must provide IBM the following information with respect to the energy efficiency ratio of an applicable Router to meet the Japanese Energy Savings law:
(a) Product names, including manufacturer's name,
(b) Category letter and the Standard Energy Efficiency Ratio,
(c) Availability of 2.4 GHz band wireless output power (for Routers falling under category C, limited to cases of 2.4 GHz band wireless transmission only or of simultaneous transmission of waves of the two frequency bands),

(d) Availability of 5 GHz band wireless output power (for Routers falling under Category C, limited to cases of 5 GHz band wireless transmission only or of simultaneous transmission of waves of the two frequency bands), and
(e) Energy efficiency ratio.

The above information must be included in a prominent location in a product catalog where either the performance of the Router is indicated or in a document used for the selection of a Router.

Requirements for the EU and other CE Marking jurisdictions

References

EU Commission Regulation No 801/2013 of 22 August 2013 amending Regulation (EC) No 1275/2008 with regard to ecodesign requirements for standby, off mode electric power consumption of electrical and electronic household and office equipment

EU Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products

Jordan JSNO 2090/2013 Technical Regulation on eco-design requirements for energy related products

Jordan JSNO 2109/2013 Technical Regulation on eco-design requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment

See Section 2.12.14 for further requirements for EMC Class B switches and routers which are not rack mounted.

2.12.7 Motors

Requirements for the USA

Small electric motors, as defined by 42 US Code 6291 (16) and US Code of Federal Regulations 10 CFR Part 431 must have an average full load efficiency as specified in 10 CFR 431.446.

Manufacturer of the motor must supply IBM with a copy of the tested motor's certification document from the certified testing agency.

Additionally, DOE regulates motors that meet all the following requirements:

(1) Is a single-speed, induction motor,
(2) Is rated for continuous duty (MG 1) operation or for duty type S1 (IEC),
(3) Contains a squirrel-cage (MG 1) or cage (IEC) rotor,
(4) Operates on polyphase alternating current 60-hertz sinusoidal line power,
(5) Is rated 600 volts or less,
(6) Has a 2-, 4-, 6-, or 8-pole configuration,
(7) Is built in a three-digit or four-digit NEMA frame size (or IEC metric equivalent), including those designs between two consecutive NEMA frame sizes (or IEC metric equivalent), or an enclosed 56 NEMA frame size (or IEC metric equivalent),
(8) Produces at least 1 horsepower (0.746 kW) but not greater than 500 horsepower (373 kW), and
(9) Meets all of the performance requirements of a NEMA Design A, B, or C motor or of an IEC Design N or H motor.

Definitions

Small electric motor means a National Electrical Manufacturers Association (NEMA) general purpose alternating current single-speed induction motor, built in a two-digit frame number series in accordance with NEMA Standards Publication MG1-1987 including IEC metric equivalent motors.

For more definitions of electric motors, see 10 CFR 431.12 Definitions.

The energy efficiency requirements take affect beginning March 9, 2015 and apply to small single phase and polyphase electric motors with a rating from ¼ to 3 horsepower (180 - 2.2kW). The regulatory requirements are effective on March 9th, 2017 for small electric motors which require listing or certification by a nationally recognized safety testing laboratory.

Energy Efficiency Requirements for small electric motors:

Motor horsepower/standard Kilowatt equivalent	Average full load efficiency Polyphase Open motors (number of poles) 6	4	2
0.25/0.18	67.5	69.5	65.6
0.33/0.25	71.4	73.4	69.5
0.5/0.37	75.3	78.2	73.4
0.75/0.55	81.7	81.1	76.8
1/0.75	82.5	83.5	77.0
1.5/1.1	83.8	86.5	84.0
2/1.5	N/A	86.5	85.5
3/2.2	N/A	86.9	85.5

Motor horsepower/standard Kilowatt equivalent	Average full load efficiency Capacitor-start capacitor-run and capacitor-start induction-run Open motors (number of poles) 6	4	2
0.25/0.18	62.2	68.5	66.6
0.33/0.25	66.6	72.4	70.5
0.5/0.37	76.2	76.2	72.4
0.75/0.55	80.2	81.8	76.2
1/0.75	81.1	82.6	80.4
1.5/1.1	N/A	83.8	81.5
2/1.5	N/A	84.5	82.9
3/2.2	N/A	N/A	84.1

Reference the following DOE web-site for more information:
http://www1.eere.energy.gov/buildings/appliance_standards/standards_test_procedures.html.

Energy efficiency requirements for electric motors meeting the above nine requirements can be found in 10 CFR Part 431 Energy Conservation Standards for Commercial and Industrial Electric Motors; Final Rule.

2.12.8 Water Pumps

Requirements for the EU, Norway, Turkey, and other jurisdictions as applicable

References

EU Commission Regulation (EC) No 547/2012 (implementing Directive 2009/125/EC of the European Parliament and of the Council) with regard to ecodesign requirements for water pumps.
EU Commission communication 2012/C 402/07.
EU Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products

Definitions

Water pump is the hydraulic part of a device that moves clean water by physical or mechanical action and is of one of the following designs:

- End suction own bearing (ESOB),
- End suction close coupled (ESCC),
- End suction close coupled inline (ESCCi),
- Vertical multistage (MS-V),
- Submersible multistage (MSS).

Clean water means water with a maximum non-absorbent free solid content of 0.25 kg/m ^{3}, and with a maximum dissolved solid content of 50 kg/m ^{3}, provided that the total gas content of the water does not exceed the saturation volume. Any additives that are needed to avoid water freezing down to – 10 °C shall not be taken into account.
Rotodynamic water pump means a water pump that moves clean water by means of hydrodynamic forces.

Requirements
Annex II of this Regulation sets out the efficiency and information requirements for rotodynamic water pumps. Manufacturers of rotodynamic water pumps must have a conformity assessment procedure and technical documentation as set out in the regulation. Manufacturers must place the technical documentation on a free access website. These pumps must be labeled in accordance with CE Marking requirements and a CE Declaration of Conformity (DoC) certificate must be provided to IBM in accordance with Annex VI of EU Directive 2009/125/EC of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products.

2.12.9 Fans

Requirements for the EU, Jordan, Norway, and other jurisdictions as applicable
References
EU Commission Regulation (EC) No 327/2011 (implementing Directive 2009/125/EC of the European Parliament and of the Council) with regard to ecodesign requirements **for fans driven by motors with an electric input power between 125 W and 500 kW.**
EU Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products
These regulations must be referenced to clarify details such as definitions, product information, measurements and calculations and methodology for calculating the target energy efficiency.
Jordan JSNO 2090/2013 Technical Regulation on eco-design requirements for energy related products
Jordan JSNO 2112/2013 Technical Regulation on eco-design requirements on eco-design requirements for fans

Definitions
Fan – means a rotary bladed machine that is used to maintain a continuous flow of gas, typically air, passing through it and whose work per unit mass does not exceed 25 kJ/kg, and which:

1. is designed for use with or equipped with an electrical motor with an electric input power between 125W and 500 kW ($\geq$ 125 W and $\leq$ 500 kW) to drive the impeller at its optimum energy efficiency point,
2. is an axial fan, centrifugal fan, cross flow fan or mixed flow fan,
3. May or may not be equipped with a motor when placed on the market or put into service.

More definitions, including those defining the fan type, can be found in the Regulation cited above. The regulation also further describes fans which are out of scope.

Fans placed on the market before January 1, 2015 as replacement for identical fans integrated into products which were placed on the market before January 1, 2013 are exempt. The packaging, product information, and technical documentation as required by the Regulation must clearly indicate this. Information must accompany these fans indicating that the fan shall only be used for the purpose for which it is intended.

Fans in scope of this regulation must meet the energy efficiency requirements in the table below. The efficiency requirements in the table below do not apply to fans which are designed to operate with an optimum energy efficiency at 8000 rotations per minute or more, or in applications in which the 'specific ratio' is over 1.11.

Minimum energy efficiency requirements for fans

Fan Types	Measurement category (A-D)	Efficiency category (static or total)	Power range P in kW	Target energy efficiency	Efficiency grade (N)
Axial Fan	A, C	Static	$0.125 \leq P \leq 10$	H target = $2.74 \cdot \ln(P) - 6.33 + N$	40
			$10 < P \leq 500$	H target = $0.78 \cdot \ln(P) - 1.88 + N$	
	B, D	Total	$0.125 \leq P \leq 10$	H target = $2.74 \cdot \ln(P) - 6.33 + N$	58
			$10 < P \leq 500$	H target = $0.78 \cdot \ln(P) - 1.88 + N$	
Centrifugal	A, C	Static	$0.125 \leq P \leq 10$	H target = $2.74 \cdot \ln(P) - 6.33 + N$	44

forward curved fan and centrifugal radial bladed fan			$10 < P \leq 500$	H target = $0.78 \cdot \ln(P) - 1.88 + N$	
	B, D	Total	$0.125 \leq P \leq 10$	H target = $2.74 \cdot \ln(P) - 6.33 + N$	49
			$10 < P \leq 500$	η target = $0.78 \cdot \ln(P) - 1.88 + N$	
Centrifugal backward curved fan without housing	A, C	Static	$0.125 \leq P \leq 10$	η target = $4.56 \cdot \ln(P) - 10.5 + N$	62
			$10 < P \leq 500$	η target = $1.1 \cdot \ln(P) - 2.6 + N$	
Centrifugal backward curved fan with housing	A, C	Static	$0.125 \leq P \leq 10$	η target = $4.56 \cdot \ln(P) - 10.5 + N$	61
			$10 < P \leq 500$	η target = $1.1 \cdot \ln(P) - 2.6 + N$	
	B, D	Total	$0.125 \leq P \leq 10$	η target = $4.56 \cdot \ln(P) - 10.5 + N$	64
			$10 < P \leq 500$	η target = $1.1 \cdot \ln(P) - 2.6 + N$	
Mixed flow fan	A, C	Static	$0.125 \leq P \leq 10$	η target = $4.56 \cdot \ln(P) - 10.5 + N$	50
			$10 < P \leq 500$	η target = $1.1 \cdot \ln(P) - 2.6 + N$	
	B, D	Total	$0.125 \leq P \leq 10$	η target = $4.56 \cdot \ln(P) - 10.5 + N$	62
			$10 < P \leq 500$	η target = $1.1 \cdot \ln(P) - 2.6 + N$	
Cross flow fan	B, D	Total	$0.125 \leq P \leq 10$	η target = $1.14 \cdot \ln(P) - 2.6 + N$	21
			$10 < P \leq 500$	η target = N	

Fans in scope of this regulation must have the following information visibly displayed in the technical documentation of the fan (in the order as below) and at a free access manufacturer's website:

1. overall efficiency (η), rounded to 1 decimal place,
2. measurement category used to determine the energy efficiency (A-D),
3. efficiency category (static or total),
4. efficiency grade at optimum energy efficiency point,
5. whether the calculation of fan efficiency assumed use of a variable speed drive (VSD) and if so, whether the VSD is integrated within the fan or the VSD must be installed with the fan,
6. year of manufacture,
7. manufacturer's name or trade mark, commercial registration number and place of manufacturer,
8. product's model number,
9. the rated motor power input(s) (kW), flow rate(s) and pressure(s) at optimum energy efficiency,
10. rotations per minute at the optimum energy efficiency point,
11. the 'specific ratio',
12. information relevant for facilitating disassembly, recycling or disposal at end-of-life,
13. information relevant to minimize impact on the environment and ensure optimal life expectancy as regards installation, use and maintenance of the fan, and
14. Description of additional items used when determining the fan energy efficiency such as ducts that are not described in the measurement category and not supplied with the fan.

A copy of the technical documentation must be provided to IBM.

Information from numbers 1, 2, 3, 4, and 5 above, must be durably marked on or near the rating plate of the fan. For number 5, the following forms of words must be used where applicable:

1. 'A variable speed drive must be installed with this fan'
2. 'A variable speed drive is integrated within the fan'.

Manufacturers will provide information in the manual of instruction on specific precautions to be taken when fans are assembled, installed or maintained. If number 5 above indicates that a VSD must be installed with the fan, manufacturers must provide details on the characteristics of the VSD to ensure optimal use.

Fans in scope of this regulation and in conformance must bear the CE mark, as shown in Annex III of Directive 2009/125/EC (example in Figure 10 of this specification). This includes the manufacturers name, address, single

point of contact, product identification number, and year of manufacture. The manufacture must provide IBM a Declaration of Conformity and maintain Technical Documentation in accordance with

- Annex VI of EU Directive 2009/125/EC and
- Jordan Technical Regulation on eco-design requirements for energy related Products JSNO 2090 and Technical Regulation on Ecodesign Requirements for Fans JSNO 10152

Requirements for Ecuador

References

Ecuador Resolution No. 14 403 Technical Regulation RTE INEN 138 "Energy Efficiency for fans with m**otors of input power between 125 W and 500 kW.**

Requirements

Fans, shipping stand-alone not installed in a product, released by or for IBM after October 2, 2014, with motors of input power between 125 W and 500 kW must meet the energy efficiency requirements of Ecuador Resolution No. 14 403.

The following information must be in Spanish and visible in the technical documentation of the fan and at a free access web page of the fan manufacturer.

1. overall efficiency (η), rounded to 1 decimal place,
2. measurement category used to determine the energy efficiency (A-D),
3. efficiency category (static or total),
4. efficiency grade at optimum energy efficiency point,
5. whether the calculation of fan efficiency assumed use of a variable speed drive (VSD) and if so, whether the VSD is integrated within the fan or the VSD must be installed with the fan,
6. year of manufacture,
7. manufacturer's name or trade mark, commercial registration number and place of manufacturer,
8. product model number,
9. the rated motor power input(s) (kW), flow rate(s) and pressure(s) at optimum energy efficiency,
10. rotations per minute at the optimum energy efficiency point,
11. the 'specific ratio',
12. information relevant for facilitating disassembly, recycling or disposal at end-of-life,
13. information relevant to minimize impact on the environment and ensure optimal life expectancy as regards installation, use and maintenance of the fan, and
14. Description of additional items used when determining the fan energy efficiency such as ducts that are not described in the measurement category and not supplied with the fan.

Manufacturers will provide information in the instruction manual on specific precautions to be taken when fans are assembled, installed or maintained. If number 5 above indicates that a VSD must be installed with the fan, manufacturers must provide details on the characteristics of the VSD to ensure optimal use.

2.12.10 Modems

Requirements for Korea

Definitions

Modem – Modulator-demodulator. Device with nameplate output power of power supply less than or equal to 150W, that enables data transmission from computers or terminals of communication devices over cable lines. The application scope is limited to external modems with their own power supply device, separated from computer or communication terminals.

Requirements

The manufacturer of the modem shall provide IBM with a test report issued by one of the designated testing institutes in Annex IV of the regulation (e.g., Korea Testing Certification, Korea Electric Testing Institute, Korea Electrotechnology Research Institute, Telecommunications Technology Association) in order for IBM to submit

Form A (found in the regulation) along with the issued test report to the Korea Energy Management Corporation (KEMCO).

Modems must be labeled according to Annex V of the Korean Regulation on Standby Power Reduction Program with a warning logo if they do not meet the requirements in the following table:

Low Power Mode Performance Requirements

Category	Standby Power mode (W)	Off mode(W)
xDSL Modem	≤2.0W	≤ 0.75W
Cable Modem	≤5.0W	≤ 0.75W

Peripheral device (excluding basic Modem components)	Allowable Standby Power mode (W)	Off mode(W)
Multi-port Modem	≤1.0W	-
Wireless LAN AP	≤5.0W	-

Figure 9 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 or the nameplate of the product where it is visually easy to find. The logo may be monochrome, the predominant color of the product's surface, or in the colors suggested by the Korean e-Standby Regulation.

Requirements for the EU, Switzerland, Liechtenstein, Norway, Turkey, and other jurisdictions as applicable
References
EU Commission Regulation No 801/2013 of 22 August 2013 amending Regulation (EC) No 1275/2008 with regard to ecodesign requirements for standby, off mode electric power consumption of electrical and electronic household and office equipment
EU Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products
Jordan JSNO 2090/2013 Technical Regulation on eco-design requirements for energy related products
Jordan JSNO 2109/2013 Technical Regulation on eco-design requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment

See Section 2.12.14 for energy requirements for EMC Class B (in accordance with EN55022:2006+A1:2007 or EN55022:2010) equipment including modems.

2.12.11 Battery Chargers (including Battery Back-up Units and Uninterruptible Power Supplies)

Requirements for California, Oregon and British Columbia
References
California Energy Commission Appliance Efficiency Regulations
See regulations for additional definitions and effective dates.
Oregon Act relating to minimum energy efficiency standards 2013
British Columbia Energy Efficiency Act, Standards for Small Battery Charging Systems

Definitions
À la carte charger means a battery charger that is individually packaged without batteries. À la carte chargers include those with multi‐voltage or multi‐port capability.
Battery backup or uninterruptible power supply charger (UPS) means a small battery charger system that is voltage and frequency dependent (VFD) and designed to provide power to an end use product in the event of a power outage, and includes a UPS as defined in IEC 62040‐3 ed.2.0. The output of the VFD upon which the UPS is dependent changes in AC input voltage and frequency and is not intended to provide additional corrective functions, such as those relating to the use of tapped transformers.
Battery charger system (BCS) means a battery charger coupled with its batteries or battery chargers coupled with their batteries, which together are referred to as battery charger systems. This term covers all rechargeable batteries

or devices incorporating a rechargeable battery and the chargers used with them. Battery charger systems include, but are not limited to:
(1) Electronic devices with a battery that are normally charged from ac line voltage or dc input voltage through an internal or external power supply and a dedicated battery charger;
(2) The battery and battery charger components of devices that are designed to run on battery power during part or all of their operations;
(3) Dedicated battery systems primarily designed for electrical or emergency backup; and
(4) Devices whose primary function is to charge batteries, along with the batteries they are designed to charge. These units include chargers for power tool batteries and chargers for automotive, AA, AAA, C, D, or 9 V rechargeable batteries, as well as chargers for batteries used in larger industrial motive equipment and à la carte chargers.
The charging circuitry of battery charger systems may or may not be located within the housing of the end-use device itself. In many cases, the battery may be charged with a dedicated external charger and power supply combination that is separate from the device that runs on power from the battery**.**
Except those:
(1) Used to charge a motor vehicle that is powered by an electric motor drawing current from rechargeable storage batteries, fuel cells, or other portable sources of electrical current, and which may include a nonelectrical source of power designed to charge batteries and components thereof. This exception does not apply to autoettes, electric personal assistive mobility devices, golf carts, or low speed vehicles, as those vehicles are defined in Division 1 of the California Vehicle Code;
(2) That are classified as Class II or Class III devices for human use under the Federal Food, Drug, and Cosmetic Act and require U.S. Food and Drug Administration listing and approval as a medical device;
(3) Used to charge a battery or batteries in an illuminated exit sign, as defined in Section 1602(l);
(4) with input that is three phase of line - to - line 300 volts root mean square or more and is designed for a stationary power application;
(5) That are battery analyzers; or
(6) That are voltage independent or voltage and frequency independent uninterruptible power supplies (UPS) as defined by International Electrotechnical Commission (IEC) 62040 - 3 ed.2.0.
Inductive charger system means a small battery charger system that transfers power to the charger through magnetic or electric induction.
Large battery charger system means a battery charger system (other than a battery charger system for golf carts) with a rated input power of more than 2 kW.
Small battery charger system means a battery charger system with a rated input power of 2 kW or less, and includes golf cart battery charger systems regardless of the output power.
USB charger system means a small battery charger system that uses a Universal Serial Bus (USB) connector as the only power source to charge the battery, and is packaged with an external power supply rated with a voltage output of 5 volts and a power output of 15 watts or less.

Requirements
Large Battery Charger Systems manufactured on or after January 1, 2014 shall meet the performance values in Table W-1 of the California Energy Commission Appliance Efficiency Regulations.

The following Small Battery Charger Systems shall meet the applicable performance values in Table W-2 of the California Energy Commission Appliance Efficiency Regulations:

- consumer products that are not USB charger systems with a battery capacity of 20 watt - hours or more, and are manufactured on or after February 1, 2013;
- consumer products that are USB charger systems with a battery capacity of 20 watt - hours or more and are manufactured on or after January 1, 2014; and
- Those that are not consumer products and are manufactured on or after January 1, 2017.

Exceptions to these Small Battery Charger requirements are à la carte chargers that are:
A. provided separately from and subsequent to the sale of a small battery charger system manufactured before the effective date of the applicable standard in Section 1605.3(w) (2);
B. necessary as a replacement for, or as a replacement component of, such small battery charger system;
C. is provided by a manufacturer directly to a consumer or to a service or repair facility; and

D. is manufactured no more than five years after the effective date in Section 1605.3(w)(2) applicable to the particular small battery charger system for which the à la carte charger is intended as a replacement or replacement component,

A la carte chargers shall not be required to meet the applicable standard in Section 1605.3(w)(2) and Table W‑2. 14 of the California regulations.

Inductive charger systems manufactured on or after February 1, 2013, shall meet either the applicable performance standards in Table W−2 or shall use less than 1 watt in maintenance mode, less than 1 watt in no battery mode, and an average of 1 watt or less over the duration of the charge and maintenance mode test.

Battery Backup and Uninterruptible Power Supplies manufactured on or after February 1, 2013, for consumer products and January 1, 2017, for products that are not consumer products shall consume no more than 0.8+0.0021 x E_b watts in maintenance mode where E_b is the battery capacity in watt‑hours.

The appliances must be tested in accordance with Sections 1603 and 1604 of the California Energy Commission Appliance Efficiency Regulations at an approved test laboratory or an approved industry certification program.

The manufacturer must file a statement with the California Executive Director for each appliance sold or offered for sale in California in accordance with Section 1606 of the California Energy Commission Appliance Efficiency Regulations. Certification information is pending from the State of California, but will include the following:

- Enter data results from the test into an Excel file formatted for uploading into the Energy Commission's Appliance Efficiency Database.
- Fill out and sign a declaration form. This form must record the contact information for the manufacturer and test laboratory along with a statement that all of the submitted information is true, accurate, and in compliance with the law.
- E-mail data file and a scan of the signed declaration to the Energy Commission. If needed, include a test laboratory approval application for the test laboratory used.

Effective dates of this regulation vary, please see regulation for details. The following are some effective dates:

- Most small consumer charger systems manufactured on or after February 1, 2013;
- Large battery charger systems and certain USB-based small consumer charger systems manufactured on or after January 1, 2014; and
- Non-consumer charger systems manufactured on or after January 1, 2017.

Each battery charger systems shall be marked with a “BC” inside a circle. The marking shall be legible and permanently affixed to:
(A) The product nameplate that houses the battery charging terminals, or;
(B) The retail packaging and, if included, the cover page of the instructions.
Examples of the compliance label:

2.12.12 Computers, Small Scale Servers, Servers, Storage Products, and peripherals

Requirements for Mexico

Definitions

Equipment and Appliances means products cited in the Mexico Catalog of Equipment and Appliances, for which Manufacturers, Importers, Distributors and Marketers, must include information regarding their energy consumption. Examples applicable for IBM products include power strips, cash registers, battery chargers, laptop chargers, portable computers (laptops and notebooks), switches, portable hard drives, scanners, workstations,

external AC-DC power adapters, commercial LEDs, multifunctional devices, computer monitors, routers, servers, backup power systems, and hand drills.
Specialized products means equipment, spare parts, accessories and additions, that are not sold to the general public, but to a specific client due to its level of technical specialization, and which are set up considering the requirements and specifications of the customer; in addition, the entities requiring this kind of equipment shall previously get from their supplier(s) the features of any such equipment, including energy consumption.

Requirements
Equipment and Appliances must contain, in a clear and visible manner, basic information (in Spanish) regarding:
1. The energy consumption per unit of time in operation;
2. The energy consumption in standby mode, per unit of time, if applicable; and
3. The quantity of product or service provided by the equipment or appliance, per unit of energy consumed.

Products which do not meet the definition of Specialized products must be labeled (in Spanish) with the above energy consumption and quantity of service provided per unit of energy consumed.

Requirements for Australia and New Zealand
References
Australia Greenhouse and Energy Minimum Standards Act 2012
Australia Greenhouse and Energy Minimum Standards (Computers) Determination 2013
AS/NZS 5813.1 - Information technology equipment –Energy performance of computers Part 1: Methods of measurement of energy performance.
AS/NZS 5813.2– Information technology equipment –Energy performance of computers Part 2: Minimum energy performance standards (MEPS) for computers.
Additional details are located at:
http://www.energyrating.gov.au/wp-content/uploads/Energy_Rating_Documents/Fact_Sheets/Office_Equipment/Computers_and_Peripherals/computer-meps-factsheet.pdf.

Definitions
Computer means a device which performs logical operations and processes data and which, at a minimum, is composed of a central processing unit to perform operations; support for user input devices such as a keyboard, mouse, digitizer or game controller; and an integrated display screen or the ability to support an external display screen to output information or both. This includes desktop computers, integrated desktop computers, notebook computers, tablet computers, and small-scale servers. Products not covered by this requirement include hand-held computing devices, game consoles, handheld gaming devices, blade personal computers, workstations, mobile workstations, computer servers that are not small-scale servers, slate computers, thin client computers, and high-end Category D computers (which include computers with four or more physical processor cores; and a discrete GPU greater than or equal to category G5 with a data width greater than or equal to 192 bits; and system memory greater than or equal to 6 gigabytes; and greater than or equal to two channels of memory; and greater than or equal to 2 PICEs slot single-ended points of x8 or x16 configuration; and a power supply unit of greater than or equal to 500W nameplate output rating.
Small-scale server is a computer which is designed to be a storage host for other computers; is marketed for home or small office use; uses a desktop computer form factor and includes all data processing, storage and network components in the one form factor; is designed to be operational at all times and to have little or no unscheduled downtime; and is capable of operating in a simultaneous multi-user environment serving several users through networked client units.

Requirements
Computers must comply with the Minimum Energy Performance Standards (MEPS) as set out in AS/NZS 5813.1 and 5813.2 and be tested in accordance with these standards. These computers must be registered in Australia and New Zealand.

Requirements for the EU and other CE Marking jurisdictions

References

EU Commission Regulation No 617/2013 of 26 June 2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for computers and computer servers
EU Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products

Definitions

Computer servers: a computing product that provides services and manages networked resources for client devices, such as desktop computers, notebooks computers, desktop thin clients, internet protocol (IP) telephones, or other computer servers. A computer server is typically placed on the market for use in data centers and office/corporate environments. A computer server is primarily accessed via network connections, and not through direct user input devices such as a keyboard or a mouse. A computer server has the following characteristics:

a. is a designed to support computer server operating systems (OS) and/or hypervisors, and targeted to run user-installed enterprise applications;
b. supports error-correcting code (ECC) and/or buffered memory (including both buffered dual in-line memory modules (DIMMS) and buffered on board (BOB) configurations)
c. is placed on the market with one or more AC-DC power supplies
d. All processors have access to shared system memory and are independently visible to a single OS hypervisor.

This Regulation shall not apply to the following product groups:
(a) Blade system and components;
(b) Server appliances;
(c) Multi-node servers;
(d) Computer servers with more than four processor sockets;
(e) Game consoles;
(f) Docking stations.

Beginning July 1, 2014, computer server power supplies must meet the following efficiency requirements. These requirements are similar to 80Plus Silver.

Single Output AC-DC power supply	<500W		500W - 1000W		>1000W	
Load	Efficiency	Power Factor	Efficiency	Power Factor	Efficiency	Power Factor
10%	70%	-	75%	0.65	80%	0.8
20%	82%	0.8	85%	0.8	88%	0.9
50%	89%	0.9	89%	0.9	92%	0.9
100%	85%	0.95	85%	0.95	88%	0.95

Multi-output (AC-DC) power supplies shall not perform at less than:
(a) 85 % efficiency at 50 % of rated output;
(b) 82 % efficiency at 20 % and 100 % of rated output, and

(a) Power factor 0.8 at 20 % of rated output;
(b) Power factor 0.9 at 50 % of rated output;
(c) Power factor 0.95 at 100 % of rated output.

Additionally beginning July 1, 2014, the following information will need to be **provided by the manufacturer and publicly available on a free-access website**:

a. Product type (such as computer server);
b. manufacturer's name and address at which they can be contacted;
c. product model number;
d. year of manufacture;
e. internal/external power supply efficiency;
f. test parameters for measurements:

- test voltage in V and frequency in Hz,
- total harmonic distortion of the electricity supply system,
- Information and documentation on the instruments, set-up and circuits used for electrical testing.

g. maximum power (Watts);
h. idle state power (Watts);
i. sleep mode power (Watts);
j. off mode power (Watts);
k. noise levels (the declared A-weighted sound power level of the computer);
l. The measurement methodology used to determine information mentioned in points (e) to (k).

If a product model is placed on the market in multiple configurations the product information required above may be reported once per product category, for the highest power-demanding configuration available within that product category. A list of all model configurations that are represented by the model for which the information is reported shall be included in the information provided.

Computer servers shall be labeled in accordance with CE marking requirements in EU Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products. This marking includes the CE mark (minimum height of 5mm), manufacturer's name, single point of contact, and date of manufacture in a human readable format. An EC Declaration of Conformity must be provided to IBM by the manufacturer of the computer server in accordance to the above Directive. The manufacturer must maintain the Technical Documentation per the requirements in the above Directive.

Additional Requirements for Original Equipment Manufacturer (OEM) designed servers with an IBM logo

References

ENERGY STAR® Program Requirements for Computer Server Version 2.0
80 PLUS® performance specification
American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments, 3rd Edition.

Definitions

Computer server: Computer servers provide services and manage networked resources for client devices (e.g., desktop computers, notebook computers, thin clients, wireless devices, PDAs, IP telephones, other computer servers, or other network devices). A computer server is sold through enterprise channels for use in data centers and office/corporate environments. A computer server is primarily accessed via network connections, versus directly-connected user input devices such as a keyboard or mouse. For purposes of this requirement, a computer server must meet all of the following criteria:
– Is marketed and sold as a computer server;
– Is designed for and listed as supporting one or more computer server operating systems (OS) and, or hypervisors;
– Is targeted to run user-installed applications typically, but not exclusively, enterprise in nature;
– Provides support for error-correcting code (ECC) and, or buffered memory (including both buffered dual in-line memory modules (DIMMs) and buffered on board (BOB) configurations);
– Is packaged and sold with one or more AC-DC or DC-DC power supplies; and
– Is designed such that all processors have access to shared system memory and are visible to a single OS or hypervisor.
In addition to the above, the definition of Computer servers, for the purposes of this section, is given in the ENERGY STAR Program Requirements for Computer Servers Version 2.0: blade, multi-node, rack-mounted, or pedestal form factor computer servers are included with no more than four processor sockets in the computer server (or per blade or node in the case of blade or multi-node servers).
Server Appliance: A computer server that is bundled with a pre-installed OS and application software that is used to perform a dedicated function or set of tightly coupled functions. Server appliances deliver services through one or more networks (e.g., IP or SAN), and are typically managed through a web or command line interface. Server appliance hardware and software configurations are customized by the vendor to perform a specific task (e.g., name

services, firewall services, authentication services, encryption services, and voice-over-IP (VoIP) services), and are not intended to execute user-supplied software.

Requirements
Computer servers designed by an OEM which will have an IBM logo or a logo owned by IBM must design the product to conform to the latest level of the ENERGY STAR® Program Requirements for Computer Servers. As of the time of publication of this specification the latest level is Version 2.0. Note: Server Appliances are exempt from this requirement.

The power supplies in the product must be rated through the 80 Plus program and listed in the 80 Plus Program and on the 80 Plus® website http://www.plugloadsolutions.com/80PlusPowerSupplies.aspx. It is preferable that Multi-Output power supplies in an OEM designed Computer Server are tested and certified as meeting the 80 PLUS® Gold requirements or higher. A test report from an independent, third-party laboratory demonstrating conformance with 80 PLUS® Gold requirements or higher is required.

Computer servers designed by an OEM must support the Class A1 allowable environmental operating range published in the American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments, 3rd Edition, in Table 2.3, on a continuous basis.

2.12.13 Lamps

Requirements for the EU and other CE Marking jurisdictions
References
EU Regulation No 1194/2012 for ecodesign requirements for directional lamps, light emitting diode lamps and related equipment
EU Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products
EU Commission Regulation 2015/1428 of 25 August 2015 amending Commission Regulation (EC) No 244/2009 with regard to ecodesign requirements for non-directional household lamps and Commission Regulation (EC) No 245/2009 with regard to ecodesign requirements for fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaires able to operate such lamps and repealing Directive 2000/55/EC of the European Parliament and of the Council and Commission Regulation (EU) No 1194/2012 with regard to ecodesign requirements for directional lamps, light emitting diode lamps and related equipment

The electrical lighting products listed below must meet the requirements set out in Annex III of EU Regulation No 1194/2012 and Annex II of EU Regulation 2015/1428 except if they are special purpose products:
(a) Directional lamps;
(b) Light-emitting diode (LED) lamps;
(c) equipment designed for installation between the mains and the lamps, including lamp control gear, control devices and luminaires (other than ballasts and luminaires for fluorescent and high-intensity discharge lamps);
Including when they are integrated into other products.

Definitions
Special purpose product means a product that uses the technologies covered by this Regulation but is intended for use in special applications because of its technical parameters as described in the technical documentation. Special applications are those that require technical parameters not necessary for the purposes of lighting average scenes or objects in average circumstances. They are of the following types:
(a) Applications where the primary purpose of the light is not lighting, such as:
  (i) Emission of light as an agent in chemical or biological processes (such as polimerisation, ultraviolet light used for curing/drying/hardening, photodynamic therapy, horticulture, petcare, anti- insect products);
  (ii) Image capture and image projection (such as camera flashlights, photocopiers, video projectors);
  (iii) Heating (such as infrared lamps);
  (iv) Signaling (such as traffic control or airfield lamps);
(b) Lighting applications where:

(i) the spectral distribution of the light is intended to change the appearance of the scene or object lit, in addition to making it visible (such as food display lighting or coloured lamps as defined in point 1 of Annex I), with the exception of variations in correlated colour temperature; or
(ii) the spectral distribution of the light is adjusted to the specific needs of particular technical equipment, in addition to making the scene or object visible for humans (such as studio lighting, show effect lighting, theatre lighting); or
(iii) The scene or object lit requires special protection from the negative effects of the light source (such as lighting with dedicated filtering for photosensitive patients or photosensitive museum exhibits); or
(iv) Lighting is required only for emergency situations (such as emergency lighting luminaires or control gears for emergency lighting); or
(v) The lighting products have to withstand extreme physical conditions (such as vibrations or temperatures below – 20 °C or above 50 °C);

Other relevant definitions can be found in the regulations.

Manufacturers of these lamps must have a conformity assessment procedure as required by the regulation. The lamps must be marked in accordance with CE marking requirements. The manufacturer must provide IBM with a CE Declaration of Conformity and Technical Documentation in accordance with Annex VI of EU Directive 2009/125/EC of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products.

Special purpose products shall comply with the information requirements set out in Annex I of EU Regulation 1194/2012 and Annex II of EU Regulation 2015/1428.

2.12.14 EMC Class B Equipment

Requirements for the EU and other CE Marking jurisdictions
References
EU Regulation 1275/2008 for ecodesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment
EU Commission Regulation No 801/2013 of 22 August 2013 amending Regulation (EC) No 1275/2008 with regard to ecodesign requirements for standby, off mode electric power consumption of electrical and electronic household and office equipment, and
EU Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products
Jordan JSNO 2090/2013 Technical Regulation on eco-design requirements for energy related products
Jordan JSNO 2109/2013 Technical Regulation on eco-design requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment

This section applies to Energy Related Products (ERP) including information technology equipment intended primarily for use in the domestic environment. Products in Annex I of the regulation include information technology equipment intended primarily for use in the domestic environment which means products classified as EMC Class B per EN 55022:2006+A1:2007 or EN 55022:2010 in EU Directive 89/336/EEC for Electromagnetic Compatibility (EMC). Examples of products which may be classified as EMC Class B include monitors, workstations, laptops, routers, switches and other networked equipment.

This regulation excludes desktop computers, integrated desktop computers and notebook computers as defined in EU Regulation 617/2013 (see Annex I of EU Regulation No 1275/2008 and amendment in Article 4 of EU Regulation 617/2013) and Class B equipment placed on the market with a low voltage external power supply ($\leq$ 250 volts) to work as intended (EPSs are regulated by EU Regulation (EC) No 278/2009 Ecodesign requirements for no-load condition electric power consumption and average active efficiency of external power supplies).

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

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

Networked equipment means equipment that can connect to a network and has one or more network ports.

Networked equipment with high network availability (HiNA equipment) means equipment with one or more of the following functionalities, but no other, as the main function(s): router, network switch, wireless network access point, hub, modem, VoIP telephone, video phone.

Networked equipment with high network availability (HiNA) functionality means equipment with the functionality of a router, network switch, wireless network access point or combination thereof included, but not being HiNA equipment.

Router means a network device whose primary function is to determine the optimal path along which network traffic should be forwarded. Routers forward packets from one network to another, based on network layer information (L3).

Network switch means a network device whose primary function is to filter, forward and distribute frames based on the destination address of each frame. All switches operate at least at the data link layer (L2).
For a complete list of definitions, please refer to the EU Regulation cited above.

For this regulation, the terms ‘router’ and ‘switch’ do not apply to products mounted in a rack for use in a data center.

Requirements
Electronic equipment, such as monitors, workstations and laptops which are EMC Class B Information Technology equipment as defined in EN 55022:2006+A1:2007 or EN 55022:2010 and newly releasing must meet the following requirements:

1. Power consumption in off-mode shall not exceed 0.50 W,
2. Power consumption in standby mode with a reactivation function shall not exceed 0.50 W,
3. Power consumption in standby mode providing only information or status display shall not exceed 1.00 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. The power management function shall be activated before delivery to IBM.

In addition, as of January 1, 2015,
1.Any Class B networked equipment shall offer a power management function, unless the Class B networked equipment is intended for data center use.
2.Specifically, any Class B HiNA equipment or equipment with HiNA functionality's power consumption in a condition providing networked standby into which the equipment is switched by the power management function shall not exceed 12W.

As of January 1, 2017, those pieces of equipment that apply to the requirements of Jan 1 2015 above must also
1.comply with the standby requirements when all wired network ports are disconnected and when all wireless network ports are deactivated
2.any equipment with HiNA functionality in networked standby shall not exceed 8W
3.all other networked equipment networked standby power shall not exceed 3W

Labeling and Documentation

PN 46G3772 Page 82 of 120	EC 899569 04NOV93	EC 899773 07DEC94	EC F15040 25AUG97	EC F73298 02SEP99	EC F74336 05SEP00	EC F72950 23JAN02	EC H64064 13MAY03	EC H17205 29JUL03
EC J85151 13MAY05	EC G32590 08FEB06	EC L04925B 11JAN07	EC L04925M 01AUG07	EC L04925N 19FEB08	EC L05962X 08AUG08	EC L79598 25FEB09	EC N24534E 02OCT09	EC L79598A 22FEB10
EC L79598B 22SEPT10	EC L79598C 27APR2011	EC L79598D 6SEPT2011	EC N31517Y 26MAR2012	ECN31946T 19APR2013	ECN33076 5DEC2013	ECN33076A 16MAY2014	ECN46883 17OCT2014	ECP02692 26MAY2015
ECO P02838 15OCT2015								

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

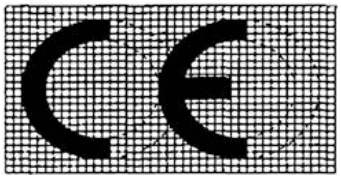


Figure 10. Example of CE conformity marking.

The following technical documents must be provided to IBM:
A.Declaration of Conformity (DoC) to EU Regulation 1275/2008 in accordance with Annex VI of EU Directive 2009/125/EC of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products and a Declaration of Conformity for compliance with Jordan JSNO 2090/2013 Technical Regulation on eco-design requirements for energy related products and Jordan JSNO 2109/2013 Technical Regulation on eco-design requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment. 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; and
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. For Israel, testing must be conducted at an approved testing facility in Israel and the results provided to IBM.

The above DoC and technical documentation must be provided in English, and other available languages such as Romanian, Turkish and Hebrew.

As of Jan 1, 2015, the following information for **networked equipment** shall be visibly displayed on the manufacturer's website:

- for each standby and/or off mode and the condition providing networked standby into which the equipment is switched by the power management function or similar function
  - the power consumption data in Watts rounded to the first decimal place
  - the period of time after which the power management function, or a similar function, switches the equipment automatically into standby and/or off mode and/or the conditions providing networked standby
- the power consumption of the product in networked standby if all wired network ports are connected and all wireless network ports are activated
- guidance on how to activate and deactivate wireless network ports

2.13 Requirements for Product Take-Back

This section applies to Products which have a logo or brand other than IBM and are not included inside an IBM branded product. For example, this section applies to monitors and laptops, which do not have an IBM logo, but rather a vendor logo. Products, such as these, must have product take-back programs in place in the jurisdictions

where required, financed and maintained by the vendor whose logo appears on the Product. Contact your IBM representative with questions and details about applicability.

2.14 Requirements for RoHS

References (limited list of jurisdictions requiring RoHS compliance)
EU Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast)
EU Decision No 768/2008/EC of the European Parliament and of the Council of 9 July 2008 on a common framework for the marketing of products
EN 50581: 2012 Technical Documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

2.14.1 Restrictions

See IBM Product specifications 53P6233 and 97P3864 for details about material restrictions, allowable finishes and exemptions. See Table 1 in this specification for additional details about material restrictions.

2.14.2 Definitions

Electrical and electronic equipment (EEE) means equipment which is dependent on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such currents and fields and designed for use with a voltage rating not exceeding 1000 volts for alternating current and 1500 volts for direct current. This definition is from EU Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances (RoHS) in electrical and electronic equipment (recast).
Finished Product, for the purposes of this specification, Finished Product means any stand alone, final assembly in any form factor, including standalone, rack-mount and tower. Examples of stand-alone, final assemblies include, but are not limited to:

Displays/ Monitors	Keyboards	Servers
Electrical tools	Mice	Smart Card Readers
External storage drives	Power distribution units	Storage products
External memory keys/flash drives	Printers	Switches
External modems	Racks	Workstations
External power supplies	Routers	

Manufacturer means any natural or legal person who manufactures an EEE or who has an EEE designed or manufactured and markets it under his name or trademark. This definition is from EU Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast).

2.14.3 Requirements for Finished Products

All EEE must meet Article 7 of EU Directive 2011/65/EU RoHS. Refer to the Directive for further details.

Documentation
Manufacturers must have in place technical documentation as required by Article 7 and carry out the internal production control procedure in line with module A of Annex II to Decision No 768/2008/EC. Manufacturers must ensure that procedures are in place for series production to remain in conformity. Changes in product design or characteristics and changes in the harmonized standards or in technical specifications by reference to which conformity of EEE is declared shall be adequately taken into account. Technical Documentation must be in accordance with the latest version of EN50581:2012, Technical Documentation for the Assessment of Electrical and Electronic Products with Respect to the Restriction of Hazardous Substances.

Manufacturers must keep the technical documentation and the EU Declaration of Conformity (DoC) for 10 years after the EEE has been placed on the market. This documentation must be readily available to IBM and provided within two business days upon request.

When laboratory sampling is completed and used as part of the technical documentation, the test method must be in accordance with the latest version of IEC 62321 Electrotechnical products - Determination of levels of six regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers) as referred to in EN50581:2012, Technical Documentation for the Assessment of Electrical and Electronic Products with Respect to the Restriction of Hazardous Substances.

Manufacturers must keep a register of non-conforming EEE and product recalls, and keep distributors, including IBM, informed thereof.

Manufacturers, when requested by a competent national authority or IBM, must provide all the information and documentation necessary to demonstrate the conformity of the EEE with the RoHS Directive, in a language which can be easily understood by the authority, and that they cooperate with the authority, at its request, on actions taken to ensure compliance with the Directive for the EEE which they have placed on the market or provided to IBM for placing on the market.

Manufacturers must draw up an EU DoC which must have the following:
1. It shall state that it has been demonstrated that the requirements specified in Article 4 of the EU Directive have been met.
2. It shall have the model structure and contain the elements specified in Annex VI of the Directive, including:

- Number, which is the unique identification of the EEE.
- Name and address of the manufacturer or authorized representative.
- Wording "This declaration of conformity is issued under the sole responsibility of the manufacturer (or installer)".
- Object of the declaration (identification of EEE allowing traceability, e.g., a photograph)
- The object of the declaration described above is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
- Where applicable, references to the relevant harmonized standards used or references to the technical specifications in relation to which conformity is declared.
- Signature block including:
    - Signed for and on behalf of:
    - Place and date of issue, and
    - Name, function and signature.

By drawing up the EU DoC, the manufacturer shall assume responsibility for the compliance of the EEE with the EU RoHS Recast Directive. Manufacturers of Finished Products must provide IBM a DoC in as many languages as available, for example Czech and Slovenian. A single DoC must be provided which references all EU CE marking legislation applicable to the product in accordance with EU Decision 768/2008/EC on a common framework for the marketing of products, Article 5. The product name or number identifier on the product must match the name or number on the DoC and the name or number on the Technical Documentation.

The above requirements for a DoC and technical documentation also applies to other jurisdictions such as the Republic of Srpska referencing their specific decrees, regulations or laws.

Labeling

The CE marking must be placed on all Finished Products, including IBM logo and non IBM logo products. Figure 11 has an example CE Mark. The CE Mark must be at least 5 mm in height. The Manufacturer of the Finished Product must place the CE mark on the product. The CE marking shall be affixed visibly, legibly and indelibly to the finished EEE or to its data plate. Where that is not possible because of the nature of the EEE, it shall be affixed to the packaging and to the accompanying documents. The CE Mark shall be the only marking which establishes the

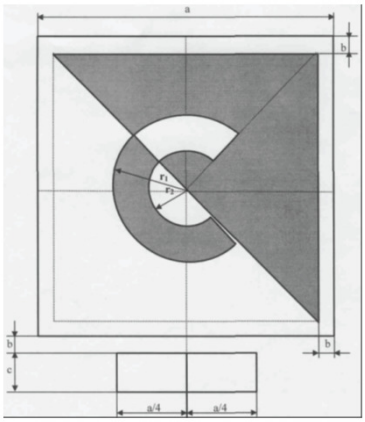
conformity of a product to the EU RoHS Recast Directive. No other markings indicating compliance to EU RoHS requirements shall be used.

EEE must have a type, batch or serial number or other element allowing its identification, or, where the size or nature of the EEE does not allow it, that the required information is provided on the packaging or in a document accompanying the EEE. This must be completed by the manufacturer of the EEE. Examples of this include, but are not limited to machine type, machine type model number or part number. This marking shall be affixed visibly, legibly and indelibly to the finished EEE or packaging.

Manufacturers must indicate their name, registered trade name or registered trade mark and the address at which they can be contacted on the EEE or, where that is not possible, on its packaging or in a document accompanying the EEE. The address must indicate a single point at which the manufacturer can be contacted.

Irrespective of the company logo on the product, when IBM is referenced on the product as the manufacturer, the IBM single point of contact information must be included. This information must include:
International Business Machines
New Orchard Road
Armonk, New York 10504
http://www.ibm.com/customersupport/

Effective June 1, 2016, the marking below is required by the Republic of Srpska (administrative unit of Bosnia-Herzegovina) on Finished Products. The marking is in the form of a square, with minimum length of side “a” to be 5 mm, with a styled Latin letter “C” in the middle. The marking must be placed immediately adjacent to the registered trade name, i.e. name of the manufacturer or authorized representative. If the marking is increased or decreased, the proportions shown in the drawing below shall be taken into account. IBM label part number 01AF466 may be used on the product to meet this requirement.
Dimensional graphic:



$b=\frac{5}{100}\times a$

$c=\frac{12}{100}\times a$

$r_1=\frac{40}{100}\times a$

$r_2=\frac{25}{100}\times a$

Appearance of the final marking:

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EC J85151 13MAY05	EC G32590 08FEB06	EC L04925B 11JAN07	EC L04925M 01AUG07	EC L04925N 19FEB08	EC L05962X 08AUG08	EC L79598 25FEB09	EC N24534E 02OCT09	EC L79598A 22FEB10
EC L79598B 22SEPT10	EC L79598C 27APR2011	EC L79598D 6SEPT2011	EC N31517Y 26MAR2012	ECN31946T 19APR2013	ECN33076 5DEC2013	ECN33076A 16MAY2014	ECN46883 17OCT2014	ECP02692 26MAY2015
ECO P02838 15OCT2015								

If it is not possible to affix the conformity marking to the equipment due to its nature, the conformity marking shall be affixed to its packaging or accompanying documentation.

Notification
Manufacturers who have reason to believe that EEE which they have delivered to IBM is not in conformity with the EU RoHS Directive must immediately take the necessary corrective measures to bring that EEE into conformity, to withdraw it or recall it, as well as immediately notify IBM.

2.14.4 Requirements for Parts

EEE, parts and Deliverables provided to IBM must meet EU Directive 2011/65/EU RoHS. Refer to the Directive for further details.

Suppliers must have in place documentation as required by Article 7 and carry out the internal production control procedure in line with module A of Annex II to Decision No 768/2008/EC. Suppliers must ensure that procedures are in place for series production to remain in conformity. Changes in product design or characteristics and changes in the harmonized standards or in technical specifications by reference to which conformity of EEE is declared shall be adequately taken into account. Suppliers must keep the documentation for 10 years after the EEE has been placed on the market. This documentation must be readily available to IBM and provided within two business days upon request in English.

When laboratory sampling is completed and used as part of the documentation, the test method must be in accordance with the latest version of IEC 62321 Electrotechnical products - Determination of levels of six regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers) as referred to in EN50581:2012, Technical Documentation for the Assessment of Electrical and Electronic Products with Respect to the Restriction of Hazardous Substances. Manufacturers, when requested by IBM, must provide all the information and documentation necessary to demonstrate the conformity of the EEE with the RoHS Directive in English.

Suppliers who have reason to believe that EEE which they have delivered to IBM is not in conformity with the EU RoHS Directive must immediately take the necessary corrective measures to bring that EEE into conformity, as well as immediately notify IBM.

2.15 Requirements for modular refrigeration units

References
EU Regulation (EC) No 842/2006 of the European Parliament and of the Council of 17 May 2006 on certain fluorinated greenhouse gases
EU Regulation (EC) No 1494/2007 of 17 December 2007 establishing the form of labels and additional labeling requirements as regards products and equipment containing certain fluorinated greenhouse gases
Canada Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems
EU Regulation No 517/2014 of the European Parliament and of the Council on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006

Requirements
Refrigeration units must be designed in accordance to the guidelines for commercial and industrial systems found in the latest version of the Canada Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems. Refrigeration units must also meet requirements in EU Regulations 842/2006, 1494/2007, and 517/2014. Fluorocarbons can no longer be used in newly releasing products or parts.

Additional standards may be relevant other than environmental standards such as UL, ASHRAE, and ARI standards. All refrigeration units must be designed as hermetically sealed systems. A hermetically sealed system means a system in which all parts that contain fluorinated greenhouse gases have been hermetically sealed during their

manufacturing by welding, brazing or otherwise making them tight by permanently connecting them and for which the refrigerant circuit does not need to be opened for placing the system into operation. The design of the refrigeration units must encompass the need to disallow the gas to release to the atmosphere. The level of refrigerant gas in a hermetically sealed system cannot exceed 6 kilograms per computer product.

At a minimum, the following must be labeled on the units:

- Notice that the product or equipment contains fluorinated greenhouse gases covered by the Kyoto Protocol
- Refrigerant type, e.g. HFC
- ASHRAE Refrigerant Number
- Refrigerant quantity
- Refrigerant oil type, and quantity,
- Ozone-depleting potential,
- Global warming potential,
- System is hermetically sealed, and
- As of 1 January 2017, the quantity of greenhouse gases contained in the product or equipment, expressed in weight and in CO_2 equivalent.

The above label must be clearly and indelibly on the product adjacent to the service points for charging or recovering the gas or on that part of the product which contains the fluorinated greenhouse gas. The above label must be translated, at a minimum, in the following languages:

- English
- Bulgarian
- Czech
- Danish
- Dutch
- Estonian
- Finnish
- French
- French Canadian
- German
- Greek
- Hungarian
- Italian
- Japanese
- Latvian
- Lithuanian
- Polish
- Croatian
- Portuguese
- Romanian
- Slovakian
- Slovenian
- Spanish
- Albanian
- Bosnian
- Icelandic
- Japanese
- Macedonian
- Maltese
- Montenegrin
- Norwegian
- Serbian
- Swedish
- Turkish
- Ukrainian

Other labels may be required in additional languages.

The latest version of the IBM Environmental Notices and User Guide must accompany the modular refrigeration units when shipped as parts, e.g., spare parts, field replaceable units. If the equipment contains fluorinated greenhouse gases with a global warming potential of 150 or more, this information shall also be included in descriptions used for advertising.

2.16 Requirements for Original Equipment Manufacturer designed Computer Servers

References

ENERGY STAR® Program Requirements for Computer Server Version 2.0

National Sanitation Foundation International Draft Standard NSF/ANSI 426 Environmental Leadership Standards for Servers

IEC TR62635 Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment

Definitions

Accessible: The component shall, following removal of the external enclosure, be visible without removal of other components and shall be removable without having to remove more than two other components. The removal shall be non-destructive.

Computer server: Computer servers provide services and manage networked resources for client devices (e.g., desktop computers, notebook computers, thin clients, wireless devices, PDAs, IP telephones, other computer servers, or other network devices). A computer server is sold through enterprise channels for use in data centers and office/corporate environments. A computer server is primarily accessed via network connections, versus directly-connected user input devices such as a keyboard or mouse. For purposes of this requirement, a computer server must meet all of the following criteria:

– Is marketed and sold as a computer server;
– Is designed for and listed as supporting one or more computer server operating systems (OS) and, or hypervisors;
– Is targeted to run user-installed applications typically, but not exclusively, enterprise in nature;
– Provides support for error-correcting code (ECC) and, or buffered memory (including both buffered dual in-line memory modules (DIMMs) and buffered on board (BOB) configurations);
– Is packaged and sold with one or more AC-DC or DC-DC power supplies; and
– Is designed such that all processors have access to shared system memory and are visible to a single OS or hypervisor.

In addition to the above, the definition of Computer servers, for the purposes of this section, is given in the ENERGY STAR Program Requirements for Computer Servers Version 2.0: blade, multi-node, rack-mounted, or pedestal form factor computer servers are included with no more than four processor sockets in the computer server (or per blade or node in the case of blade or multi-node servers).

Commonly available tools: A tool which is widely used and readily available for purchase by any individual or business without restrictions.

Server Appliance: A computer server that is bundled with a pre-installed OS and application software that is used to perform a dedicated function or set of tightly coupled functions. Server appliances deliver services through one or more networks (e.g., IP or SAN), and are typically managed through a web or command line interface. Server appliance hardware and software configurations are customized by the vendor to perform a specific task (e.g., name services, firewall services, authentication services, encryption services, and voice-over-IP (VoIP) services), and are not intended to execute user-supplied software.

Requirements

Note: Server Appliances are exempt from this section.

Computer servers designed by an Original Equipment Manufacturer (OEM) which will have an IBM logo or a logo owned by IBM must meet the following criteria:

- External enclosures shall consist of one or more of the following materials, each of which comprise separable parts:
  - Steel or aluminum alloys, or
  - Plastic containing a minimum of 20% postconsumer recycled plastic.
- The product shall be designed with the following features:
  - External enclosures shall be removable by hand or with commonly available tools, without destruction of the enclosure.
  - The following components shall be identified, accessible, and removable by hand or with commonly available tools:
    - Printed circuit boards where the surface of the board is greater than 10 square centimeters;
    - Plastic containing brominated flame retardants;
    - Gas discharge lamps;
    - Liquid crystal displays (including casing) with a surface area greater than 100 square centimeters and those back-lit with gas discharge lamps; and
    - External electric cables.
  - Data drives, cards, processors, memory DIMMs, power supplies, fans and I/O cards, shall be accessible and replaceable by hand or with commonly available tools.

- Wires and cables that connect to external sources of power or data shall be removable from the products by hand or with commonly available tools without either the wire or cable, or the product being rendered unusable, unless required for technical or safety reasons.
- Plastic parts greater than 100 grams, except printed circuit boards, wire and cables shall not have
  - Molded, glued or otherwise attached metal inserts or fasteners, unless the metal component can be snapped off manually or removed with commonly available tools, and
  - Adhesives, coatings, paints, or finishes on plastic parts.

The OEM must disclose and declare to IBM the minimum percentage by weight of Postconsumer Recycled Material (see Definitions Section 1.2). The disclosure shall include calculations as required by National Sanitation Foundation International Draft Standard NSF/ANSI 426 Environmental Leadership Standards for Servers.

The OEM must disclose and declare to IBM the recyclability of the product using IEC TR62635 methodology. The product must have a minimum recyclability rate of 90% by weight. Additional details can be found in the National Sanitation Foundation International Draft Standard NSF/ANSI 426 Environmental Leadership Standards for Servers.

The OEM must provide IBM a manual, in English, for third-party reuse and recycling organizations. The information is for product preparation for reuse and recycling and must include at a minimum:
- The different components and materials;
- The location of materials with special handling needs as identified in European WEEE Directive 2012/19/EU Annex VII, e.g.,
  - ✓mercury containing components,
  - ✓batteries,
  - ✓printed circuit boards if the surface of the board is greater than 10 square centimeters,
  - ✓toner cartridges, liquid and paste, as well as color toner,
  - ✓plastic containing brominated flame retardants,
  - ✓cathode ray tubes,
  - ✓chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, or hydrocarbons,
  - ✓gas discharge lamps,
  - ✓liquid crystal displays of a surface greater than 100 square centimeters and all those back-lighted with gas discharge lamps,
  - ✓external electric cables,
  - ✓components containing refractory ceramic fibres,
  - ✓components containing intentionally added radioactive substances, and
  - ✓electrolyte capacitors containing substances of concern (height > 25 mm, diameter > 25 mm or proportionately similar volume).
- Technical reference of each individual sub-assembly providing 1) a pin diagram, and 2) the make and model of each connector capable of being field terminated, as provided to manufacturer repair/authorized service centers;
- The components that cannot be replaced by non-manufacturer supplied components;
- A list of components that are compatible or equivalent with original components; and
- A disassembly or end-of-life characterization report that includes, at a minimum, step-by-step disassembly instructions with required tools, product specifications and troubleshooting information.

3 Notification Procedures

If the Deliverable being supplied to IBM does not meet one or more of the applicable requirements in ES 46G3772, the Supplier must immediately notify their IBM procurement representative. This also applies if the Supplier or a subcontractor(s) makes changes in their operations that will cause a Deliverable to no longer comply with ES 46G3772. If any Deliverable contains a substance in applications restricted by this specification, Suppliers must immediately report such information to their IBM procurement representative.

4 Removed

5 Revision History

Date	EC Level	Change Summary
2015-10-15	P02838	Section 1.2 - Definitions – Updated definition of Article and RoHS Substances. Table 1 – Added nanomaterials. Tris-(aziridinyl) – phosphineoxide, Tris (2,3 dibromopropyl) phosphate and Cadmium - added prohibition for Substances and Preparations. Changed authorized SVHCs to restrictions at the Article level rather than at the Deliverable. Additional restriction added for Hexachloroethane and Nonylphenol ethoxylates. Table 2 – Added Isopropyl alcohol, Nonylphenols, Tetraethyl lead, and Tetramethyl lead. Additional definition of nanomaterial added. Table 3 – 4 phthalates added for new RoHS requirements. Section 2.2.2 - European Standard EN 14582 reference for products certifying to EPEAT standard for computer servers. Table 4 – Removed (moved to Table 1 or 5) 2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320) 2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328) 4, 4'-Diaminodiphenylmethane (MDA) 2, 4-Dinitrotoluene Nanomaterials Perfluorooctanoic acid Arsenic pentoxide Arsenic trioxide Hydrazine Added 2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350) Dicyclohexyl phthalate 2,4-di-tert-butyl-6-(5- chloro benzotriazol -2-yl) phenol (UV-327) Hexamethylene diacrylate Perfluorononan-1-oic acid (2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-heptadecafluorononanoic acid and its sodium and ammonium salts 1,3-propanesultone Section 2.2.3 – The term "Deliverable" has been replaced with "Article" and a note added referring to the September 10, 2015 ruling from the EU Court of Justice. Table 5 – Added 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. Section 2.3.1 – C Mark requirement added. Table 8 – Prohibited Zinc silver oxide, zinc air and zinc manganese dioxide button batteries Section 2.9 – Clarification for geography. Section 2.10 – Removed requirement for battery notice for Czech Republic. Section 2.12.13 – amended for EU Regulation 2015/1428. Section 2.14.3 – new label required for the Republic of Srpska. Section 4 – Removed. Annex NN – Updated. Annex OO – "Deliverable" replaced with "Article" in Title Annex WW – Added.
2015-05-22	P02692	Table 1 – Restriction on Azocolourants updated. Allowance for cadmium in electrical contacts removed. Annex citation for Perfluorinated compounds corrected. PFOAs restriction added. Legal reference for Benzidine-based chemicals added. Additional restrictions for BBP, DEHP, DBP and DIBP. Nonylphenol ethoxylates added. Table 2 – Annex citation for MDI corrected. Table 3 – Allowance for mercury use in lamps removed. Table 4 - PFOA entry modified. Toluene Diisocyanates added. PFCA added. Specific entries added for brominated and chlorinated substances in printed wiring board laminates at 900ppm. Lead reporting entry added for cable jacketing concentrations from 300 to 1000ppm and lead acid batteries. Postconsumer recycled plastic added. Table 5 - Added UV-320, UV-328, cadmium fluoride, cadmium sulphate, DOTE, and reaction mass of DOTE and MOTE. Table 8 – Mercury allowance listed for homogeneous material in all battery types, for new Canada regulation. Cadmium restricted level for all battery types lowered to 0.001%. Section 2.6 – Updated with new labeling requirements for Canada. Mercury containing CCFLs not allowed for

Date	EC Level	Change Summary
		new PNs. Section 2.12.2 – New standard reference for EPS testing – EN 50563:2011 / A1: 2013. New requirements added for the US. Section 2.12.9 – Updated with new requirements for Ecuador. Section 2.12.11 – Updated with a reference to new British Columbia requirements for small battery chargers. Section 2.12.12 - New requirements for OEM designed computer servers (4 or less processor sockets). Section 2.15 – Updated with information and citation for new EU regulation for fluorocarbons. Section 2.16 – Added for OEM designed Computer servers (4 or less processor sockets). Annex P – Additional examples added. Annex Z – Updated with additional PFOA CAS numbers. Annex LL – Added 2 additional PAHs. Annex NN – Added DOTE, UV-320, Reaction mass of DOTE and MOTE, cadmium fluoride, cadmium sulphate, UV-328, and lead dipicrate. Annex UU – Added. Annex VV – Added.
2014-10-17	N46883	Section 1.2 – Added definitions for Agglomerate, Aggregate, and Particle. Table 1 – Mercury use in lamps prohibited. Additional lead restriction for paints, enamels, varnishes, inks and lacquers. Additional restrictions added for HFCs. Fluorinated and perfluorinated compounds added. Exemption for rubber added for BNST. Table 4 - HFCs removed. 2-benzotriazol-2-yl-4, 6-di-tert-butylphenol (UV-320) and 2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328) added. Table 5 – New SVHCs added- 1, 2-Benzenedicarboxylic acid, dihexyl ester, branched and linear and cadmium chloride. Table 12 – MFD, Printers and POS products removed. Section 2.9.1 – Updated as applicable due to the transition from Standard SJ/T 11363-2006 to Standard GB/T 26572-2011 per the China marking standard SJ/T 1164-2014. Section 2.9.2.1 – China Standard reference updated. Allowance to have the Mark 1 logo in product instructions only removed. DOM marking requirement updated. Section 2.9.2.2 – Reference to China HST table now in ENUG. HST table requirements updated. Section 2.12.1 – Definition of computer monitor altered for Australia requirements. Section 2.12.7 – US requirements for single phase motors updated. Requirements for 3 phase motors removed. Section 2.14.3 – Requirement added to place IBM SPOC on products where IBM is listed as manufacturer. Section 2.15 – Additional languages required for labels. Annex K – Substances added. Annex L – Updated with additional synonyms. Annex JJ – Additional substances added. Annex NN – Authorized substances removed. New SVHCs added. Annex SS – Added. Annex TT – Added.
2014- 05-16	N33076A	Table 1 – Annex changed for Benzidine and compounds to QQ. “Articles containing leather parts” added in entry for hexavalent chromium. Table 2 – Entry for Carcinogens, Mutagens, and Reproductive toxicants deleted as they were duplications for another entry. Entry for 2-butoxyethanol updated. Table 4 – Added - cobalt dichloride, cobalt metal, cobalt sulfate, 2, 3-Dibromo-1-propanol (was in brominated flame retardant category before), dibromoneopentyl glycol (was in brominated flame retardant category before), indium phosphide, nanomaterials, nickel sulfamate, nickel sulphate, nonylphenols and refractory ceramic fibres. Diethyl phthalate was given a separate entry from the general phthalate category, and beryllium (CAS 7440-41-7) was given a separate entry from the general beryllium/beryllium compounds entry. Arsenic pentaoxide and arsenic trioxide each given a separate entry from the general arsenic/arsenic compounds entry. Reporting level for HBCDD changed from 1000 ppm to 50 ppm. Table 5 - Lead titanium trioxide now specifically listed here rather than just in Annex NN. Cadmium sulphide and DNHP added. Table 8 – Exemptions for mercury level for button cell batteries removed. Section 2.3.1 – Reference in Section “California Safe Drinking Water and Toxic Enforcement Act” ISN-CAP54 changed to ISN-CAP65. Clarification added that only the CE mark may be used to demonstrate conformity to an EU CE mark legislation. Section 2.4.2 – Requirements added for labeling batteries for Ecuador. Instructions for battery removal now refers to removal by a qualified professional. The removal instructions must accompany the product or refer to the location of the removal instructions. Section 2.8.2 – Requirement added to send information about reading a coded DOM. Section 2.10 – Further clarification for switches and routers that require an IBM ENUG. Section 2.12 – Multiple sections updated with reference and requirements for energy regulations in Jordan. Section 2.12.2 – Reference to Oregon rule added. Scope of EPSs altered with publication of EU Regulation 617/2013 for computer and computer servers. Section 2.12.7 – Scope of EU ERP regulation for motors altered. Annex U – Arsenic trioxide and arsenic pentoxide removed as these substances now have specific entries on

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		Table 4. Annex V- Title changed to Beryllium Compounds. Beryllium removed since it now has its own entry on Table 4. Additional CAS number added for beryllium carbonate. Annex MM – Additional examples added for perchlorates. Annex NN – New SVHCs listed. Annex RR – Added.
2013-12-05	N33076	Section 1.2 – Added definition of EEE. Table 1 – Added acids generated from chromium trioxide and their oligomers, ammonium dichromate, biocidal product, chromium trioxide, hexavalent chromium restriction for leather, potassium chromate, potassium dichromate, sodium chromate, sodium dichromate, and trichloroethylene. Table 4 - Added TCPP. Table 5 – Added APFO, cadmium, cadmium oxide. Removed ammonium dichromate, chromic acid, chromium trioxide, potassium chromate, potassium dichromate, sodium chromate, sodium dichromate, and trichloroethylene. Section 2.3.1 – Clarification for perchlorate notification requirements and prototype labeling. Removed requirement for RoHS label for Turkey. Section 2.4.2 - Updates for Brazil testing requirements. New requirements added for alkaline and non-alkaline zine manganese oxide batteries. Section 2.8 - Updates for Peru and Serbia. Clarified marking requirements. Section 2.9.2.2 - Remove "or Part" from sentences requiring an HST table. Section 2.10 – Clarifications provided for requirements for shipping the ENUG. Section 2.11 – Removed. Section 2.12.1 – Update for A/NZ requirements for monitors. Update scope for EU Regulation 1275/2008. Section 2.12.14 added for EMC Class B equipment, monitor and modem section referenced to this section. Addition of Vietnam requirements. Section 2.12.2 – Clarification for Canada, EPSs only used internal to a rack system are out of scope. EPS definition amended for EU 278/2009. EPS section reformatted. Sections 2.12.3 and 2.12.4 - Updated with new amendment changes for EU requirements. Section 2.12.5 and 2.12.6 - Updated EU section with new amendment requirements. Section 2.12.7 – Added US requirement for certification document. Section 2.12.8 - Water pumps - additional EU Commission communication referenced for testing. Section 2.12.11 - Updated with reference to Oregon requirements. Section 2.12.12 - Updated A/ NZ requirements. Added new EU requirements for servers. Section 2.12.14 - Added. Section 2.14.2 - Added examples. Annex A - Added 2 additional entries for asbestos. Annex K – 5 additional ozone depleting chemicals listed. Annex NN – Added new SVHC substances Annex OO – Added new REACH authorized substances.
2013-04-19	N31946T	Table 1 – MDI CAS numbers expanded; Benzidine expanded to include all compounds; cadmium prohibitions expanded to all resins; dimethylfumarate prohibition expanded to Articles; Added - benzenamine, N-phenyl, hexachlorobenzene, 2-methoxyethanol, phthalates – summation of 4 prohibited, Polychlorinated napthalenes, polycyclic aromatic hydrocarbons, substances subject to REACH Authorization, tetrachlorobenzenes. Table 2 – PIC chemicals added; polychlorinated napthalenes moved to Table 1, Nanoparticle substances added. Section 2.2 – Reference to EN 50581:2012 added. Table 4 – Hydrazine, TBPH, and TBB added. Benzenamine, N-phenyl, hexachlorobenzene, and polychlorinated napthalenes moved to Table 1. BBP, DEHP, DBP, and DIBP moved to Table 1. Table 5 – Arsenic acid, bis (2-methoxyethyl) ether, 2,2'-dichloro 4,4' methylenedianiline, NN-dimethylacetamide, formaldehyde, oligomeric reaction products with aniline, and Strontium chromate moved to REACH Authorization status and thus to Table 1. Additional REACH SVHCs added to Table 5 either listed specifically in Table 5 or in Annex NN. The substances specifically listed in Table 5, because there is a potential for their presence in IT equipment, include diboron trioxide, diisopentylphthalate, EGDME, fatty acids C16-18 lead salts, lead monoxide, lead oxide sulphate, orange lead, phthalate (2-) dioxotrilead, pyrochlore, and tetralead trioxide sulphate. Section 2.3.1 – Requirement for labeling engineering prototypes added. Section 2.4.2 – Clarification for size of heavy metal symbol for EU battery labeling. Requirement for manufacturer registration in WI for zinc air button cell batteries. Update for requirements for Brazil labeling. Section 2.8.1 Reference to new EU WEEE Directive. Requirements for Nigeria, Peru, and Turkey added. Clarification that electronic tools require a WEEE label. Section 2.9.1 – Further description for selling parts and products commercially. Section 2.10 – Additional examples given which require the ENUG. Section 2.12.1 – Korea energy requirements updated. Requirements for A/NZ added. Section 2.12.2 and 2.12.7 – Technical documentation in Romanian required. Section 2.12.7 – Requirements for USA added. Section 2.12.8 – Requirements for EU, Norway, and Turkey changed from EU Regulation 641/2009 to EU Regulation 547/2012.

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		Section 2.12.9 – Added - Technical documentation must be provided to IBM. CE marking and DoC clarified. Section 2.12.12 – Requirements for A/NZ for Computers and Small Scale Servers added. Section 2.12.13 – Added. Section 2.14 – Clarified with requirements for Finished Products and parts. Info for EN50581:2012 added. DoCs for Finished Products must be provided to IBM. Clarification for CE marking added. Section 2.15 – Added. Annex NN – Updated. Annex OO – Added. Annex PP – Added. Annex QQ – Added.
2012-03-26	N31517Y	Table 1 - CAS number for Dimethylfumarate changed from 210-849-0 to 624-49-7. Additional restrictions listed for pentachlorophenol. Table 4 – Added 2-Butanone oxime and n-Butyl glycidyl ether. Section 2.2 – Reference to requirement for testing of RoHS substances to be in accordance with EN 62596. Section 2.2.3 Revised to refer to a new Annex which lists all SVHC substances as listed at the time of release of this specification. Table 5 – The following substances were added: arsenic acid, Bis(2-methoxyethyl)ether, Bis(2-methoxyethyl) phthalate, 2,2'-dichloro-4,4'-methylenedianiline, N,N-dimethylacetamide, Formaldehyde, oligomeric reaction products with aniline. Section 2.8.1 – India and Macedonia added as jurisdictions requiring the WEEE label. Section 2.12.1 – Requirements for Norway, Israel, and Turkey added. Section 2.12.2 – Definition of Consumer Product updated. Web site for US DOE requirements for EPSs and battery chargers updated. Requirement for Norway and Turkey added. Requirements for Canada revised. Section 2.12.3 – Requirements for Norway and Turkey added. Section 2.12.4 – Requirements for Norway and Turkey added. Section 2.12.7 – Requirements for Norway, Israel, Turkey, and Canada added. Section 2.12.8 – Requirements for Norway and Turkey added. Section 2.12.9 – Requirements for Norway added. Section 2.12.10 – Added. Section 2.12.11 – Added. Section 2.12.12 – Added. Section 2.14 – Added. Annex NN – Added.
2011-09-06	L79598D	Section 1.2 – Definitions of Homogeneous Material, RoHS and RoHS substances updated to reflect new RoHS recast Directive. Table 1 – Restrictions for PFOS changed. Additional restriction for cadmium in brazing fillers added. Added DBP, BBP and DEHP. Table 4 – Added tetrabutyltin, 4, 4'-diaminodiphenylmethane, 2,4-dinitrotoluene, polychlorinated naphthalenes and Benxenamine, N-phenyl-, reaction products with styrene. Table 5 – Updated CAS numbers for chromic acid. Moved dichromic acid to row with chromic acid to reflect the ECHA list of SVHCs. Added DIHP. Removed DBP, BBP and DEHP and placed them in Table 1. Table 8 – Mercuric oxide button cell batteries prohibited. Section 2.4.2 – Added Macedonia as requiring the EU battery graphic. Section 2.8.1 and 2.8.2 – Removed IBM requirement for "EU Only" on WEEE label. Figure 5 – Remove IBM requirement for "EU Only" on WEEE label Section 2.12.2 – Added definitions – battery charger and consumer product. Added testing requirement for EPS and battery chargers for US requirements. Section 2.12.9 – Removed submission requirements to IBM for limited documentation. Annex I – Additional mercury compounds added for clarity. Annex R – Additional naphthalene compounds added.
2011-04-27	L79598C	Table 1 - The following SVHC were placed on Table 1 as prohibited – 4,4' – diaminodiphenylmethane, hexabromocyclododecane, diisobutylphthalate, diarsenic trioxide, diarsenic pentaoxide, lead chromate, lead sulfochromate yellow, lead chromate molybdate sulphate red, tris (2-chloroethyl) phosphate, and 2,4-dinitrotoluene. Section 2.2 – Supplier documentation required to be maintained for 10 years. Section 2.2.2 – Reporting requirements clarified. Table 4. PVC reporting level changed to 1000ppm in a homogeneous material. Clarifications that some of the substances have restricted levels or applications found in the other tables. Table 5 The following SVHC were move to Table 1 as prohibited – 4,4' – diaminodiphenylmethane, hexabromocyclododecane, di-isobutylphthalate, diarsenic trioxide, diarsenic pentaoxide, lead chromate, lead sulfochromate yellow, lead chromate molybdate sulphate red, tris (2-chloroethyl) phosphate, and 2,4-dinitrotoluene. The following were added: 1,2-benzenedicarboxylic acid, di-C_{6-8}- branched alkyl esters, C_7-rich (DIHP), 1,2-benzenedicarboxylic acid, di-C_{7-11}- branched and linear alkyl esters (DHNUP), chromic acid, chromium trioxide, cobalt carbonate, cobalt diacetate, cobalt dinitrate, cobalt sulphate, dichromic acid, 2-ethoxyethanol, 2-ethoxyethyl acetate, hydrazine, 2-methoxyethanol, 1-methyl-2-pyrrolidone, strontium chromate, and 1,2,3-trichloropropane. Note added that IBM plans to prohibit the use of BBP, DEHP and DBP in

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		the 4Q2011 release of this specification. Section 2.3.1 – Requirement added for product compliance identification number. Section for California Best Management Practices for Perchlorate Materials added. Section 2.4.2 – Capacity rating labeling (Ah) required for all batteries except coin and small primary cylindrical. IEC Standard 60086-2 naming for button cell batteries referenced as acceptable for battery type and chemistry labeling. Section 2.8.1 – WEEE marking required for Buenos Aires, Argentina. Section 2.8.2 – Serbia added as a jurisdiction requiring the year of manufacture. Section 2.10 – Requirement for hard copy notice added for battery take back information for the Czech Republic. Section 2.12.1 – Requirement for EU DoC and technical documentation for monitors to be in Turkish. Section 2.12.2 - Deleted requirement to put EPS information in packaging when sent as a service part. Changed requirement for EU, Switzerland, and Liechtenstein to apply to only EMC Class B EPSs. The EU DoC must cite a second EU regulation 278/2009. Format for technical documentation provided. EU DoC and technical documentation must be provided in Turkish. Requirements added for Canada. Section 2.12.7 – CE Mark and DoC requirements added for motors. Section 2.12.8 – CE Mark and DoC requirements added for circulators. Section 2.12.9 – Section added for fans. Annex MM – Added.
2010–09-22	L79598B	Table 1- Added acrylamide. Changed restrictions for Decabromo diphenyl ether, no deminimus allowed. Toluene removed from Table 1 and placed in Table 2. Table 2- Added 2-butoxyethanol and toluene. Table 4 – Removed antimony trioxide from antimony category and placed in its own category. Changed the name of butyl benzyl phthalate to benzyl butyl phthalate. Created a category for beryllium copper alloys and this removed the reporting of these substances in the general beryllium category. Added p-Dichlorobenzene, di-n-hexyl phthalate, formaldehyde (for different applications from the restricted applications in Table 1), hexachlorobenzene, n-hexane, polycyclic aromatic hydrocarbons, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, tris(1,3-dichloro-2-propyl)phosphate, tris(2-chloroethyl)phosphate, tris(2,3-dirbromopropyl)phosphate, and vinyl chloride. Created a new category for tetrabromobisphenol A and removed it from reporting in the brominated flame retardant category. Table 5- Added acrylamide, ammonium dichromate, boric acid, potassium chromate, potassium dichromate, sodium chromate, and tetraboron disodium heptaoxide, hydrate. Changed disodium tetraborate decahydrate to disodium tetraborate anhydrous. Section 2.12.2- Added US requirements for external power supplies. Section 2.12.7- Added Australia and New Zealand requirements for motors. Section 2.12.8- Added. Section 2.13- Added. Annex LL – Added.
2010-02-22	L79598A	Section 1.2 – Definition of Mixture added. Section 1.5 – Reference to specifications 26P0381 and 77P0594 removed. Reference to PQA 873444 and Specification 5897660 added. Table 1 – Added – DEGBE, DEGME, DEGBE, Hydrofluorocarbons, Monomethyl-tetrachlorodiphenyl methane, monomethyl-dichloro-diphenyl methane, DBBT, nitrogen trifluoride, pentachlorobenzene,, and sulphur hexafluoride. Additional restrictions added for Perfluorocarbons. PFOS and toluene restrictions slightly altered. Dibutyltin compounds listed in Annex KK. Table 2 – Carcinogens, Cyclohexane, Methylenediphenyl diisocyanate, Mutagens and Reproductive toxicants added. “Xenylamine” added to the substance name for “4-Aminobiphenyl”. Table 4 – Reporting for chlorinated flame retardants now required for all products and parts, not just storage. Bis (2-ethylhexyl) phthalate (DEHP) changed to Di (2-ethylhexyl) phthalate to reflect naming scheme for EU regulations. CAS number remains the same. Added – DIBP, DIDP, DINP, DnOP, DnPP, bisphenol A, and long chained chlorinated paraffins. Section 2.2.3 - The word “Proposed” removed from the five Anthracene oil substances and Coal tar pitch. Additional proposed SVHC added – Residues (coal tar), pitch distn, Distillates (coal tar), heavy oils, Distillates (coal tar), heavy oils pyrene fraction, and Distillates (coal tar), pitch, pyrene fraction. Table 5 – A customer communication is required for Deliverables to IBM in the EU for the substances with an asterisk. Trichloroethylene and Disodium tetraborate decahydrate added. Section 2.4.2.7 – Deleted. Section 2.10 – Customer Environmental Notices and User Guide required to ship with whole unit replacement parts. Section 2.12.5.1 – Information must be included in a product catalog. Section 2.12.6.1 – Information must be included in a product catalog. Section 2.12.7 - Added for motors. Annexes G, H, L, X, CC, EE, FF – Additional substances added. Annexes JJ, KK – Added.
2009-10-02	N24534E	Section 1.2 Definitions - The definition for “Field Use Material”, “Frequently Handled Cables”, and “Chemical Product Supply” was added. Clarification made for definition of Deliverable to include tools.

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		Section 2.1.1 - Clarification added that if a substance appears multiple times in Tables and Annexes the more restrictive level applies. Entries for Benzidine and PCBs clarified. PVC prohibition in system enclosures clarified to include resin blends containing PVC. Table 1. Clarification added for lead in Frequently Handled Cables. Additional requirements for formaldehyde in textiles added. Dimethylfumarate CAS No. 210-849-0 added. Entry for DecaBDE edited for 2009 amendment to a Maine law, now with a deminimus level and for 2009 Oregon Senate Bill 596. DBT, DOT, TBT and TPT added. References to restrictions from the EU Marketing and Use Directive now changed to the EU REACH regulation. Table 4. Medium chained short chlorinated paraffins, DEHP, BBP, DBP, and HBCDD added. Table 5. Another CAS number added for Hexabromocyclododecane. Additional entries for the new proposed chemicals to the candidate list – acrylamide, aluminosilicate, zirconia aluminosilicate, DIBP, 2,4-dintitrotoluene, lead chromate, lead chromate molybdate sulphate red, lead sulfochromate yellow and tris(2-chloroethyl) phosphate. Five anthracene substances and one coal tar pitch substance were not added to Table 5 but mentioned in the text of the section. Section 2.3.1.2 California Safe Drinking Water and Toxic Enforcement Act **-** Changed from IBM may - to IBM will require a laboratory analysis to document lead concentration for Frequently Handled Cables. More detail added for lead use in Frequently Handled cables and a list of cables which are considered Frequently Handled. Section 2.3.1.3 Section added for Marking packaging for RoHS compliance for Turkey. Section 2.4.2 MSDS requirements added for Deliverables containing lead acid batteries. Section 2.4.2.1 Testing requirement added for Turkey requirements. Table 8. Reorganized by battery type for clarity. Added restrictions for silver oxide, alkaline manganese and zinc-air button cell batteries all containing mercury. Additional restrictions for zinc manganese batteries. Section 2.4.2.6 Requirement added for information included in the packaging for batteries in Brazilian Portuguese for battery information. Section 2.4.2.7 Added. Section 2.6 Information about tube length is needed for CCFLs. Section 2.10 Requirement for Croatia WEEE notice added. Section 2.12.1.3 Added for EU and Switzerland requirements. Section 2.12.2.1.2 Requirements Certification in Oregon added for External Power Supplies. Section 2.12.2.2.2 Requirements Label for Korea updated to reflect new Korean law. Section 2.12.3 to 2.12.6 Added for laptops, workstations, switches and routers. Annexes Multiple additions to CAS numbers in Annexes. Annex O Beryllium oxide deleted because it has its own entry on Table 4. Annex AA. Additional Phthalate substances added for reference.
2009-02-25	L79598	Section 1.1 Objective - Clarification provided that Deliverables without certain types of parts would not need to meet the requirements for those parts, e.g. Deliverables without batteries do not need to meet the requirements for batteries in Section 2.5. Section 1.2 Definitions - The definition for "Not detected" was altered. Section 1.5 - Additional IBM Procurement RoHS specifications cited. Section 2.1.1 - Additional PVC requirement - Bezels for Storage products must not use PVC Table 1 - Entry for Azo colorants was clarified. Level for azodyes which may release aromatic amines was lowered to 30ppm and restriction applies to textiles and leather in direct and prolonged contact with skin. Mercury exceptions amended to include unavoidable impurity at levels below 10ppm. Added - Phenol, 2- (2H - benzotriazol -2-yl) - 4, 6-bis (1, 1- dimethylethyl)- (CAS No 3846-71-7). Another prohibition added for formaldehyde releasing into the air at or above 0.1ppm. An exception was added for mercury as an unavoidable impurity at levels below 10 ppm. Restricted mercury levels in CCFLs are now listed. Table 2 - Clarification made for trichloroethylene and tetrachloroethylene where prohibition also applies to adhesives, paints and cleaning agents. 2, 4,6-Tri-tert-butylphenol added. Formaldehyde prohibited above 0.1% in mixtures or solutions. Table 4 - Chlorinated flame retardants added at 1000ppm in a homogeneous material for Storage products. Brominated flame retardant reporting level changed to homogeneous material. Tributyltin and triphenyltin compounds added for Articles and mixtures. Dibutyltin compounds, dioctyltin compounds, perchlorates, and sulphur hexafluoride added. Toluene added as reportable for uses besides adhesives and spray paints. All HFCs are reportable. Table 5 - CAS numbers added for sodium dichromate and Hexabromocyclododecane to correspond with the published SVHC Candidate List. Cyclododecane removed. Section 2.3 - Words added to provide timeline for submission of PCDs. Section 2.4.1.1 - Requirement for a logo was clarified for Products. Table 9 - Battery Management Plan requirement for Brazil, EU, Croatia and Turkey. Section 2.5.2.6 - Added requirements for batteries for Brazil. Section 2.7 - New EU RoHS levels required for mercury content in CCFLs and other lamps. Section 2.9.1 - Clarification made that external power supplies and adapters require a WEEE label. Section 2.9.2 - The requirement for "EU Only" was clarified for IBM logo Deliverables. Information added for location of WEEE symbol when the product size or function does not allow the label to be placed on the product. Marking for WEEE has been updated for Croatia requirements. The black bar is no longer sufficient to meet "put on the market" requirements. A date of manufacture must be on the product with the WEEE label.

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		Section 2.11 - Section modified to require IBM logo products to have the latest release of IBM's Environmental Notices and User Guide ship with all products, as well as parts which require it. Section 2.12 - Documentation from Suppliers must be updated if status changes 2.13.1 Monitors - Table added showing Energy Efficiency Grades. Monitors required to meet Grade 2 2.13.2. - Energy requirements and/ or labeling for monitors, adapters and chargers added for Korea. Registration required in Australia and New Zealand added. Energy label for the USA added for packaging. Annexed - Annex GG added and the list of chemicals and CAS numbers removed from Table 2. Additional CAS numbers added to Annex L. CAS numbers in Annex CC changed to match JIG 101 standard.
2008-08-08	L05962X	Section 1.2 - Definitions for Article and Substance(s) of Very High Concern added. Table 1 - Additional formaldehyde requirements added for Deliverables with composite wood. For the Deca BDE entry, the definition of computer plastic housings was clarified to include 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. PFOS prohibition clarifications added. Section 2.3.3 SVHC in Articles - Reporting Requirements - Added Table 12 - Requirement added for part/replacement part label for Mercury added products. Section 2.12 Requirements for Parts/Products Containing Composite Wood - Added. Section 2.13 Product Energy Requirements - Added. Annex K. CAS number changed for Dichlorofluoropropane (HCFC-261) from 7779-56-6 to 7799-56-6. CAS number 421-82-3 for Pentachlorodifluoropropane (HCFC-222) deleted and replaced with NA. CAS number 422-82-3 for 1,3-dichloro-1,1,2,2-tetrafluoropropane (HCFC-234cc) deleted and replaced with NA.
2008-02-19	L04925N	Section 1.1 - Clarification for compliance to 46G3772 specification and all environmental regulations added. Section 2.1.1 Further clarification for PVC and TBBA restriction for system enclosures. Table 1 - Chemical substances added for Deliverables with wood parts - arsenic, benzo[a]pyrene, additional cadmium restrictions for wood, creosote and other compounds, additional lead restrictions for wood, pentachlorophenol and an additional restriction for formaldehyde in wood. Arsenic prohibited in paints added. Cadmium in plastics prohibition added for clarification. Deca BDE prohibited, reference to no intentional addition is removed and prohibitions added. Table 2 - The following substances were added: Dichloromethane, trichloroethylene and ethylene based glycol ethers for field use materials and chemical products. Section 2.3 - Clarification added that suppliers are required to complete a PCD for Deliverables. Table 4 - Beryllium Oxide now placed in its own row, separated from Beryllium and compounds Table 8 - Restrictions for content of batteries updated. Material restrictions for nonremovable batteries added. Table 9 - Added. This table summarizes some of the jurisdictions which require battery management plans. Section 2.5.2 - EU Labeling requirement for capacity added. Section 2.5.2.6 - Deleted. California requirement added to section 2.5.2.2 Annexes D, O, R, X, AA and EE were updated. Annex FF added.
2007-08-01	L04925M	Section 1.2 Definitions for Battery or accumulator, Not detected, RoHS, REACH and WEEE were added. Definitions for Preparation and Substance were edited to match EU Regulation No 1907/2006 REACH. Section 1.3 Deviation process modified. Duplicate wording eliminated. Words itemizing compliance by supplier category deleted. Section 2 TBBA and PVC are now prohibited by IBM in product enclosures. This section was modified to put hardware prohibitions into Table 1 and additional prohibitions for Substances and Preparation into Table 2. Restrictions for cadmium, lead, mercury, hexavalent chromium and PBB and PBDEs were moved to Table 1. Full chemical disclosure is required for Substances and Preparations. Table 1 The following substances were added: formaldehyde, hexachlorobutadiene, toluene, tris (2,3 dibromopropyl) phosphate and tris-(aziridinyl)- phosphineoxide. The following substances have been brought forward from the Annex for Azo colorants to Table 1 or 2 because they are regulated irrespective if they are present in dyes - benzidine, 2-naphthylamine, and 4-aminobiphenyl. Mercury in fluorescent lamps must not exceed 10 milligrams per lamp. Restrictions (other than RoHS) for RoHS substances moved to this table from Table 2. Restrictions for lead changed to reflect new Danish decree for lead use in electronic equipment. Lead restriction in paints and varnishes added for restrictions in Switzerland. Decabromo diphenylether listed separately from the other restricted PBDEs. New legislation in the State of Washington prohibits any level of PBDEs (except decabromo diphenylether). PBDEs and PBBs are now prohibited below the EU RoHS 1000ppm level. Restriction level for Shortchain Chlorinated Paraffins reduced to 0.1% by weight from 1.0 % by weight. The reference to the EU Directive on the approximation of the laws, regulations and the administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations changed to the new EU Regulation concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) was added. Table 2 Lists additional prohibitions for Substances, Preparations, field use materials and product chemicals. Newly added chemicals include - 4-nitrobiphenyl, trichlorobenzene, 4-aminobiphenyl, benzene, and 2-naphthylamine. Table 4. The following substances were added: PFAS and PFOA. Table 7 Nickel cadmium batteries prohibited. Additional heavy metals restrictions added. Section 2.5.2.1 - Requirement added for battery removal instructions to be included in instruction manuals. Section 2.5.2.3 - Battery clarification changed to Alkaline zinc-manganese and zinc-manganese for China Regulation on Mercury Content Limitation for Batteries. China labeling requirements for Mark logos was added

Date	EC Level	Change Summary
		here, note these requirements were already included in Section 2.10, but added in the battery section for clarity. Section 2.7 and Table 10 - Package labeling now required for mercury containing products. Section 2.10.3.1 Mark logo may be placed on the packaging only if the instructions and the packaging are integrated together. Section 2.10.3.3 - Date of Manufacture format requirements further clarified. Lead acid batteries do not require a Mark logo. Section 2.10.3.4 - HST table may be included in electronic versions of product instructions such as removable laser disks. Table 15 Added to provide example of HST table. Section 2.11. - Section is added to notify suppliers of hardware publications for IBM logo products that there are specific environmental notices which must be included in the publications.
2007-01-11	L04925B	Title - IBM Logo Reference Removed Section 1.1 - Removed reference to IBM Logo product. Scope of specification is now any Deliverable where this specification is referenced in a Statement of Work, print, contract or other procurement document. Section 1.2 - New terms defined - Deliverable, preparations and substances. Section 1.3 - IBM Procurement can obtain consent for deviation from Vice President of relevant product division rather than solely development. Section 2.2 - Chlorinated Solvents, Hexachloroethane, and Perfluoroctane sulfonates added to substances prohibited from use. Cadmium use in plating or in a surface coating containing cadmium prohibited. Lead prohibition above 300ppm in frequently handled cables added. Table 1 - “Details of Restriction” column changed for Asbestos, Halogenated diphenyl methanes, PCBs, and PCTs. Table 2 - “Details of Restriction” changed for Cadmium, Lead, Mercury, PBBs and PBDEs. Section 2.3 - Threshold for cadmium reporting changed for cadmium use in plating and surface coating applications from 100ppm to any detected cadmium must be reported. Threshold for reporting for Mercury changed to “Any detectable level”. Section 2.4.1 added requiring a logo mark and a label per California Safe Drinking Water and Toxic Enforcement Act. Section 2.4.1 clarification added exempting parts without adequate surface area from coding requirements. Section 2.5.2 - Requirement for battery manufacturers to have Battery Management Plans. Section 2.5.2.1 - EU battery labeling requirements clarified as applicable for all batteries. Section 2.5.2.6 added requiring a label or flyer for California Perchlorate Best Management Practices. Section 2.7 - Font size for labels for product containing mercury changed from 1.5mm to 3.53mm. Section 2.11 added for China EIP logo, DOM and HST table. 4.0 References added. 5.0 Revision History added.

ANNEXES: Chemical Lists with CAS Numbers

Unless specifically indicated as complete for the chemicals affected, these annex listings are examples only, except where noted.

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
Cummingtonite	17499-08-0
Fibrous erionite	66733-21-9
Tremolite	77536-68-6 14567-73-8

Annex B. Azo colorants -

Note: The EC azo dyes ban applies to 1.) Certain azo colorants that by reductive cleavage of azo groups may release one of the following 22 aromatic amines and 2.) The Azodye compound listed in the second table of this annex.

1. List of regulated aromatic amines	
biphenyl-4-ylamine	92-67-1
Benzidine (Note: benzidine is also listed as prohibited in Table 1, which is more restrictive than the requirements for azo colorants.)	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	60-09-3
2. List of regulated azodyes	
A mixture of Disodium- (6- (4- anisidino) -3- sulfonato -2- (3,5- dinitro- 2-oxidophenylazo) -1-naphtholato) (1- (5-chloro -2-oxidophenylazo) -2-naphtholato) chromate (1-); (molecular formula $C_{39}H_{23}ClCrN_7O_{12}S.2Na$); Trisodium bis (6- (4-anisidino) -3- sulfonato -2- (3,5- dinitro-2- oxidophenylazo) -1- naphtholato) chromate(1-) (molecular formula $C_{46}H_{30}CrN_{10}O_{20}S_2.3Na$)	118685-33-9 Not available

Annex C. 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
Cadmium chromate	14312-00-6
Other cadmium compounds	-

Annex D. Halogenated aromatic substances

Polychlorinated biphenyls (PCB)(Note: PCBs are prohibited by other regulations, see PCBs in Table 1 and Annex O)	See Annex O
Halogenated diarylalkanes - Monomethyltetrachlorodiphenylmethane (Trade name: Ugilec 141) Monomethyldichlorodiphenylmethane (Trade name: Ugilec 121) Monomethyldibromodiphenylmethane (Trade name: DBBT)	 76253-60-6 81161-70-8 99688-47-8
Halogenated benzenes - Chlorobenzene (Monochlorobenzene, MCB) Dichlorobenzene, 1,2- (ortho-DCB)	 108-90-7 95-50-1

Dichlorobenzene, 1,4- (para-DCB)	106-46-7
Pentachlorobenzene	608-93-5
Tetrachlorobenzene, 1, 2, 4, 5-	95-94-3
Tetrachlorobenzene, 1, 2, 3, 5-	634-90-2
Tetrachlorobenzene, 1, 2, 3, 4-	634-66-2
Trichlorobenzene, 1, 2,4 -	120-82-1
Trichlorobenzene, 1, 2, 3-	87-61-6
Hexachlorobenzene	118-74-1

Annex E. Halogenated diphenyl methanes

Monomethyl tetrachloro diphenyl methane; Trade name: Ugilec 141	76253-60-6
Monomethyl dichloro diphenyl methane; Trade name: Ugilec 121, Ugilec 21	81161-70-8
Monomethyl dibromo dipenyl methane (DBBT)	99688-47-8

Annex F. Hexachloroethane

Hexachloroethane	67-72-1

Annex G. Hexavalent Chromium/Hexavalent Chromium Compounds

Ammonium dichromate	7789-09-5
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
Lead chromate molybdate sulphate red	12656-85-8
Lead sulfochromate yellow	1344-37-2
Potassium chlorochromate	16037-50-6
Potassium chromate	7789-00-6
Potassium dichromate	7778-50-9
Silver chromate	7784-01-2
Sodium chromate	7775-11-3
Sodium chromate, dihydrate	7789-12-0
Sodium dichromate	10588-01-9
Strontium chromate	7789-06-2
Zinc chromate	13530-65-9
Other hexavalent chromium compounds	-

Annex H. 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 (II) 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) 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
Lead arsenite	10031-13-7
Lead azide	13424-46-9
Lead hexafluorosilicate	25808-74-6
Lead (II) methanesulphonate	17570-76-2
Lead naphthenate	61790-14-5
Lead dinitrate	10099-74-8
Lead chromate molybdate sulphate red	12656-85-8
Lead sulfochromate yellow	1344-37-2
Tetraethyl lead	78-00-2

Tetramethyl lead	75-74-1
Other lead compounds	-

Annex I. Mercury /Mercury Compounds
An extensive list of mercury compounds can be found at
http://www.pic.int/en/CasNumbers/mercury%20compounds%20CAS%20numbers.pdf

Mercury	7439-97-6
Phenylmercury acetate	62-38-4
Phenylmercury propionate	103-27-5
Phenylmercury 2-ethylhexanoate	13302-00-6
Phenylmercuric octanoate	13864-38-5
Phenylmercury neodecanoate	26545-49-3
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 J. 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 K. 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:	
Dibromodifluoromethane (Halon-1202)	75-61-6
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
Tribromofluoromethane (Halon 1103)	353-54-8
Dibromochlorofluoromethane (Halon 1112)	353-55-9
Tetrabromodifluoroethane (Halon 2204)	Not available
Bromodichlorofluoromethane (Halon 1121)	Not available
Pentabromofluoroethane (Halon 2105)	Not available
Tribromotrifluoroethane (Halon 2303)	Not available
Bromopentafluoroethane (Halon 2501)	Not available
Tribromopentafluoropropane (Halon 3503)	Not available
Dibromohexafluoropropane (Halon 3602)	Not available
Bromoheptafluoropropane (Halon 3701)	Not available
Other:	
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
1-Bromopropane (n-propyl bromide)	106-94-5
Bromoethane (ethyl bromide)	74-96-4
Chlorobromomethane	74-97-5
Trifluoroiodomethane (trifluoromethyl iodide)	2314-97-8
Chloromethane (methyl chloride)	74-87-3
Hydrobromofluorocarbons (HBFCs) and their isomers:	
Bromodifluoromethane and its isomers	1511-62-2
HBFC-22B1 (FM-100)	1511-62-2
CHFBr2	1868-53-7
CH_2FBr	Not available
C_2HFBr_4	Not available
$C_2HF_2Br_3$	Not available
$C_2HF_3Br_2$	354-04-1 DR [2] 66542-88-9
C_2HF_4Br	Not available
$C_2H_2FBr_3$	Not available
$C_2H_2F_2Br_2$	75-82-1
$C_2H_2F_3Br$	421-06-7
$C_2H_3FBr_2$	358-97-4
$C_2H_3F_2Br$	Not available
C_2H_4FBr	762-49-2
C_3HFBr_6	Not available
$C_3HF_2Br_5$	Not available
$C_3HF_3Br_4$	Not available
$C_3HF_4Br_3$	Not available
$C_3HF_5Br_2$	Not available
C_3HF_6Br	Not available
$C_3H_2FBr_5$	Not available
$C_3H_2F_2Br_4$	Not available
$C_3H_2F_3Br_3$	Not available
$C_3H_2F_4Br_2$	Not available
$C_3H_2F_5Br$	Not available
$C_3H_3FBr_4$	Not available
$C_3H_3F_2Br_3$	Not available
$C_3H_3F_3Br_2$	Not available
$C_3H_3F_4Br$	Not available
$C_3H_4FBr_3$	Not available
$C_3H_4F_2Br_2$	Not available
$C_3H_4F_3Br$	Not available
$C_3H_5FBr_2$	Not available

$C_3H_5F_2Br$	Not available
C_3H_6FBr	Not available
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) 1,1,1,2-tetrachloro-2-fluoroethane 1,1,2,2-tetrachloro-1-fluoroethane	134237-32-4 130879-71-9 DR [2] 134237-32-4[3] 354-11-0 354-14-3
Trichlorodifluoroethane (HCFC-122) Trichloro-1,1-difluoroethane 1,2,2-trichloro-1,1-difluoroethane 1,2,2-trichloro-1,2-difluoroethane 1,1,1-trichloro-2,2-difluoroethane 1,1,2-trichloro-2,2-difluoroethane	41834-16-6 55949-46-7 354-21-2 DR [2] 134237-33-5[3] DR[2] 62549-18-2 354-15-4 354-12-1 Not available
Dichlorotrifluoroethane (HCFC-123) Dichloro-1,1,2-trifluoroethane 2,2-dichloro-1,1,1-trifluoroethane 1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a) 1,1-dichloro-1,2,2-trifluoroethane 2,2-dichloro-1,1,2-trifluoroethane	34077-87-7 90454-18-5 306-83-2 354-23-4 812-04-4 Not available
Chlorotetrafluoroethane (HCFC-124) 2-chloro-1,1,1,2-tetrafluoroethane 1-chloro-1,1,2,2-tetrafluoroethane (HCFC-124a)	63938-10-3 2837-89-0 354-25-6
Trichlorofluoroethane (HCFC-131) 1,1,2-trichloro-2-fluoroethane 1,1,2-trichloro-1 (or 2)-fluoroethane 1,1,2-trichloro-1-fluoroethane (HCFC-131a) 1,1,1-trichloro-2-fluoroethane (HCFC-131b)	27154-33-2 134237-34-6[3] 359-28-4 90134-98-8 811-95-0 2366-36-1
Dichlorodifluoroethane (HCFC-132) Dichloro-1,1-difluoroethane 1,1-dichlorodifluoroethane (meso) 1,2-dichloro-1,2-difluoroethane (R,R)-(+-).1,2-dichloro-1,2-difluoroethane 1,2-dichloro-1,1-difluoroethane (HCFC-132b) 1,1-dichloro-1,2-difluoroethane 1,1-dichloro-2,2-difluoroethane 1,2-dichloro-1,2-difluoroethane	25915-78-0 55494-45-6 31153-51-2 33579-37-2 33489-30-4 1649-08-7 1842-05-3 471-43-2 431-06-1
Chlorotrifluoroethane (HCFC-133) 1-chloro-1,2,2-trifluoroethane 1-chloro-1,1,2-trifluoroethane 2chloro-1,1,1-trifluoroethane (HCFC-133a)	1330-45-6 DR[2] 38097-47-1 431-07-2 421-04-5 75-88-7
Dichlorofluoroethane (HCFC-141) 1,1-dichloro-1-fluoroethane (HCFC-141b) 1,2-dichloro-1-fluoroethane 1,1-dichloro-2-fluoroethane	25167-88-8 1717-00-6 430-57-9 430-53-5
Chlorodifluoroethane (HCFC-142) Chloro-1,1-difluoroethane 2-chloro-1,1-difluoroethane 1-chloro-1,1-difluoroethane (HCFC-142b) 1-chloro-1,2-difluoroethane (HCFC-142a)	25497-29-4 DR[2] 58561-84-5 DR[2] 27175-71-9 55949-44-5 338-65-8 75-68-3 DR[2] 65762-25-6 338-64-7
Hexachlorofluoropropane (HCFC-221) 1,1,1,2,3,3-hexachloro-3-fluoropropane	29470-94-8 134237-35-7[3] 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	Not available
Pentachlorodifluoropropane (HCFC-222)	116867-32-4
	134237-36-8[3]
1,1,2,3,3-pentachloro-1,3-difluoropropane	431-82-3
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	Not available
1,1,1,3,3-pentachloro-2,3-difluoropropane	Not available
(1,1,3,3,3-pentachloro-1,2-difluoropropane)	
1,1,2,2,3-pentachloro-1,3-difluoropropane	Not available
1,1,2,3,3-pentachloro-1,2-difluoropropane	Not available
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	Not available
1,1,3,3-tetrachloro-1,2,3-trifluoropropane	Not available
1,2,2,3-tetrachloro-1,1,3-trifluoropropane	Not available
1,1,2,3-tetrachloro-1,2,3-trifluoropropane	Not available
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	Not available
1,1,2-trichloro-1,2,3,3-tetrafluoropropane	Not available
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)	134190-48-0[3]
1,1,1,2,3-pentachloro-2-fluoropropane	421-94-3
1,1,2,3,3-pentachloro-2-fluoropropane	Not available
1,1,1,3,3-pentachloro-3-fluoropropane	Not available
1,1,2,2,3-pentachloro-1-fluoropropane	Not available

1,1,1,2,2-pentachloro-3-fluoropropane	Not available
1,1,1,2,3-pentachloro-3-fluoropropane	Not available
1,1,1,3,3-pentachloro-2-fluoropropane	Not available
1,1,2,2,3-pentachloro-3-fluoropropane	Not available
1,1,2,3,3-pentachloro-1-fluoropropane	Not available
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	Not available
1,1,1,2,-tetrachloro-2,3-difluoropropane	Not available
1,1,1,2,-tetrachloro-3,3-difluoropropane	Not available
1,1,2,3,-tetrachloro-1,2-difluoropropane	Not available
1,1,2,3,-tetrachloro-1,3-difluoropropane	Not available
1,2,3,3,-tetrachloro-1,2-difluoropropane (1,1,2,3,-tetrachloro-2,3-difluoropropane)	Not available
1,2,2,3,-tetrachloro-1,1-difluoropropane	Not available
1,2,2,3,-tetrachloro-1,3-difluoropropane	Not available
1,1,3,3,-tetrachloro-1,3-difluoropropane	Not available
1,1,2,2,-tetrachloro-3,3-difluoropropane (2,2,3,3,-tetrachloro-1,1-difluoropropane)	Not available
1,1,2,2,-tetrachloro-1,3-difluoropropane	Not available
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	Not available
1,2,3-trichloro-1,2,3-trifluoropropane	Not available
1,1,2-trichloro-1,3,3-trifluoropropane	Not available
1,3,3-trichloro-1,1,2-trifluoropropane	Not available
2,2,3-trichloro-1,1,3-trifluoropropane	Not available
1,2,3-trichloro-1,1,3-trifluoropropane	Not available
1,2,2-trichloro-1,1,3-trifluoropropane	Not available
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)	422-00-4
2,3-dichloro-1,1,1,3-tetrafluoropropane (HCFC-234da)	Not available
1,1-dichloro-1,2,3,3-tetrafluoropropane	Not available
1,2-dichloro-1,1,3,3-tetrafluoropropane	Not available
2,3-dichloro-1,1,1,2-tetrafluoropropane	Not available
2,2-dichloro-1,1,1,3-tetrafluoropropane	Not available
1,2-dichloro-1,1,2,3-tetrafluoropropane	Not available
1,3-dichloro-1,1,2,3-tetrafluoropropane	Not available
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	Not available
2-chloro-1,1,2,3,3-pentafluoropropane	Not available
Tetrachlorofluoropropane (HCFC-241)	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	Not available
1,1,2,2-tetrachloro-3-fluoropropane	Not available
1,2,2,3-tetrachloro-1-fluoropropane	Not available
1,1,3,3-tetrachloro-1-fluoropropane	Not available
1,1,3,3-tetrachloro-2-fluoropropane	Not available
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	Not available
1,1,2-trichloro-1,3-difluoropropane	Not available
1,1,3-trichloro-1,2-difluoropropane	Not available
1,1,2-trichloro-2,3-difluoropropane	Not available
1,2,2-trichloro-1,3-difluoropropane	Not available
2,2,3-trichloro-1,1-difluoropropane	Not available
1,1,1-trichloro-3,3-difluoropropane	Not available
1,1,3-trichloro-1,3-difluoropropane	Not available
1,1,2-trichloro-3,3-difluoropropane	Not available
1,1,3-trichloro-2,3-difluoropropane	Not available
1,2,3-trichloro-1,3-difluoropropane	Not available
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	Not available
1,2-dichloro-1,1,3-trifluoropropane	Not available
1,1-dichloro-1,2,3-trifluoropropane	Not available
2,3-dichloro-1,1,2-trifluoropropane	Not available
2,2-dichloro-1,1,3-trifluoropropane	Not available
1,2-dichloro-1,2,3-trifluoropropane	Not available
1,3-dichloro-1,1,3-trifluoropropane	Not available
1,1-dichloro-1,3,3-trifluoropropane	Not available
3,3-dichloro-1,1,2-trifluoropropane	Not available
2,3-dichloro-1,1,3-trifluoropropane	Not available
1,3-dichloro-1,2,3-trifluoropropane	Not available
Chlorotetrafluoropropane (HCFC-244)	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	Not available

3-chloro-1,1,1,2-tetrafluoropropane	Not available
2-chloro-1,1,2,3-tetrafluoropropane	Not available
3-chloro-1,1,1,3-tetrafluoropropane	Not available
3-chloro-1,1,2,3-tetrafluoropropane	Not available
Trichlorofluoropropane (HCFC-251)	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	Not available
1,1,1-trichloro-3-fluoropropane	Not available
1,1,2-trichloro-3-fluoropropane	Not available
1,1,3-trichloro-3-fluoropropane	Not available
1,2,2-trichloro-1-fluoropropane	Not available
1,2,3-trichloro-1-fluoropropane	Not available
Dichlorodifluoropropane (HCFC-252)	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	Not available
1,1-dichloro-2,3-difluoropropane	Not available
1,2-dichloro-1,2-difluoropropane	Not available
1,2-dichloro-1,3-difluoropropane	Not available
1,3-dichloro-1,3-difluoropropane	Not available
2,2-dichloro-1,1-difluoropropane	Not available
2,2-dichloro-1,3-difluoropropane	Not available
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	Not available
3-chloro-1,1,3-trifluoropropane (1-chloro-1,3,3-trifluoropropane)	Not available
1-chloro-1,2,3-trifluoropropane	Not available
2-chloro-1,2,3-trifluoropropane	Not available
Dichlorofluoropropane (HCFC-261)	127404-11-9 134237-45-9[3]
1,1-dichloro-1-fluoropropane	7799-56-6
1,1-dichloro-2-fluoropropane	53074-31-0
1,1-dichloro-3-fluoropropane	53074-30-9
1,2-dichloro-1-fluoropropane	7799-56-5
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	Not available
Chlorodifluoropropane (HCFC-262)	134190-53-7[3]

1-chloro-1,1-difluoropropane	421-02-3
2-chloro-1,1-difluoropropane	430-93-3
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	Not available
1-chloro-1,3-difluoropropane	Not available
Chlorofluoropropane (HCFC-271)	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
Chlorofluoroethane (HCFC-151)	762-50-5

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 L. Perfluorocarbons (PFC)

Carbon tetrafluoride (Perfluoromethane, tetrafluoromethane) (PFC-14)	75-73-0
Perfluoroethane (Hexafluoroethane) (PFC-116)	76-16-4
Perfluoropropane (Octafluoropropane) (PFC-218)	76-19-7
Perfluorobutane (Decafluorobutane) (PFC-3-1-10; R-31-10)	355-25-9
Perfluoropentane (Dodecafluoropentane) (PFC-4-1-12; R-41-12)	678-26-2
Perfluorohexane (Tetradecafluorohexane) (PFC-5-1-14; R-51-14)	355-42-0
Perfluorocyclobutane (Octafluorocyclobutane) (PFC-c-318)	115-25-3
Perfluoroheptane	335-57-9
Perfluorooctane	307-34-6

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

2-Bromobiphenyl	2052-07-5
3-Bromobiphenyl	2113-57-7
4-Bromobiphenyl	92-66-0
Decabromobiphenyl	13654-09-6
Dibromobiphenyl	92-86-4
Heptabromobiphenyl	35194-78-6
Hexabromobiphenyl	59080-40-9
Hexabromo-1,1-biphenyl	36355-01-8
Nonabromobiphenyl	27753-52-2
Octabromobiphenyl	61288-13-9, 27858-07-7
Pentabromobiphenyl	56307-79-0
Polybrominated Biphenyl	59536-65-1
Tetrabromobiphenyl	40088-45-7
Tribromobiphenyl	59080-34-1
Firemaster FF-1	67774-32-7

Annex N. Polybrominated diphenyl 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 O. 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 P. Shortchain Chlorinated Paraffins (also known as Shortchain chlorinated alkanes)

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

Chlorinated paraffins (C_{10-13}) (also known as Alkanes, C_{10-13}, chloro)	85535-84-8
Alkanes, C_{10-12}, chloro	108171-26-2
Alkanes, C_{12-13}, chloro	71011-12-6
Other Short Chain Chlorinated Paraffins	-

Annex Q. Chlorinated Solvents (complete list)

Chloroform	67-66-3
1,1,2-trichloroethane	79-00-5
1,1,2,2-tetrachloroethane	79-34-5
1,1,1,2-tetrachloroethane	630-20-6
Pentachloroethane	76-01-7
1,1-dichloroethylene	75-35-4
1,1,1 Trichloroethane (note - this substance is also included in the Annex for ozone depleting substances)	71-55-6
Carbon tetrachloride (note - this substance is also included in the Annex for ozone depleting substances)	56-23-5

Annex R. Polychlorinated naphthalenes

Polychlorinated Naphthalenes	70776-03-3
Dichloronaphthalene	28699-88-9
Trichloronaphthalene	1321-65-9
Tetrachloronaphthalene	1335-88-2
Pentachloronaphthalene	1321-64-8
Hexachloronaphthalene	1335-87-1
Heptachloronaphthalene	32241-08-0
Octachloronaphthalene	2234-13-1
Other polychlorinated naphthalenes	-

Annex S. Tributyl tin oxide (TBTO)

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

Annex T. Antimony/Antimony Compounds

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

Annex U. Arsenic/Arsenic Compounds

Arsenic	7440-38-2
Gallium arsenide	1303-00-0
Calcium arsenate	7778-44-1
Calcium arsenite	27152-57-4
Potassium arsenite	10124-50-2
Potassium arsenate	7784-41-0
Lead arsenate	3687-31-8
Sodium arsenate	10048-95-0
Copper arsenate	10103-61-4
Ammonium arsenate	7784-44-3
Lead arsenate	7784-40-9
Arsenic acid, magnesium salt	10103-50-1
Arsenic trichloride	7784-34-1
Arsine	7784-42-1
Copper arsenite	10290-12-7
Arsenic acid	7778-39-4
Other arsenic compounds, not including arsenic pentoxide and arsenic trioxide, as these substances have a separate entry on the reportable table)	-

Annex V. Beryllium/Beryllium Compounds

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

Beryllium carbonate	66104-24-3 and 13106-47-3
Beryllium nitrate	13597-99-4
Other beryllium compounds (This does not include beryllium, beryllium oxide and beryllium copper alloys. These substances have a separate entry on the reportable table.)	-

Annex W. Bismuth/Bismuth Compounds and Alloys

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

Annex X. 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
TBBA, unspecified	30496-13-0
TBBA-epichlorhydrin oligomer	40039-93-8
TBBA-TBBA-diglycidyl-ether oligomer	70682-74-5
TBBA carbonate oligomer	28906-13-0
TBBA carbonate oligomer, phenoxy end capped	94334-64-2
TBBA carbonate oligomer, 2,4,6-tribromo-phenol terminated	71342-77-3
Brominated epoxy resin end-capped with tribromophenol	139638-58-7
Brominated epoxy resin end-capped with tribromophenol	135229-48-0
TBBA-(2,3-dibromo-propyl-ether)	21850-44-2
TBBA bis-(2-hydroxy-ethyl-ether)	4162-45-2
TBBA-bis-(allyl-ether)	25327-89-3
TBBA-dimethyl-ether	37853-61-5
Tetrabromo-bisphenol S	39635-79-5
TBBS-bis-(2,3-dibromo-propyl-ether)	42757-55-1
2,4-Dibromo-phenol	615-58-7
2,4,6-tribromo-phenol	118-79-6
Pentabromo-phenol	608-71-9
2,4,6-Tribromo-phenyl-alltl-ether	3278-89-5
Tribromo-phenyl-allyl-ether, unspecified	26762-91-4
Bis(methyl)tetrabromo-phthalate	55481-60-2
Bis(2-ethlhexyl)tetrabromo-phtalate	26040-51-7
2-Hydroxy-propyl-2-(2-hydroxy-ethoxy)-ethyl-TBP	20566-35-2
TBPA, glycol-and propylene-oxide esters	75790-69-1
N,N'-Ethylene –bis-(tetrabromo-phthalimide)	32588-76-4
Ethylene-bis(5,6-dibromo-norbornane-2,3-dicarboximide)	52907-07-0
2,3-Dibromo-2-butene-1,4-diol	3234-02-4
Dibromo-neopentyl-glycol	3296-90-0
Dibromo-propanol	96-13-9
Tribromo-neopentyl-alcohol	36483-57-5
Poly tribromo-styrene	57137-10-7
Tribromo-styrene	61368-34-1
Dibromo-styrene grafted PP	171091-06-8
Poly-dibromo-styrene	31780-26-4
Bromo-/Chloro-paraffins	68955-41-9
Bromo-/Chloro-alpha-olefin	82600-56-4
Vinylbromide	593-60-2
Tris-(2,3-dibromo-propyl)-isocyanurate	52434-90-9
Tris(2,4-Dibromo-phenyl) phosphate	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	84852-53-9
Tribromo-bisphenyl-maleinimide	59789-51-4
Brominated trimethylphenyl-~~l~~indane	
Hexabromo-cyclo-dodecane (HBCD), unspecified	3194-55-6 25637-99-4

Tetrabromo-chyclo-octane	31454-48-5
1,2-Dibromo-4-(1,2 dibromo-methyl)-cyclo-hexane	3322-93-8
TBPA Na salt	25357-79-3
Tetrabromo phthalic-anhydride	632-79-1
TBBA-bisphenol A-phosgene polymer	32844-27-2
Bis(methyl)tetrabromo-phtalate	55481-60-2
Formaldehyde, polymer with bromophenol and 2-(chloromethyl)oxirane	68541-56-0
Brominated flame retardant which comes under notation of ISO 1043-4 code number FR (14) [Aliphatic/alicyclic brominated compounds]	-
Brominated flame retardant which comes under notation of ISO 1043-4 code number FR (15) [Aliphatic/alicyclic brominated compounds in combination with antimony compounds]	-
Brominated flame retardant which comes under notation of ISO 1043-4 code number FR (16) [Aromatic brominated compounds excluding brominated diphenyl ether and biphenyls]	-
Brominated flame retardant which comes under notation of ISO 1043-4 code number FR (17) [Aromatic brominated compounds excluding brominated diphenyl ether and biphenyls) in combination with antimony compounds]	-
Brominated flame retardant which comes under notation of ISO 1043-4 code number FR (22) [Aliphatic/alicyclic chlorinated and brominated compounds]	-
Brominated flame retardant which comes under notation of ISO 1043-4 code number FR (42) [Brominated organic phosphorus compounds]	-

Annex Y. Magnesium/Magnesium Alloys

Magnesium	7439-95-4
Other magnesium alloys	-

Annex Z. Perfluorooctyl acid (PFOA) and salts (for a more comprehensive list of PFOA CAS numbers see OECD http://search.oecd.org/officialdocuments/displaydocumentpdf/?cote=env/jm/mono%282006%2915&doclanguage=en

Pentadecafluorooctanoic acid	335-67-1
2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-penta¬deca¬fluoro-octanoic acid, sodium salt	335-95-5
2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-penta¬deca¬fluoro-octanoic acid, potassium salt	2395-00-8
2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-penta¬deca¬fluoro-octanoic acid, silver salt	335-93-3
Acid Fluoride of PFOA	335-66-0
Methyl ester of PFOA	376-27-2
Ethyl ester of PFOA	3108-24-5
2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-penta¬deca¬fluoro-octanoic acid, ammonium salt	3825-26-1
Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, chromium(3+)	68141-02-6
Ethanaminium, N,N,N-triethyl-, salt with pentadecafluorooctanoic acid (1:1)	98241-25-9

Annex AA. Phthalates

Di (2-methoxyethyl) phthalate	117-82-8
Dimethyl phthalate (DMP)	131-11-3
Diethyl phthalate (DEP)	84-66-2
Diallyl phthalate (DAP)	131-17-9
Di-n-propyl phthalate (DPP)	131-16-8
Butyl cyclohexyl phthalate (BCP)	84-64-0
Dicyclohexyl phthalate (DCP)	84-61-7
Diisohexyl phthalate (DiHxP)	146-50-9
Diisoheptyl phthalate (DiHpP)	41451-28-9
Butyl decyl phthalate (BDP)	89-19-0
Diisooctyl phthalate (DIOP)	27554-26-3
N-Octyl n-decyl phthalate (ODP)	119-07-3
Diundecyl phthalate (DUP)	3648-20-2
Diisoundecyl phthalate (DIUP)	85507-79-5
Ditridecyl phthalate (DTDP)	119-06-2
Diisotridecyl phthalate (DIUP)	68515-47-9

Annex BB. Polyvinyl Chloride

Polyvinyl chloride (PVC)	9002-86-2

Annex CC. Radioactive Substances

Uranium – 238	7440-61-1
Plutonium	7440-07-5
Radon	10043-92-2
Americium – 241	14596-10-2
Thorium – 232	7440-29-1

Cesium	7440-46-2
Cesium – 137	10045-97-3
Strontium	7440-24-6
Strontium-90	10098-97-2
Other radioactive substances	-

Annex DD. Selenium/Selenium Compounds

Selenium	7782-49-2
Hydrogen selenide	7783-07-5
Sodium selenide	1313-85-5
Selenium dioxide	7446-08-4
Sodium selenate	13410-01-0
Dimethyl selenide	593-79-3
Selenium oxide	12640-89-0
Other selenium compounds	-

Annex EE. Tributyl Tin, Triphenyl Tin

Tributyltin	688-73-3
Tributyltin oxide	56-35-9
Tributyltin benzoate	4342-36-3
Tributyl tin bromide	1461-23-0
Tributyltin linoleate	24124-25-2
Tributyltin methacrylate	2155-70-6
Triphenyl tin	668-34-8
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)	67772-01-4
Tributyltin sulfamate	6517-25-5
Bis(tributyltin) maleate	14275-57-1
Tributyltin chloride	1461-22-9, 7342-38-3
Mixture of tributyltin cyclopentanecarboxylate and its analogs (Tributyltin naphthenate)	-
Tributyltin cyclopentane carbonate=mixture	5409-17-2
Triphenyltin fatty acid ((9-11) salt)	18380-71-7 18380-72-8 47672-31-1 94850-90-5
Mixture of tributyltin 1,2,3,4,4a,4b,5,6,10,10a-decahydro -7-isopropyl- 1,4a- dimethyl-1-phenanthlenecarboxylate and its analogs (Tributyltin rosin salt)	26239-64-5
Tributyltin naphthenate	85409-17-2
Other Tributyl Tins & Triphenyl Tins	-

Annex FF. Creosote, Coal Tar, Anthracene Etc.

Cresote; wash oil	8001-58-9
Creosote Oil; wash oil	61789-28-4
Distillates (coal tar), naphthalene oils; naphthalene oil	84650-04-4
Cresote oil, acenaphthene fraction; wash oil	90640-84-9
Distillates (coal tar), upper; heavy anthracene oil	65996-91-0
Anthracene oil	90640-80-5
Tar acids, coal, crude; crude phenols	65996-85-2
Cresote, wood	8021-39-4
Low temperature tar oil, alkaline; extract residues (coal), low temperature coal tar alkaline	122384-78-5

Coal tar	8007-45-2

Annex GG. Ethylene based Glycol Ethers

2-Methoxyethanol	109-86-4
Methoxyethanol	32718-54-0
Methoxyethanol acetate	110-49-6
2-Ethoxyethanol	110-80-5
Ethoxyethanol acetate	111-15-9
Diethylene glycol dimethyl ether	111-96-6
Ethylene glycol dimethyl ether	110-71-4
Methoxyacetic acid	625-45-6
Ethoxyacetic acid	627-03-2

Annex HH. Pentachlorophenol (PCP) and its salts and esters

Pentachlorophenol	87-86-5
Sodium pentachlorophenol	131-52-2

Annex II. Lead sulfochromate yellow (C.I. Pigment Yellow 34)

Please note these CAS numbers have been deleted from the CA index, but still may be in use.

Chrome orange	8012-76-8
Chrome Orange Pigment	61513-05-1
Chrome Orange Pigment	61513-06-2
C.I. Pigment Yellow 34	61513-07-3
C.I. Pigment Yellow 34	81209-53-2

Annex JJ. Hydrofluorocarbons (HFCs)

Trifluoromethane (HFC-23)	75-46-7
Difluoromethane (HFC-32)	75-10-5
Fluoromethane (HFC-41)	593-53-3
1,1,1,2,3,4,4,5,5,5-decafluoropentane (HFC-43-10)	138495-42-8
2H, 3H-Decafluoropentane (HFC-43-10mee)	138495-42-8
Pentafluoroethane (HFC–125)	354-33-6
1,1,2,2-tetrafluoroethane (HFC-134)	359-35-3
1,1,1,2-tetrafluoroethane (HFC-134a)	811-97-2
1,1,2-trifluoroethane (HFC-143)	430-66-0
1,1,1-trifluoroethane (HFC-143a)	420-46-2
1,2-Difluoroethane (HFC-152)	624-72-6
1,1-Difluoroethane (HFC-152a)	75-37-6
Monofluoroethane (Ethyl fluoride) (HFC-161)	353-36-6
1,1,1,2,3,3,3-heptafluoropropane (HFC-227ca)	431-89-0
1,1,1,2,2,3,3-heptafluoropropane (HFC-227ca)	2252-84-8
1,1,2,2,3,3-hexafluoropropane (HFC-236ca)	27070-61-7
1,1,1,2,2,3-hexafluoropropane (HFC-236cb)	677-56-5
1,1,1,2,3,3-hexafluoropropane (HFC-236ea)	431-63-0
1,1,1,3,3,3-hexafluoropropane (HFC-236fa)	690-39-1
1,1,2,2,3-pentafluoropropane (HFC-245ce and HFC245ca)	679-86-7
1,1,1,3,3-pentafluoropropane (HFC-245fa)	460-73-1
1,1,1,3,3-pentafluorobutane (HFC-365mfc)	406-58-6
Heptafluorocyclopentane (HFC-c-447ef)	15290-77-4
1,1,1,2,2,3,4,5,5,5,-decafluoropentane (HFC-43-10 mee)	138495-42-8
HFC-1234yf	Not available
HFC-1234ze	Not available
HFC-1336mzz	Not available
HFC-1233zd	Not available
HFC-1233xf	Not available

Annex KK. Dibutyltin Compounds (DBT)

Dibutyltin oxide	818-08-6
Dibutyltin chloride	683-18-1
Dibutyltin diacetate	1067-33-0
Dibutyltin dilaurate	77-58-7
Dibutyltin hydrogen borate	75113-37-0
Dibutyltin maleate	78-04-6
Other dibutyltin compounds	-

Annex LL. Polycyclic aromatic hydrocarbons (PAHs)

Acenaphthene	83-32-9
Acenaphthylene	208-96-8
Anthanthrene	191-26-4
Anthracene (Please note this substance is also a REACH SVHC required	120-12-7

to be reported on the PCD if present in the referenced concentration as cited in Section 2.2.3.)	
Benz[*a*]anthracene	56-55-3
Benzo[*b*]fluoranthene	205-99-2
Benzo[*j*]fluoranthene	205-82-3
Benzo[*k*]fluoranthene	207-08-9
Benzo[*ghi*]fluoranthene	203-12-3
Benzo[*a*]fluorene	238-84-6
Benzo[*b*]fluorene	243-17-4
Benzo[*ghi*]perylene	191-24-2
Benzo[*c*]phenanthrene	195-19-7
Benzo[*a*]pyrene	50-32-8
Benzo[*e*]pyrene	192-97-2
Chrysene	218-01-9
Coronene	191-07-1
Cyclopenta[*cd*]pyrene	27208-37-3
Dibenz[*a,h*]anthracene	53-70-3
Dibenzo[*a,e*]pyrene	192-64-0
Dibenzo[*ah*]pyrene	189-64-0
Dibenzo[*a,i*]pyrene	189-55-9
Dibenzo[*a,l*]pyrene	191-30-0
Fluoranthene	206-44-0
Fluorene	86-73-7
Indeno[1,2,3-*cd*]pyrene	193-39-5
5-methylchrysene	3697-24-3
1-methylphenathrene	832-69-9
Naphthalene	91-20-3
Perylene	198-55-0
Phenanthrene	85-01-8
Pyrene	129-00-0
Triphenylene	217-59-4
Dibenz[a, c]anthracene	215-58-7
Dibenz[a, j]anthracene	224-41-9

Annex MM. Perchlorates

Ammonium perchlorate	7790-98-9
Lithium perchlorate	7791-03-9
Potassium perchlorate	7778-74-7
Sodium perchlorate	7601-89-0
Barium perchlorate	13465-95-7
Lead perchlorate	13637-76-8
Magnesium perchlorate	10034-81-8
Nickel perchlorate	13637-71-3

Annex NN. SVHC Candidate List (offered here as a reference, current and detailed list maintained by ECHA at http://echa.europa.eu/web/guest/candidate-list-table). Authorized SVHCs are listed in Annex OO.

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
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]	Not available
2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE)	15571-58-1
2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)	3846-71-7
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-ethylheyxl)oxy]- 2- oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE and MOTE)	Not available
Cadmium fluoride	7790-79-6
Cadmium sulphate	10124-36-4; 31119-53-6
2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)	25973-55-1
Lead dipicrate	6477-64-1
1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4
Sodium perborate; perboric acid, sodium salt	Not available

Sodium peroxometaborate	7632-04-4
Cadmium chloride	10108-64-2
Cadmium sulphide	1306-23-6
Disodium 4-amino-3-[[4'[(2,4-diaminophenyl)azo] [1,1'-biphenyl] -4-yl]azo] -5-hydroxy-6-(phenylazo) naphthalene- 2,7-disulphonate (C.I. Direct Black 38)	1937-37-7
Dihexyl phthalate	84-75-3
Imidazolidine-2-thione; (2-imidazoline-2-thiol)	96-45-7
Trixylyl phosphate	25155-23-1
Disodium 3,3'-[[1,1'-biphenyl] -4,4'- diylbis (azo)] bis (4-aminonaphthalene- 1- sulphonate) (C.I. Direct Red 28)	573-58-0
Lead di(acetate)	301-04-2
Cadmium	7440-43-9
Cadmium oxide	1306-19-0
Ammonium pentadecafluorooctanoate (APFO)	3825-26-1
Pentadecafluorooctanoic acid (PFOA)	335-67-1
Dipentyl phthalate (DPP)	131-18-0
4-Nonylphenol, branched and linear, ethoxylated [substances with a linear and/or branched alkyl chain with a carbon number of 9 covalently bound in position 4 to phenol, ethoxylated covering UVCB- and well-defined substances, polymers and homologues, which include any of the individual isomers and/or combinations thereof]	Not available
Zirconia Aluminosilicate Refractory Ceramic Fibres are fibres covered by index number 650-017-00-8 in Annex VI, part 3, table 3.1 of Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labeling and packaging of substances and mixtures, and fulfil the three following conditions: a) oxides of aluminum, silicon and zirconium are the main components present (in the fibres) within variable concentration ranges b) fibres have a length weighted geometric mean diameter less two standard geometric errors of 6 or less micrometres (µm). c) alkaline oxide and alkali earth oxide (Na2O+K2O+CaO+MgO+BaO) content less or equal to 18% by weight	None available
Calcium arsenate	7778-44-1
Aluminosilicate Refractory Ceramic Fibres are fibres covered by index number 650-017-00-8 in Annex VI, part 3, table 3.1 of Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, and fulfil the three following conditions: a) oxides of aluminium and silicon are the main components present (in the fibres) within variable concentration ranges b) fibres have a length weighted geometric mean diameter less two standard geometric errors of 6 or less micrometres (µm) c) alkaline oxide and alkali earth oxide (Na2O+K2O+CaO+MgO+BaO) content less or equal to 18% by weight	None available
2-Methoxyaniline; o-Anisidine	90-04-0
Trilead diarsenate	3687-31-8
4-(1,1,3,3-tetramethylbutyl)phenol	140-66-9
Bis(2-methoxyethyl) phthalate	117-82-8
Lead diazide, Lead azide	13424-46-9
Lead styphnate	15245-44-0
Phenolphthalein	77-09-8
Cobalt dichloride	7646-79-9
1,2,3-Trichloropropane	96-18-4
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	68515-42-4
1-Methyl-2-pyrrolidone	872-50-4
Hydrazine	302-01-2, 7803-57-8
2-Ethoxyethyl acetate	111-15-9
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	71888-89-6
Cobalt(II) carbonate	513-79-1
Cobalt(II) diacetate	71-48-7
2-Methoxyethanol	109-86-4
Cobalt(II) dinitrate	10141-05-6
Cobalt(II) sulphate	10124-43-3
2-Ethoxyethanol	110-80-5

Disodium tetraborate, anhydrous	1303-96-4, 1330-43-4, 12179-04-3
Tetraboron disodium heptaoxide, hydrate	12267-73-1
Boric acid	10043-35-3, 11113-50-1
Acrylamide	79-06-1
Anthracene oil, anthracene-low	90640-82-7
Anthracene oil, anthracene paste, anthracene fraction	91995-15-2
Anthracene oil	90640-80-5
Anthracene oil, anthracene paste, distn. Lights	91995-17-4
Pitch, coal tar, high temp.	65996-93-2
Anthracene oil, anthracene paste	90640-81-6
Bis(tributyltin)oxide (TBTO)	56-35-9
Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)	85535-84-8
Triethyl arsenate	15606-95-8
Anthracene	120-12-7
Lead hydrogen arsenate	7784-40-9
Pyrochlore, antimony lead yellow	8012-00-8
6-methoxy-m-toluidine (p-cresidine)	120-71-8
Henicosafluoroundecanoic acid	2058-94-8
Hexahydromethylphthalic anhydride [1], Hexahydro-4-methylphthalic anhydride [2], Hexahydro-1-methylphthalic anhydride [3], Hexahydro-3-methylphthalic anhydride [4]	25550-51-0, 19438-60-9, 48122-14-1, 57110-29-9
Cyclohexane-1,2-dicarboxylic anhydride [1], cis-cyclohexane-1,2-dicarboxylic anhydride [2], trans-cyclohexane-1,2-dicarboxylic anhydride [3]	85-42-7, 13149-00-3, 14166-21-3
Dibutyltin dichloride (DBTC)	683-18-1
Lead bis(tetrafluoroborate)	13814-96-5
Lead dinitrate	10099-74-8
Silicic acid, lead salt	11120-22-2
4-Aminoazobenzene	60-09-3
Lead titanium zirconium oxide	12626-81-2
Lead monoxide (lead oxide)	1317-36-8
o-Toluidine	95-53-4
3-ethyl-2-methyl-2-(3-methylbutyl)-1,3-oxazolidine	143860-04-2
Silicic acid ($H_2Si_2O_5$), barium salt (1:1), lead-doped	68784-75-8
Trilead bis(carbonate)dihydroxide	1319-46-6
Furan	110-00-9
N,N-dimethylformamide	68-12-2
4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated	Not available
4-Nonylphenol, branched and linear	Not available
4,4'-methylenedi-o-toluidine	838-88-0
Diethyl sulphate	64-67-5
Dimethyl sulphate	77-78-1
Lead oxide sulfate	12036-76-9
Lead titanium trioxide	12060-00-3
Acetic acid, lead salt, basic	51404-69-4
[Phthalato(2-)]dioxotrilead	69011-06-9
Bis(pentabromophenyl) ether (decabromodiphenyl ether; DecaBDE)	1163-19-5
N-methylacetamide	79-16-3
Dinoseb (6-sec-butyl-2,4-dinitrophenol)	88-85-7
1,2-Diethoxyethane	629-14-1
Tetralead trioxide sulphate	12202-17-4
N-pentyl-isopentylphthalate	776297-69-9
Dioxobis(stearato)trilead	12578-12-0
Tetraethyllead	78-00-2
Pentalead tetraoxide sulphate	12065-90-6
Pentacosafluorotridecanoic acid	72629-94-8
Tricosafluorododecanoic acid	307-55-1
Heptacosafluorotetradecanoic acid	376-06-7
1-bromopropane (n-propyl bromide)	106-94-5
Methoxyacetic acid	625-45-6
4-methyl-m-phenylenediamine (toluene-2,4-diamine)	95-80-7
Methyloxirane (Propylene oxide)	75-56-9
Trilead dioxide phosphonate	12141-20-7
o-aminoazotoluene	97-56-3

1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0
Orange lead (lead tetroxide)	1314-41-6
4,4'-oxydianiline and its salts	101-80-4
Biphenyl-4-ylamine	92-67-1
Diisopentylphthalate	605-50-5
Fatty acids, C16-18, lead salts	91031-62-8
Diazene-1,2-dicarboxamide (C,C'-azodi(formamide))	123-77-3
Sulfurous acid, lead salt, dibasic	62229-08-7
Lead cyanamidate	20837-86-9
α,α-Bis[4-(dimethylamino)phenyl]-4 (phenylamino)naphthalene-1-methanol (C.I. Solvent Blue 4)	6786-83-0
N,N,N',N'-tetramethyl-4,4'-methylenedianiline	101-61-1
1,3,5-tris[(2S and 2R)-2,3-epoxypropyl]-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione (β-TGIC)	59653-74-6
Diboron trioxide	1303-86-2
1,2-bis(2-methoxyethoxy)ethane (TEGDME; triglyme)	112-49-2
4,4'-bis(dimethylamino)-4"-(methylamino)trityl alcohol	561-41-1
Lead(II) bis(methanesulfonate)	17570-76-2
Formamide	75-12-7
[4-[4,4'-bis(dimethylamino) benzhydrylidene]cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride (C.I. Basic Violet 3)	548-62-9
1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)	110-71-4
[4-[[4-anilino-1-naphthyl][4-(dimethylamino)phenyl]methylene]cyclohexa-2,5-dien-1-ylidene] dimethylammonium chloride (C.I. Basic Blue 26)	2580-56-5
1,3,5-Tris(oxiran-2-ylmethyl)-1,3,5-triazinane-2,4,6-trione (TGIC)	2451-62-9
4,4'-bis(dimethylamino)benzophenone (Michler's ketone)	90-94-8

Annex OO. List of substances subject to REACH Authorization (current as of the date of this specification, current list maintained in the latest REACH regulation and its amendments) PROHIBITED AT OR ABOVE 0.1% WEIGHT BY WEIGHT OF THE ARTICLE

Acids generated from chromium trioxide and their oligomers. Group containing: Chromic acid Dichromic acid Oligomers of chromis acid and dichromic acid	 7738-94-5 13530-68-2 Not yet assigned
Ammonium dichromate	7789-09-5
Arsenic acid	7778-39-4
Benzyl butyl phthalate (BBP) Please note a more restrictive level is listed in Table 1 for this substance.	85-68-7
Bis (2-ethylhexyl) phthalate (DEHP) Please note a more restrictive level is listed in Table 1 for this substance.	117-81-7
Bis(2-methoxyethyl) ether (Diglyme)	111-96-6
Chromium trioxide	1333-82-0
Diarsenic trioxide	1327-53-3
4,4'-Diaminodiphenylmethane (MDA)	101-77-9
Diarsenic pentaoxide	1303-28-2
Dibutyl phthalate (DBP) Please note a more restrictive level is listed in Table 1 for this substance.	84-74-2
1,2-dichloroethane (EDC)	107-06-2
2,2'-dichloro-4,4'-methylenedianiline (MOCA)	101-14-4
Dichromium tris(chromate)	24613-89-6
Diisobutyl phthalate (DIBP) Please note a more restrictive level is listed in Table 1 for this substance.	84-69-5
N,N-dimethylacetamide (DMAC)	127-19-5
2,4-Dinitrotoluene (2,4-DNT)	121-14-2
Formaldehyde, oligomeric reaction products with aniline	25214-70-4
Hexabromocyclododecane (HBCDD) alpha-hexabromocyclododecane beta-hexabromocyclododecane gamma-hexabromocyclododecane	3194-55-6, 25637-99-4 134237-50-6 134237-51-7 134237-52-8
Lead chromate	7758-97-6
Lead sulfochromate yellow (C.I. Pigment Yellow 34)	1344-37-2
Lead chromate molybdate sulphate red (C.I. Pigment Red 104)	12656-85-8
Pentazinc chromate octahydroxide	49663-84-5
Potassium chromate	7789-00-6
Potassium dichromate	7778-50-9

Potassium hydroxyoctaoxodizincatedichromate	11103-86-9
Sodium chromate	7775-11-3
Sodium dichromate	7789-12-0, 10588-01-9
Strontium chromate	7789-06-2
5-tert-butyl-2,4,6-trinitro- m-xylene (Musk xylene)	81-15-2
Trichloroethylene	79-01-6
Tris (2-chloroethyl) phosphate (TCEP)	115-96-8

Annex PP. Methylenediphenyl diisocyanate (MDI)

Methylenediphenyl diisocyanate (MDI)	26447-40-5
4,4'-Methylenediphenyl diisocyanate	101-68-8
2,4'-Methylenediphenyl diisocyanate	5873-54-1
2,2'-Methylenediphenyl diisocyanate	2536-05-2

Annex QQ. Benzidine-based substances

1,3-Naphthalenedi-sulfonic acid, 7-hydroxy-8-[2-[4′-[2-(4-hydroxyphenyl)diazenyl][1,1′-biphenyl]-4-yl]diazenyl]-	117-33-9
1,3,6-Naphthalenetri-sulfonic acid, 8-hydroxy-7-[2-[4′-[2-(2-hydroxy-1-naphthalenyl)diazenyl][1,1′-biphenyl]-4-yl]diazenyl]-, lithium salt (1:3)	65150-87-0
2,7-Naphthalenedi-sulfonic acid, 5-amino-3-[2-[4′-[2-(7-amino-1-hydroxy-3-sulfo-2-naphthalenyl)diazenyl][1,1′-biphenyl]-4-yl]diazenyl]-4-hydroxy-, sodium salt (1:2)	68214-82-4
2,7-Naphthalenedi-sulfonic acid, 4-amino-5-hydroxy-3-[2-[4′-[2-[2-hydroxy-4-[(2-methylphenyl)amino] phenyl]diazenyl][1,1′-biphenyl]-4-yl]diazenyl]-6-(2-phenyldiazenyl)-	72379-45-4
2,7-Naphthalenedi-sulfonic acid, 4-amino-5-hydroxy [[[(substituted phenylamino)] substituted phenylazo] diphenyl]azo-, phenylazo-, disodium salt.	Accession No. 21808 CAS No. CBI (NA)
4-(Substituted naphthalenyl)azo diphenylyl azo-substituted carbopolycycle azo benzene-sulfonic acid, sodium salt	Accession No. 24921 CAS No. CBI (NA)
4-(Substituted phenyl)azo biphenylyl azo-substituted carbopolycycloazo benzene-sulfonic acid, sodium salt	Accession No. 26256 CAS No. CBI (NA)
4-(Substituted phenyl)azo biphenylyl azo—substituted carbo-polycycle azo benzene-sulfonic acid, sodium salt	Accession No. 26267 CAS No. CBI (NA)
Phenylazoamino-hydroxynaphthalenylazobiphenylazo substituted benzene sodium sulfonate	Accession No. 26701 CAS No. CBI (NA)
[1,1′-Biphenyl]-4,4′-diamine	92-87-5
[1,1′-Biphenyl]-4,4′-diamine, dihydrochloride	531-85-1
1-Naphthalenesulfonic acid, 3,3′-[[1,1′-biphenyl]-4,4′-diylbis(azo)]bis[4-amino-, disodium salt (C.I. Direct Red 28)	573-58-0
2,7-Naphthalenedisulfonic acid, 4-amino-3-[[4′-[(2,4-diaminophenyl) azo][1,1′-biphenyl]-4-yl]azo]-5-hydroxy-6-(phenylazo)-, disodium salt (C.I. Direct Black 38)	1937-37-7
1-Naphthalenesulfonic acid, 8,8′-[[1,1′-biphenyl]-4,4′-diylbis(azo)]bis[7-hydroxy-,disodium salt (C.I. Direct Red 44)	2302-97-8
2,7-Naphthalenedisulfonic acid, 5-amino-3-[[4′-[(7-amino-1-hydroxy-3-sulfo-2-naphthalenyl)azo][1,1′-biphenyl]-4-yl]azo]-4-hydroxy-, trisodium salt (C.I. Direct Blue 2)	2429-73-4
Benzoic acid, 5-[[4′-[(1-amino-4-sulfo-2-naphthalenyl) azo][1,1′-biphenyl]-4-yl]azo]-2-hydroxy-,disodium salt (C.I. Direct Orange 8)	2429-79-0
Benzoic acid, 5-[[4′-[[2,6-diamino-3-[[8-hydroxy-3,6-disulfo-7-[(4-sulfo-1-naphthalenyl)azo]-2-naphthalenyl]azo]-5-methylphenyl]azo][1,1′-biphenyl]-4-yl]azo]-2-hydroxy-, tetrasodium salt (C.I. Direct Brown 31)	2429-81-4
Benzoic acid, 5-[[4′-[(7-amino-1-hydroxy-3-sulfo-2-naphthalenyl) azo][1,1′-biphenyl]-4-yl]azo]-2-hydroxy-, disodium salt (C.I. Direct Brown 2)	2429-82-5
2,7-Naphthalenedisulfonic acid, 4-amino-3-[[4′-[(2,4-diamino-5-methylphenyl)azo][1,1′-biphenyl]-4-yl]azo]-5-hydroxy-6-(phenylazo)-, disodium salt (Direct Black 4)	2429-83-6
Benzoic acid, 5-[[4′-[(2-amino-8-hydroxy-6-sulfo-1-naphthalenyl)azo][1,1′-biphenyl]-4-yl]azo]-2-hydroxy-, disodium salt (C.I. Direct Red 1)	2429-84-7
Benzoic acid, 5-[[4′-[[2,6-diamino-3-methyl-5-[(4-sulfophenyl)azo]phenyl]azo][1,1′-biphenyl]-4-yl]azo]-2-hydroxy-, disodium salt (C.I. Direct Brown 1:2)	2586-58-5
2,7-Naphthalenedisulfonic acid, 3,3′-[[1,1′-biphenyl]-4,4′-diylbis(azo)]bis[5-amino-4-hydroxy-, tetrasodium salt (C.I. Direct Blue 6]	2602-46-2
Benzoic acid, 5-[[4′-[[2,4-dihydroxy-3-[(4-sulfophenyl) azo]phenyl]azo][1,1′-biphenyl]-4-yl]azo]-2-hydroxy-, disodium salt (C.I. Direct Brown 6)	2893-80-3
1,3-Naphthalenedisulfonic acid, 8-[[4′-[(4-ethoxyphenyl) azo][1,1′-biphenyl]-4-yl]azo]-7-hydroxy-,disodium salt (C.I. Direct Red 37)	3530-19-6
1,3-Naphthalenedisulfonic acid, 7-hydroxy-8-[[4′-[[4-[[(4-methylphenyl) sulfonyl]oxy]phenyl]azo][1,1′-biphenyl]-4-yl]azo]-, disodium salt (C.I. Acid Red 85)	3567-65-5
2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy-3-[[4′-[(4-hydroxyphenyl)azo][1,1′-biphenyl]-4- yl]azo]-6-(phenylazo)-, disodium salt (C.I. Direct Green 1)	3626-28-6

Benzoic acid, 5-[[4′-[[2,4-diamino-5-[(4-sulfophenyl) azo]phenyl]azo][1,1′-biphenyl]-4-yl]azo]-2-hydroxy-, disodium salt (C.I. Direct Brown 1)	3811-71-0
2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy-6-[[4′-[(4-hydroxyphenyl)azo][1,1′-biphenyl]-4-yl] azo]-3-[(4-nitrophenyl)azo]-, disodium salt (C.I. Direct Green 6)	4335-09-5
2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy-3-[[4′-[[4-hydroxy-2-[(2-methylphenyl)amino]phenyl]azo] [1,1′- biphenyl]-4-yl]azo]-6-[(4-sulfophenyl) azo]-, trisodium salt (C.I. Acid Black 94)	6358-80-1
Benzoic acid, 5-[[4′-[[4-[(4-amino-7-sulfo-1-naphthalenyl)azo]-6-sulfo-1-naphthalenyl]azo][1,1′-biphenyl]-4-yl] azo]-2-hydroxy-, trisodium salt (C.I. Direct Brown 27)	6360-29-8
Benzoic acid, 5-[[4′-[[2,6-diamino-3-methyl-5-[(4-sulfophenyl)azo]phenyl] azo][1,1′-biphenyl]-4-yl]azo]-2- hydroxy-3-methyl-, disodium salt (C.I. Direct Brown 154)	6360-54-9
Benzoic acid, 3,3′-[(3,7-disulfo-1,5-naphthalenediyl)bis [azo(6-hydroxy-3,1-phenylene)azo[6(or7)-sulfo-4,1-naphthalenediyl]azo[1,1′-biphenyl]-4,4′-diylazo]]bis[6-hydroxy-, hexasodium salt (C.I. Direct Brown 74)	8014-91-3
Cuprate(2-), [5-[[4′-[[2,6-dihydroxy-3-[(2-hydroxy-5-sulfophenyl)azo]phenyl] azo][1,1′-biphenyl]-4-yl]azo]-2-hydroxybenzoato(4-)]-, disodium salt (C.I. Direct Brown 95)	16071-86-6

Annex RR. Nonylphenols

Nonylphenol	25154-52-3
p-nonyl-phenol	104-40-5
4-nonyl-phenol, branched=	84852-15-3
Nonylphenol, branched	90481-04-2
Isononylphenol	11066-49-2
p-Isononylphenol	26543-97-5
p-(Nonan-2-yl))phenol	17404-66-9
p-(2-Methyloctan-2-yl) phenol	30784-30-6
4-(3-Methyloctan-3-yl) phenol	52427-13-1
o-Nonylphenol	136-83-4
o-Isononylphenol	27938-31-4
Phenol, 2-nonyl-, branched	91672-41-2
m-Nonylphenol	139-84-4
Neononylphenol	1196678-78-0
4-(3,5-Dimethylheptan-3-yl) phenol	186825-36-5
4-(3,6-Dimethylheptan-3-yl)phenol	142731-63-3
2-(Nonan-2-yl) phenol	17404-45-4
Phenol, 2-tert-nonyl-	89585-68-2
Phenol, sec-nonyl-	97372-03-7
Phenol, 4-tert-nonyl-	58865-77-3
Phenol, o-sec-nonyl-	27214-48-8
Phenol, p-sec-nonyl-	27072-91-9

Annex SS. Fluorinated ethers and alcohols

HFE-125	Not available
HFE-134 (HG-00)	Not available
HFE-143a	Not available
HCFE-235da2 (isofluorane)	Not available
HFE-245cb2	Not available
HFE-245fa2	Not available
HFE-254cb2	Not available
HFE-347 mcc3 (HFE-7000)	Not available
HFE-347pcf2	Not available
HFE-356pcc3	Not available
HFE-449sl (HFE-7100)	Not available
HFE-569sf2 (HFE-7200)	Not available
HFE-43-10pccc124 (H-Galden 1040x) HG-11	Not available
HFE-236ca12 (HG-10)	Not available
HFE-338pcc13 (HG-01)	Not available
HFE-347mmy1	Not available
2,2,3,3,3-pentafluoropropanol	Not available
Bis(trifluoromethyl)-methanol	Not available
HFE-227ea	Not available
HFE-2236ea2 (desfluoran)	Not available
HFE-236fa	Not available
HFE-245fa1	Not available
HFE-263fb2	Not available
HFE-329 mcc2	Not available
HFE-338 mcf2	Not available

HFE-338mmz1	Not available
HFE-347 mcf2	Not available
HFE-356 mec3	Not available
HFE-356mm1	Not available
HFE-356pcf2	Not available
HFE-356pcf3	Not available
HFE-365 mcf3	Not available
HFE-347pc2	Not available

Annex TT. Perfluorinated compounds

Perfluoropolymethylisopropyl-ether (PFPMIE)	Not available
Trifluoromethyl sulphur pentafluoride	Not available
Nitrogen trifluoride	7783-54-2
Perfluorocyclopropane	Not available

Annex UU. Toluene Diisocyanate (this list is all inclusive)

Toluene diisocyanate trimer	9019–85–6
Poly(toluene diisocyanate)	9017–01–0
Toluene diisocyanate dimer	26747–90–0
Toluene diisocyanate ‘‘cyclic’’ trimer	26603–40–7
2,6-Toluene diisocyanate Note - reportable except for use in coatings, adhesives, elastomers, binders, and sealants at less than or equal to 0.1% in a Consumer Product (defined as a chemical substance that is directly, or as part of a mixture, sold or made available to consumers for their use in or around a permanent or temporary household or residence, in or around a school, or in recreation. [Source: US Code of Federal Regulations Title 40 Part 721.3 Subpart A])	91–08–7
2,4-Toluene diisocyanate Note - reportable except for use in coatings, adhesives, elastomers, binders, and sealants at less than or equal to 0.1% in a Consumer Product (defined as a chemical substance that is directly, or as part of a mixture, sold or made available to consumers for their use in or around a permanent or temporary household or residence, in or around a school, or in recreation. [Source: US Code of Federal Regulations Title 40 Part 721.3 Subpart A])	584–84–9
Toluene diisocyanate unspecified isomer Note - reportable except for use in coatings, adhesives, elastomers, binders, and sealants at less than or equal to 0.1% in a Consumer Product (defined as a chemical substance that is directly, or as part of a mixture, sold or made available to consumers for their use in or around a permanent or temporary household or residence, in or around a school, or in recreation. [Source: US Code of Federal Regulations Title 40 Part 721.3 Subpart A])	26471–62–5

Annex VV. Nonylphenol Ethoxylates

Ethanol, 2-[2-(4-nonylphenoxy)ethoxy]-	20427-84-3
Poly(oxy-1,2-ethanediyl), α-(4-nonylphenyl)- ω-hydroxy-	26027-38-3
3,6,9,12,15,18,21-Heptaoxatricosan-1-ol, 23- (nonylphenoxy)-	27177-05-5
3,6,9,12,15,18,21,24,27-Nonaoxanonacosan-1- ol, 29-(nonylphenoxy)-	27177-08-8
Ethanol, 2-(nonylphenoxy)-	27986-36-3
Ethanol, 2-[2-[2-[2-(4- nonylphenoxy)ethoxy] ethoxy]ethoxy]-	7311-27-5
Poly(oxy-1,2-ethanediyl), α(nonylphenyl)- ω-hydroxy-	9016-45-9
Ethanol, 2-[2-(nonylphenoxy)ethoxy]-	27176-93-8
Poly(oxy-1,2-ethanediyl), α-(2- nonylphenyl)-ω-hydroxy-	51938-25-1
Poly(oxy-1,2-ethanediyl), α-(isononylphenyl)- ω-hydroxy-	37205-87-1
3,6,9,12,15,18,21,24-Octaoxahexacosan-1-ol, 26-(nonylphenoxy)-	26571-11-9

Annex WW. Long-chained chlorinated paraffins

Alkanes, C_{18-28}, chloro	85535-86-0
Paraffin oils, chloro	85422-92-0
Paraffin waxes and hydrocarbon waxes, chloro	63449-39-8
Alkanes, chloro	61788-76-9
Alkanes, C_{6-18}, chloro	68920-70-7
Alkanes, C_{10-21}, chloro	84082-38-2
Alkanes, C_{10-32}, chloro	84776-06-7
Alkanes, C_{16-27}, chloro	84776-07-8
Alkanes, C_{16-35}, chloro	85049-26-9
Alkanes, C_{10-26}, chloro	97659-46-6
Paraffins (petroleum), normal $C_{>10}$, chloro	97553-43-0
Alkanes, C_{18-20}, chloro	106232-85-3
Alkanes, C_{22-40}, chloro	106232-86-4
Alkanes, C_{22-26}, chloro	108171-27-3