

**Engineering Specification - 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**

**PN 97P3864**

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Owner:	Pam Lembke Environmental Product Stewardship, IBM Systems pamlembke@us.ibm.com	15 May 2023
Reviewed and Approved by:	Amanda Stapels Manager, Systems Compliance High End Servers, Systems Environmental Management, ESD Controls and ASIC Tools IBM Systems Development	6 June 2023

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**1.0 Scope**

**1.1 Objectives**

This Deliverable must comply with the most recent European Union (EU) Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, amendments, and with the requirements in this specification.

In order to comply with this Directive, this Deliverable must not contain lead (Pb), mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs), polybrominated diphenyl ethers (PBDEs), bis (2-ethylhexyl) phthalate, butyl benzyl phthalate, dibutyl phthalate and/or diisobutyl phthalate in some cases above certain levels. See remaining Sections of this specification for more specific information on exemptions and allowable substitute materials.

In addition to this specification, IBM maintains other environmental specifications for Deliverables, for example, IBM Engineering Specification 46G3772 - Baseline Environmental Requirements for Supplier Deliverables to IBM. See Section 3 for details and web site location. Where multiple documents exist, which contain requirements for the same Deliverable, the most restrictive requirement applies.

Per IBM Engineering Specification 46G3772, suppliers are required to complete a Product Content Declaration (PCD) for IBM Suppliers for Deliverables sold to IBM. The most recent release of the PCD must be used and is located at: <http://www.ibm.com/ibm/environment/products/ecpquest.shtml>.

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IBM is no longer selling medical devices. Information and requirements in this spec specific to medical devices is **not** being maintained and is included for historical reference purposes only. Text specific to medical devices is generally in grey text.

**1.2 Definitions**

**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].

**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. See Section 1.3 for specific information about tools and consumable items.

**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) and EU Directive 2011/65/EU on the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS)].

**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] For example, a plastic cover is a “Homogeneous Material” if it consists of one type of plastic that is not coated with or has attached to it or inside it any other kinds of materials. In this case, the limit values found in Table 1 would apply to the plastic. An electric cable that consists of metal wires surrounded by nonmetallic insulation materials is an example of a “nonhomogeneous material” because the different materials could be separated by mechanical processes. In this case, the limit values found in Table 1 would apply to each of the separated materials. A semiconductor package contains many homogeneous materials which include plastic molding material, tin-electroplating coatings on the lead (Pb) frame, the lead frame alloy and gold-bonding wires. Homogeneous is understood to be of uniform composition throughout.

**Industrial monitoring and control instruments** - means monitoring and control instruments designed for exclusively industrial or professional use [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.

*In vitro diagnostic medical device* - means any medical device which is a reagent, reagent product, calibrator, control material, kit, instrument, apparatus, piece of equipment, software or system, whether used alone or in combination, intended by the manufacturer to be used *in vitro* for the examination of specimens, including blood and tissue donations, derived from the human body, solely or principally for the purpose of providing information on one or more of the following: (a) concerning a physiological or pathological process or state; (b) concerning congenital physical or mental impairments; (c) concerning the predisposition to a medical condition or a disease; (d) to determine the safety and compatibility with potential recipients; (e) to predict treatment response or reactions; (f) to define or monitoring therapeutic measures. Specimen receptacles shall also be deemed to be *in vitro* diagnostic medical devices. [Source – EU Regulation 2017/746 of the European Parliament and of the Council of 5 April 2017 on *in vitro* diagnostic medical devices.]

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**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, such as toner, cleaners, lubricants, oils, and refrigerants.

**Medical Devices – Note: this definition is for RoHS and WEEE purposes.** Medical Devices means a medical device within the meaning of point (a) of Article 1(2) of Directive 93/42/EEC and which is also EEE [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]; medical device - means any instrument, apparatus, appliance, material or other article, whether used alone or in combination, including the software necessary for its proper application intended by the manufacturer to be used for human beings for the purpose of:

- Diagnosis, prevention, monitoring, treatment or alleviation of disease
- Diagnosis, monitoring, treatment, alleviation of or compensation for an injury or handicap,
- Investigation, replacement or modification of the anatomy or of a physiological process,
- Control of conception,

And which does not achieve its principal intended action in or on the human body by pharmacological, immunological or metabolic means, but which may be assisted in its function by such means. [Source: EU Council Directive 93/42/EEC of 14 June 1993 concerning medical devices].

**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.

**Parts** - fabricated Materials, components, devices and/or assemblies.

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

**RoHS** - an acronym for the EU Directive 2011/65/EU (recast) on the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment, subsequent amendments to this Directive, and subsequent amendments.

**WEEE** - an acronym for 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 and Verification

This engineering specification applies to all Deliverables supplied for IBM which have this specification cited on their respective IBM part number drawings, part or product specifications, statement of work, procurement agreements, purchase contracts, purchase orders or other procurement documentation. The supplier is responsible for compliance with this specification as well as for any subcontracted operations and procured Parts, Materials, components, devices, Products or assemblies used in the manufacture of Deliverables for IBM applications. Upon request by IBM, the supplier will verify via analytical testing, compliance to this specification. Supplier may use analytical techniques to confirm results. Additional information available in section 2.1.

This specification does not apply to consumable items such as CDs, DVDs, floppy disks, tape cartridges, non-electrical tools (e.g., hammers, screwdrivers, ladders), customer instruction manuals or product packaging materials (e.g., cardboard and wood pallets). Electrical and electronic tools (with the exception of large-scale stationary industrial tools) are included within the scope of the EU RoHS Directive. These tools (e.g., electronic drills, electronic tools for welding, soldering, riveting, nailing or screwing) must meet the requirements of this specification with the exception of unique IBM material requirements found in Sections 2.4 and 2.5.

This document should not be used on component documentation unless

1. The component will never be exposed to soldering temperatures.

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2. The component is expected to be able to be processed at higher temperatures based on supplier and/or IBM evaluation.

This document does not imply qualification has been complete at the component or assembly level.

**Deviation from the requirements of this specification must have prior written approval by IBM's procurement representative. IBM Procurement shall obtain the documented consent from the appropriate IBM representatives. IBM Procurement must contact the author of this document for details on the documentation requirements for deviations.**

### 1.4 Document Administration

This document is maintained and controlled by IBM Systems.

## 2.0 Requirements

### 2.1 Substances Prohibited From Use

The EU RoHS Directive and legal requirements in other jurisdictions ban the use of the following in new electrical and electronic products:

- Lead (Pb),
- Mercury (Hg),
- Cadmium (Cd),
- Hexavalent chromium (Cr<sup>+6</sup>),
- Polybrominated biphenyl (PBB) flame retardants,
- Polybrominated diphenyl ether (PBDE) flame retardants,
- Bis (2-ethylhexyl) phthalate (DEHP),
- Butyl benzyl phthalate (BBP),
- Dibutyl phthalate (DBP) and
- Diisobutyl phthalate (DIBP).

This prohibition applies to the above substances and all compounds containing these substances. These substances and compounds must not be in or on any Deliverable, except for use in the exemptions listed in Section 2.3 or in the allowed concentrations found in Table 1 below. The maximum allowable level found in a Homogeneous Material (e.g., metal, adhesive, paint, plastic, plating), cannot exceed the levels found in the table below. Please note these substances, generally in specific applications, have more restrictive requirements than those cited by the EU RoHS Directive. Please refer to IBM Engineering Specification 46G3772 for more restrictive requirements for all of the RoHS substances.

**Table 1. EU RoHS Maximum Concentration Values (MCV)**

<u>Substance</u>	<u>RoHS Maximum Concentration Value in a Homogeneous Material- % by weight or (ppm)</u>	<u>Additional application restrictions may apply. See IBM specification 46G3772 for more details.</u>
Lead (Pb)	0.1% or 1,000 ppm	Specific applications have more restrictive levels.
Mercury (Hg)	0.1% or 1,000 ppm	Any detectable level must be reported except unavoidable impurities at levels below 10ppm.
Cadmium (Cd)	0.01% or 100 ppm	Any detectable level must be reported for plating and surface coating applications.
Hexavalent chromium (Cr <sup>+6</sup> )	0.1% or 1,000 ppm	Specific applications have more restrictive levels.
Polybrominated biphenyl (PBB) flame retardants	0.1% or 1,000 ppm	Any detectable level must be reported.
Polybrominated diphenyl ether (PBDE) flame retardants. Note: IBM includes Decabromo diphenyl	0.1% or 1,000 ppm	Any detectable level must be reported.

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ether in this category.		
Bis (2-ethylhexyl) phthalate (DEHP)	0.1% or 1,000 ppm	
Butyl benzyl phthalate (BBP)	0.1% or 1,000 ppm	
Dibutyl phthalate (DBP)	0.1% or 1,000 ppm	
Diisobutyl phthalate (DIBP)	0.1% or 1,000 ppm	

When laboratory sampling is completed for testing the RoHS substances in Table 1, 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 EN IEC 63000:2018, Technical Documentation for the Assessment of Electrical and Electronic Products with Respect to the Restriction of Hazardous Substances (IEC 63000:2016).

## 2.2 Categories of EEE

Categories of EEE in scope of the EU RoHS Directive are listed below. The category of the EEE determines the allowable exemptions that may be used by the EEE.

Please note typical IBM IT equipment falls under the scope of Category 3.

Category	Name of Category
1	Large household appliances
2	Small household appliances
3	Information Technology (IT) and telecommunications equipment
4	Consumer equipment
5	Lighting equipment
6	Electrical and electronic tools
7	Toys, leisure and sports equipment
8	Medical devices
9	Monitoring and control instruments including industrial monitoring and control instruments
10	Automatic dispensers
11	Other EEE not covered by any of the categories above

Examples of EEE by relevant category are listed in Appendix B [Source: EU Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on Waste Electrical and Electronic Equipment]. This listing of examples is not all-inclusive.

## 2.3 Exemptions

The following are the applications which are exempt from the requirements of RoHS as cited by the EU Directive, and subsequent amendments. The prohibition, as stated in Section 2.1, is in place for all other applications. IBM has determined some of the exemptions will not be allowed for IBM products or parts. This information is noted by the exemption. Where specified by IBM in the procurement documents some of these exemptions may still be used when the order is for spare parts for the repair and reuse of equipment placed on the market prior to a specific date.

If the Exemption Status/Date column says, “TBD: Under Evaluation”, the current exemption has been requested to be renewed and is currently under evaluation within the EU Commission. Previously published projected expiration dates no longer apply. This spec will be updated when the renewal request has been completed and new expiration dates are available. Additional information about exemption status is available at [https://environment.ec.europa.eu/topics/waste-and-recycling/rohs-directive/implementation-rohs-directive\\_en](https://environment.ec.europa.eu/topics/waste-and-recycling/rohs-directive/implementation-rohs-directive_en).

IBM deliverables cannot utilize expired exemptions. In general, existing spare parts that utilize an expired exemption may be used as spare parts for EEE that was placed on the market before the associated exemption date expiration date. Contact IBM procurement to discuss specific situations.

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**Table 2. RoHS Exemptions - EU Directive 2011/65/ EU Annex III for Electrical and Electronic Equipment Categories 1 - 11**

No.	EU Directive 2011/65/EU Exemptions from Annex III for Electrical and Electronic Equipment Categories 1 through 11	Category <sup>1</sup>	Exemption Status/Date <sup>2,3</sup>	IBM Requirements/Notes <sup>4,5</sup>
1	Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):			
1(a)	For general lighting purposes < 30 Watts: 2.5 mg or less	All		See footnote 5
1(b)	For general lighting purposes ≥ 30 Watts and < 50 Watts: 3.5 mg or less	All		See footnote 5
1(c)	For general lighting purposes ≥50 Watts and < 150 W: 5 mg or less	All		See footnote 5
1(d)	For general lighting purposes ≥150 Watts: 15 mg or less	All		See footnote 5
1(e)	For general lighting purposes with circular or square structural shape and tube diameter ≤17 mm: 7 mg or less	All		See footnote 5
1(f)	For special purposes: 5 mg	All		See footnote 5
1(g)	For general lighting purposes < 30 W with a lifetime equal or above 20 000 h: 3.5 mg or less	All	31 December 2017	This exemption is not allowed in IBM products.
2(a)	Mercury in double-capped linear fluorescent lamps for general lighting purposes not exceeding (per lamp):			
2(a)(1)	Tri-band phosphor with normal lifetime and a tube diameter < 9mm (e.g., T2): 4 mg or less	All	Expired	See footnote 5
2(a)(2)	Tri-band phosphor with normal lifetime and a tube diameter ≥ 9 mm and ≤ 17 mm (e.g., T5): 3 mg or less	All	Expired	See footnote 5
2(a)(3)	Tri-band phosphor with normal lifetime and a tube diameter > 17 mm and ≤ 28 mm (e.g., T8): 3.5 mg or less	All	Expired	See footnote 5
2(a)(4)	Tri-band phosphor with normal lifetime and a tube diameter > 28 mm (e.g., T12): 3.5 mg or less	All	Expired	See footnote 5
2(a)(5)	Tri-band phosphor with long lifetime (≥ 25,000 h): 5 mg or less	All	Expired	See footnote 5
2(b)	Mercury in other fluorescent lamps not exceeding (per lamp):			

<sup>1</sup> When “All” is listed in the Categories column, it applies specifically to all categories allowed for IBM Deliverables; it may not include all categories associated with EU Directive 2011/65/EU.

<sup>2</sup> “TBD: Under Evaluation”: The current exemption has been requested to be renewed and is currently under evaluation within the EU. Previously published projected expiration dates no longer apply. If a date is listed, it may be an IBM specific requirement.

<sup>3</sup> IBM deliverables cannot utilize expired exemptions. In general, existing spare parts that utilize an expired exemption may be used as spare parts for EEE that was placed on the market before the associated exemption date expiration date. Contact IBM procurement to discuss specific situations.

<sup>4</sup> IBM is no longer selling medical devices. Information and requirements in this spec specific to medical devices is not being maintained and is included for historical reference purposes only. Text specific to medical devices is generally in grey text.

<sup>5</sup> This exemption is not allowed for IBM Deliverables in Categories 1 to 7 and 10 assigned an IBM part number released after January 16th, 2015.

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No.	EU Directive 2011/65/EU Exemptions from Annex III for Electrical and Electronic Equipment Categories 1 through 11	Category <sup>1</sup>	Exemption Status/Date <sup>2,3</sup>	IBM Requirements/Notes <sup>4,5</sup>
2(b)(1)	Linear halophosphate lamps with tube > 28 mm (e.g., T10 and T12): 10 mg or less	All	Expired 13 April 2012	This exemption is not allowed.
2(b)(2)	Non-linear halophosphate lamps (all diameters): 15 mg or less.	All	Expired 13 April 2016	This exemption is not allowed.
2(b)(3)	Non-linear tri-band phosphor lamps with tube diameter > 17 mm (e.g., T9): 15 mg or less	All	Expired	See footnote 5
2(b)(4)	Lamps for other general lighting and special purposes (e.g., induction lamps): 15 mg or less	All	Expired	See footnote 5
3	Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp):			
3(a)	– Short lamp length ( $\leq 500$ mm): 3.5 mg	All	Expired	See footnote 5
3(b)	– Medium lamp length ( $> 500$ mm and $\leq 1500$ mm): 5 mg	All	Expired	See footnote 5
3(c)	– Long lamp length ( $> 1500$ mm): 13 mg	All	Expired	See footnote 5
4(a)	Mercury in other low pressure discharge lamps (per lamp): 15 mg or less	All	Expired	See footnote 5
4(b)	Mercury in High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner) in lamps with improved colour rendering index $R_a > 60$ :			
4(b)-I	$P \leq 155$ W: 30 mg or less	All	Expired	See footnote 5
4(b)-II	$155$ W $< P \leq 405$ W: 40 mg or less	All	Expired	See footnote 5
4(b)-III	$P > 405$ W: 40 mg or less	All	Expired	See footnote 5
4(c)	Mercury in other High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner):			
4(c)-I	$P \leq 155$ W: 25 mg or less	All	Expired	See footnote 5
4(c)-II	$155$ W $< P \leq 405$ W: 30 mg or less	All	Expired	See footnote 5
4(c)-III	$P > 405$ W: 40 mg or less	All	Expired	See footnote 5
4(d)	Mercury in High Pressure Mercury (vapour) lamps (HPMV)	All	Expired 13 April 2015	This exemption is not allowed for IBM Deliverables.
4(e)	Mercury in metal halide lamps (MH)	All	Expired	See footnote 5
4(f)	Mercury in other discharge lamps for special purposes not specifically mentioned in this Annex	All	Expired	See footnote 5

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No.	EU Directive 2011/65/EU Exemptions from <u>Annex III</u> for Electrical and Electronic Equipment Categories 1 through 11	Category <sup>1</sup>	Exemption Status/Date <sup>2,3</sup>	IBM Requirements/Notes <sup>4,5</sup>
4(g)	Mercury in hand crafted luminous discharge tubes used for signs, decorative or architectural and specialist lighting and light-artwork, where the mercury content shall be limited as follows: (a) 20 mg per electrode pair + 0.3 mg per tube length in cm, but not more than 80 mg, for outdoor applications and indoor applications exposed to temperatures below 20 °C. (b) 15 mg per electrode pair + 0.24 mg per tube length in cm, but not more than 80 mg, for all other indoor applications.	All	Expired 31 December 2018	This exemption is not allowed for IBM Deliverables-
5(a)	Lead (Pb) in the glass of cathode ray tubes	All	Expired	See footnote 5
5(b)	Lead (Pb) in glass of fluorescent tubes not exceeding 0.2% by weight	All	Expired	See footnote 5
6(a)	Lead (Pb) as an alloying element in steel for machining purposes and in galvanized steel containing up to 0.35% lead by weight	Cat 1-7 & 10	Expired	(See new wording below for new exemption 6(a)-I.)
6(a)-i		Cat 8 other than in vitro		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	Subcategory created for IBM tracking purposes.
6(a)-ii		Cat 8 in vitro		See footnote 4
6(a)-iii		Cat 9 industrial Cat 11	TBD: Under Review	Subcategory created for IBM tracking purposes.
6(a)-I	Lead as an alloying element in steel for machining purposes containing up to 0.35 % lead by weight and in batch hot dip galvanized steel components containing up to 0.2 % lead by weight	Cat 1-7 & 10	TBD: Under Review	
6(b)	Lead (Pb) as an alloying element in aluminum containing up to 0.4% lead by weight	Cat 1-7 & 10	Expired	(See new wording below for new exemption 6(b)-I.)
6(b)-i		Cat 8 other than in vitro		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	Subcategory created for IBM tracking purposes.
6(b)-ii		Cat 8 in vitro		Subcategory created for IBM tracking purposes. See footnote 4
6(b)-iii		Cat 9 industrial Cat 11	TBD: Under Review	Subcategory created for IBM tracking purposes.
6(b)-I	Lead as an alloying element in aluminum containing up to 0.4 % lead by weight, provided it stems from lead-bearing aluminum scrap recycling.	Cat 1-7 & 10	TBD: Under Review	
6(b)-II	Lead as an alloying element in aluminum for machining purposes with a lead content up to 0.4 % by weight	Cat 1-7 & 10	TBD: Under Review	

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6(c)	Copper alloy containing up to 4% lead (Pb) by weight	Cat 1-7 & 10	TBD: Under Review		
6(c)-i		Cat 8 other than in vitro		Subcategory created for IBM tracking purposes. See footnote 4	
		Cat 9 other than industrial	TBD: Under Review		
6(c)-ii		Cat 8 in vitro		Subcategory created for IBM tracking purposes. See footnote 4	
6(c)-iii		Cat 9 industrial	TBD: Under Review	21 July 2024	Subcategory created for IBM tracking purposes.
		Cat 11			
7(a)	Lead (Pb) in high melting temperature type solders (i.e. lead-based alloys containing 85% by weight or more lead)	Cat 1-7 & 10	TBD: Under Review	(Except applications covered by point 24 of this Annex)	
7(a)-i		Cat 8 other than in vitro		See footnote 4	
		Cat 9 other than industrial	TBD: Under Review	Subcategory created for IBM tracking purposes.	
7(a)-ii		Cat 8 in vitro		See footnote 4	
7(a)-iii		Cat 9 industrial Cat 11	TBD: Under Review	Subcategory created for IBM tracking purposes.	
7(b)	Lead (Pb) in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signaling, transmission, and network management for telecommunications	All	Expired 21 July 2016	This exemption is not allowed.	
7(c)-I	Electrical and electronic components containing lead (Pb) in a glass or ceramic other than dielectric ceramic in capacitors, e.g., piezoelectric devices, or in a glass or ceramic matrix compound	Cat 1-7 & 10	TBD: Under Review	(Except applications covered under point 34 of this Annex)	
7(c)-I-i		Cat 8 other than in vitro		See footnote 4	
		Cat 9 other than industrial	TBD: Under Review	Subcategory created for IBM tracking purposes.	
7(c)-I-ii		Cat 8 in vitro		Subcategory created for IBM tracking purposes. See footnote 4	
7(c)-I-iii		Cat 9 industrial Cat 11	TBD: Under Review	Subcategory created for IBM tracking purposes.	
7(c)-II	Lead (Pb) in dielectric ceramic in capacitors for a rated voltage of 125V AC or 250V DC or higher	Cat 1-7 & 10	TBD: Under Review	Does not apply to applications covered by exemptions 7(c)-I and 7(c)-IV.	
7(c)-II-i		Cat 8 other than in vitro		See footnote 4	
		Cat 9 other than industrial	TBD: Under Review	Subcategory created for IBM tracking purposes.	

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7(c)-II-ii		Cat 8 in vitro		Subcategory created for IBM tracking purposes. See footnote 4
7(c)-II-iii		Cat 9 industrial	TBD: Under Review	Subcategory created for IBM tracking purposes.
		Cat 11	21 July 2024	
7(c)-III	Lead (Pb) in dielectric ceramic in capacitors for a rated voltage of less than 125V AC or 250V DC	All	Expired 1 January 2013	This exemption is not allowed for IBM Deliverables
7(c)-IV	Lead (Pb) in PZT based dielectric ceramic materials for capacitors which are part of integrated circuits or discrete semiconductors	Cat 1-7 & 10	Expired	
7(c)-IV-i		Cat 8 other than in vitro		See footnote 4
		Cat 9 other than industrial	Expired	Subcategory created for IBM tracking purposes.
7(c)-IV-ii		Cat 8 in vitro		See footnote 4 Subcategory created for IBM tracking purposes.
7(c)-IV-iii		Cat 9 industrial Cat 11	21 July 2024	Subcategory created for IBM tracking purposes.
8(a)	Cadmium and its compounds in one shot pellet type thermal cut-offs	All	Expired 1 January 2012	
8(b)	Cadmium and its compounds in electrical contacts	Cat 1-7 & 10	Expired 16 Jan 2015	(see new wording below in exemption 8bI)
8(b)-i		Cat 8 other than in vitro		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	Subcategory created for IBM tracking purposes.
8(b)-ii		Cat 8 in vitro		Subcategory created for IBM tracking purposes. See footnote 4
8(b)-iii		Cat 9 industrial	TBD: Under Review	Subcategory created for IBM tracking purposes.
		Cat 11	21 July 2024	
8(b)-I	Cadmium and its compounds in electrical contacts used in: - circuit breakers; - thermal sensing controls; - thermal motor protectors (excluding hermetic thermal motor protectors); - AC switches rated at: * 6 A and more at 250 V AC and more; or * 12 A and more at 125 V AC and more; - DC switches rated at 20 A and more at 18 V DC and more; and - switches for use at voltage supply frequency ≥ 200 Hz.	Cat 1-7 & 10	TBD: Under Review	
9	Hexavalent chromium as an anticorrosion agent of the carbon steel cooling system in absorption refrigerators up to 0.75 % weight in the cooling solution	Cat 1-7 & 10	Expired	See footnote 5

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No.	EU Directive 2011/65/EU Exemptions from <u>Annex III</u> for Electrical and Electronic Equipment Categories 1 through 11	Category <sup>1</sup>	Exemption Status/Date <sup>2,3</sup>	IBM Requirements/Notes <sup>4,5</sup>
9-i		Cat 8 other than in vitro		See footnote 4
		Cat 9 other than industrial	Expired	Subcategory created for IBM tracking purposes.
9-ii		Cat 8 in vitro		See footnote 4
9-iii		Cat 9 industrial Cat 11	21 July 2024	Subcategory created for IBM tracking purposes.
9(a)	DecaBDE in polymeric applications	All	30 June 2008	This exemption is not allowed for IBM Deliverables.
9(a)-I	Up to 0.75 % hexavalent chromium by weight, used as an anticorrosion agent in the cooling solution of carbon steel cooling systems of absorption refrigerators (including minibars) designed to operate fully or partly with electrical heater, having an average utilized power input < 75 W at constant running conditions	Cat 1-7 & 10	Expired 5 March 2021.	This exemption is not allowed for IBM Deliverables.
9(a)-II	Up to 0.75 % hexavalent chromium by weight, used as an anticorrosion agent in the cooling solution of carbon steel cooling systems of absorption refrigerators: — designed to operate fully or partly with electrical heater, having an average utilized power input ≥ 75 W at constant running conditions, — designed to fully operate with non-electrical heater.	Cat 1-7 & 10	Not allowed in IBM deliverables.	This exemption is not allowed for IBM Deliverables.
9(b)	Lead (Pb) in bearing shells and bushes for refrigerant-containing compressors for heating, ventilation, air conditioning and refrigeration (HVACR) applications	Cat 1-7 & 10	Expired.	See footnote 5
9(b)-i		Cat 8 in vitro	21 July 2023	Subcategory created for IBM tracking purposes.
9(b)-ii		Cat 9 industrial Cat 11	21 July 2024	Subcategory created for IBM tracking purposes.
9(b)-iii		Cat 8 other than in vitro		See footnote 4
		Cat 9 other than industrial	Expired 21 July 2021	Subcategory created for IBM tracking purposes.
9(b)-(I)	Lead (Pb) in bearing shells and bushes for refrigerant- containing hermetic scroll compressors with a stated electrical power input equal or below 9 kW for heating, ventilation, air conditioning and refrigeration (HVACR) applications	Cat 1-7 & 10	Expired	This exemption is not allowed for IBM Deliverables.
11(a)	Lead (Pb) used in C-press compliant pin connector systems	All	Expired 24 September 2010	This exemption is not allowed for IBM Deliverables.
11(b)	Lead (Pb) used in other than C-press compliant pin connector systems	All	Expired 1 January 2013	This exemption is not allowed for IBM Deliverables.

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No.	EU Directive 2011/65/EU Exemptions from <u>Annex III</u> for Electrical and Electronic Equipment Categories 1 through 11	Category <sup>1</sup>	Exemption Status/Date <sup>2,3</sup>	IBM Requirements/Notes <sup>4,5</sup>
12	Lead (Pb) as a coating material for the thermal conduction module C-ring	All	Expired 24 September 2010	This exemption is not allowed for IBM Deliverables.
13(a)	Lead (Pb) in white glasses used for optical applications			See subcategories below.
13(a)-i		Cat 8 in vitro		Subcategory created for IBM tracking purposes. See footnote 4
13(a)-ii		Cat 9 industrial Cat 9 other Cat 11	TBD: Under Review	Subcategory created for IBM tracking purposes.
13(a)-iii		Cat 1-7 & 10	TBD: Under Review	Subcategory created for IBM tracking purposes.
13(b)	Cadmium and lead (Pb) in filter glasses and glasses used for reflectance standards.	Cat 1-7 & 10	Expired 5 July 2018	
13(b)-i		Cat 8 in vitro		Subcategory created for IBM tracking purposes. See footnote 4
13(b)-ii		Cat 9 industrial & Cat 11	TBD: Under Review	Subcategory created for IBM tracking purposes.
13(b)-iii		Cat 8 other than in vitro		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	Subcategory created for IBM tracking purposes.
13(b)-(I)	Lead (Pb) in ion coloured optical filter glass types	Cat 1-7 & 10	TBD: Under Review	
13(b)-(II)	Cadmium in striking optical filter glass types; (excluding applications falling under exemption 39 of RoHS Annex III.)	Cat 1-7 & 10	TBD: Under Review	
13(b)-(III)	Cadmium and lead (Pb) in glazes used for reflectance standards	Cat 1-7 & 10	TBD: Under Review	
14	Lead (Pb) in solders consisting of more than two elements for the connection between the pins and the package of microprocessors with a lead content of more than 80% and less than 85% by weight	All	Expired 1 January 2011	This exemption is not allowed for IBM Deliverables.
15	Lead (Pb) in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit flip chip packages	Cat 1-7 & 10	Expired.	See 15(a) below for new exemption wording.
15-i		Cat 8 other than in vitro		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	Subcategory created for IBM tracking purposes.
15-ii		Cat 8 in vitro		Subcategory created for IBM tracking purposes. See footnote 4
15-iii		Cat 11	21 July 2024	Subcategory created for IBM tracking purposes.
		Cat 9 industrial	TBD: Under Review	

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No.	EU Directive 2011/65/EU Exemptions from <u>Annex III</u> for Electrical and Electronic Equipment Categories 1 through 11	Category <sup>1</sup>	Exemption Status/Date <sup>2,3</sup>	IBM Requirements/Notes <sup>4,5</sup>
15(a)	Lead (Pb) in solders to complete a viable electrical connection between the semiconductor die and carrier within integrated circuit flip chip packages where at least one of the following criteria applies: - a semiconductor technology node of 90 nm or larger; - a single die of 300 mm <sup>2</sup> or larger in any semiconductor technology node; - stacked die packages with die of 300 mm <sup>2</sup> or larger, or silicon interposers of 300 mm <sup>2</sup> or larger.	Cat 1-7 & 10	TBD: Under Review	
16	Lead (Pb) in linear incandescent lamps with silicate coated tubes	All	Expired 1 September 2013	This exemption is not allowed for IBM Deliverables
17	Lead (Pb) halide as radiant agent in High Intensity Discharge (HID) lamps used for professional reprography applications	All	Expired	See footnote 4 See footnote 5 This exemption is not allowed for IBM Deliverables.
18(a)	Lead (Pb) as activator in the fluorescent powder (1% lead by weight or less) of discharge lamps when used as specialty lamps for diazoprinting reprography, lithography, insect traps, photochemical and curing processes containing phosphors such as SMS ((Sr,Ba) <sub>2</sub> MgSi <sub>2</sub> O <sub>7</sub> :Pb)	Cat 1-7 & 10	Expired 1 January 2011	This exemption is not allowed for IBM Deliverables.
18(b)	Lead (Pb) as activator in the fluorescent powder (1% lead by weight or less) of discharge lamps when used as sun tanning lamps containing phosphors such as BSP (BaSi <sub>2</sub> O <sub>5</sub> :Pb)	Cat 1-7 & 10	Expired for IBM Deliverables.	See footnote 5
18(b)-i		Cat 8 other than in vitro		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	Subcategory created for IBM tracking purposes.
18(b)-ii		Cat 8 in vitro		See footnote 4
18(b)-iii		Cat 9 industrial	21 July 2024	Subcategory created for IBM tracking purposes.
		Cat 11	TBD: Under Review	Subcategory created for IBM tracking purposes.
18(b)-I	Lead (Pb) as activator in the fluorescent powder (1% lead by weight or less) of discharge lamps containing phosphors such as BSP (BaSi <sub>2</sub> O <sub>5</sub> :Pb), when used in medical phototherapy equipment.	Cat 5 and 8	Not allowed in IBM equipment	Applies to categories 5 and 8, excluding applications covered by entry 34 of Annex IV. See footnote 4
19	Lead (Pb) with PbBiSn-Hg and PbInSn-Hg in specific compositions as main amalgam and with PbSn-Hg as auxiliary amalgam in very compact Energy Saving Lamps (ESL)	All	Expired 1 June 2011	This exemption is not allowed for IBM Deliverables.

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20	Lead (Pb) oxide in glass used for bonding front and rear substrates of flat fluorescent lamps used for Liquid Crystal Displays (LCDs)	All	Expired 1 June 2011	This exemption is not allowed for IBM Deliverables.
21	Lead (Pb) and Cadmium (Cd) in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glasses	Cat 1-7 & 10	Expired for IBM Deliverables released after January 16th, 2015.	See footnote 5
21-i		Cat 8 other than in vitro		See footnote 4 Subcategory created for IBM tracking purposes
		Cat 9 other than industrial	Expired 21 July 2021	
21-ii		Cat 8 in vitro		See footnote 4
21-iii		Cat 9 industrial Cat 11	21 July 2024	Subcategory created for IBM tracking purposes
21(a)	Cadmium when used in colour printed glass to provide filtering functions, used as a component in lighting applications installed in displays and control panels of EEE.	Cat 1-7 & 10	Expired 21 July 2021	Except applications covered by exemption 21(b) or exemption 39.
21(b)	Cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glasses.	Cat 1-7 & 10	Expired 21 July 2021	Except applications covered by exemptions 21(a) or 39
21(c)	Lead in printing inks for the application of enamels on other than borosilicate glasses.	Cat 1-7 & 10	Expired 21 July 2021	Applies to categories 1 to 7 and 10 and expires on 21 July 2021.
22	Lead (Pb) as impurity in RIG (rare earth iron garnet) Faraday rotators used for fiber optic communications systems	All	Expired 31 December 2009	This exemption is not allowed for IBM Deliverables.
23	Lead (Pb) in finishes of fine pitch components other than connectors with a pitch of 0.65 mm and less	All	Expired 23 September 2010	This exemption is not allowed for IBM Deliverables.
24	Lead (Pb) in solders for the soldering to machined through hole discoidal and planar array ceramic multilayer capacitors	Cat 1-7 & 10	Expired for IBM Deliverables released after January 16th, 2015	See footnote 5
24-i		Cat 8 other than in vitro		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	Subcategory created for IBM tracking purposes.
24-ii		Cat 8 in vitro		See footnote 4
24-iii		Cat 9 industrial Cat 11	TBD: Under Review 21 July 2024	Subcategory created for IBM tracking purposes
25	Lead (Pb) oxide in surface conduction electron emitter displays (SED) used in structural elements, notably in the seal frit and frit ring	All	Expired/Not allowed for IBM Deliverables	See footnote 5

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26	Lead (Pb) oxide in the glass envelope of black light blue lamps	All	Expired 1 June 2011	This exemption is not allowed for IBM Deliverables.
27	Lead (Pb) alloys as solder for transducers used in high-powered (designated to operate for several hours at acoustic power levels of 125 dB SPL and above) loudspeakers	All	Expired 24 September 2010	This exemption is not allowed for IBM Deliverables.
28	Hexavalent chromium in corrosion preventive coating of unpainted metal sheeting and fasteners used for corrosion protection and Electromagnetic Interference Shielding in equipment falling under category three of Directive 2002/96/EC (IT and telecommunications equipment)	All	Expired 1 July 2007	This exemption is not allowed for IBM Deliverables.
29	Lead (Pb) bound in crystal glass as defined in Annex I (Categories 1, 2, 3 and 4) of Council Directive 69/493/EEC (Council Directive 69/493/EEC of 15 December 1969 on the approximation of the laws of the Member States relating to crystal glass)	Cat 1-7 & 10	TBD: Under Review	
29-i		Cat 8 other than in vitro		See footnote 4
		Cat 9 other than industrial	Expired	Subcategory created for IBM tracking purposes
29-ii		Cat 8 in vitro		See footnote 4
29-iii		Cat 9 industrial	21 July 2024	Subcategory created for IBM tracking purposes
		Cat 11	TBD: Under Review	
30	Cadmium alloys as electrical/mechanical solder joints to electrical conductors located directly on the voice coil in transducers used in high-powered loudspeakers with sound pressure levels of 100 dB (A) and more	All	Expired/Not allowed for IBM Deliverables	See footnote 5
31	Lead (Pb) in soldering materials in mercury free flat fluorescent lamps (which e.g. are used for liquid crystal displays, design or industrial lighting)	All	Expired/Not allowed for IBM deliverables	See footnote 5
32	Lead (Pb) oxide in seal frit used for making window assemblies for Argon and Krypton laser tubes	Cat 1-7 & 10	Expired	See footnote 5
32-i		Cat 8 other than in vitro		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	Subcategory created for IBM tracking purposes
32-ii		Cat 8 in vitro	21 July 2023	See footnote 4
32-iii		Cat 9 industrial	TBD: Under Review	Subcategory created for IBM tracking purposes
		Cat 11	21 July 2024	
33	Lead (Pb) in solders for the soldering of thin copper wires of 100 µm diameter and less in power transformers	All	Expired/not allowed for IBM deliverables	See footnote 5

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34	Lead (Pb) in cermet-based trimmer potentiometer elements	Cat 1-7 & 10	Expired/not allowed for IBM deliverables.	See footnote 5
34-i		Cat 8 other than in vitro		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	Subcategory created for IBM tracking purposes
34-ii		Cat 8 in vitro		See footnote 4
34-iii		Cat 9 industrial	TBD: Under Review	Subcategory created for IBM tracking purposes
		Cat 11	21 July 2024	
35	Cadmium in photoresistors for optocouplers applied in professional audio equipment	All	Expired 31 December 2009	This exemption is not allowed for IBM Deliverables.
36	Mercury used as a cathode sputtering inhibitor in DC plasma displays with a content up to 30 mg per display	All	1 July 2010	This exemption is not allowed for IBM Deliverables.
37	Lead (Pb) in the plating layer of high voltage diodes on the basis of a zinc borate glass body	Cat 1-7 & 10	Expired	See footnote 5
37-i		Cat 8 other than in vitro		Subcategory created for IBM tracking purposes See footnote 4
		Cat 9 other than industrial	Expired	
37-ii		Cat 8 in vitro		Subcategory created for IBM tracking purposes See footnote 4
37-iii		Cat 9 industrial Cat 11	21 July 2024	Subcategory created for IBM tracking purposes
38	Cadmium and cadmium oxide in thick film pastes used on aluminum bonded beryllium oxide	All	Expired/Not allowed in IBM Deliverables	See footnote 5
39	Cadmium in colour converting II-VI LEDs (< 10 µg Cd per mm <sup>2</sup> of light-emitting area) for use in solid state illumination or display systems	All	1 July 2014	This exemption is not allowed for IBM Deliverables and has been eliminated by the EU and replaced by 39(a), see below.
39(a)	Cadmium selenide in downshifting cadmium-based semiconductor nanocrystal quantum dots for use in display lighting applications (< 0,2 µg Cd per mm <sup>2</sup> of display screen area)	All	Not allowed in IBM Deliverables	
40	Cadmium in photoresistors for analogue optocouplers applied in professional audio equipment	Cat 1-7 & 10	31 December 2013	This exemption is not allowed for IBM Deliverables.

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41	Lead (Pb) in solders and termination finishes of electrical and electronic components and finishes of printed circuit boards used in ignition modules and other electrical and electronic engine control systems, which for technical reasons must be mounted directly on or in the crankcase or cylinder of hand-held combustion engines (classes SH:1, SH:2, SH:3, of Directive 97/68/EC of the European Parliament and the Council)	Cat 1-7 & 10	31 Dec 2018	This exemption is not allowed for IBM Deliverables.
42	Lead in bearings and bushes of diesel or gaseous fuel powered internal combustion engines applied in non-road professional use equipment: – with engine total displacement ≥ 15 liters; or – with engine total displacement < 15 liters and the engine is designed to operate in applications where the time between signal to start and full load is required to be less than 10 seconds; or regular maintenance is typically performed in a harsh and dirty outdoor environment, such as mining, construction, and agriculture applications.	Cat 11	TBD: Under Review	Applies to category 11, excluding applications covered by exemption 6(c).
43	Bis(2-ethylhexyl) phthalate in rubber components in engine systems, designed for use in equipment that is not intended solely for consumer use and provided that no plasticized material comes into contact with human mucous membranes or into prolonged contact with human skin and the concentration value of bis(2ethylhexyl) phthalate does not exceed: (a) 30 % by weight of the rubber for (i) gasket coatings; (ii) solid-rubber gaskets; or (iii) rubber components included in assemblies of at least three components using electrical, mechanical or hydraulic energy to do work, and attached to the engine. (b) 10% by weight of the rubber for rubber-containing components not referred to in point (a). For the purposes of this entry, ‘prolonged contact with human skin’ means continuous contact of more than 10 minutes duration or intermittent contact over a period of 30 minutes, per day.	Cat 11	21 July 2024	
44	Lead in solder of sensors, actuators, and engine control units of combustion engines within the scope of Regulation (EU) 2016/1628 of the European Parliament and of the Council, installed in equipment used at fixed positions while in operation which is designed for professionals, but also used by non-professional users	Cat 11	21 July 2024	Applies to category 11 and expires on 21 July 2024

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45	Lead diazide, lead styphnate, lead dipicramate, orange lead (lead tetroxide), lead dioxide in electric and electronic initiators of explosives for civil (professional) use and barium chromate in long time pyrotechnic delay charges of electric initiators of explosives for civil (professional) use	Cat 11		

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**Table 3. RoHS Exemptions – EU Directive 2011/65/EU Annex IV for Electrical and Electronic Equipment Categories 8 and 9 only**

No.	EU Directive 2011/65/EU Exemptions from Annex IV for Electrical and Electronic Equipment Categories 8 and 9 only	Category	EU Expiration Date	Comments
Equipment utilizing or detecting ionizing radiation				
1	Lead, cadmium and mercury in detectors for ionizing radiation.	Cat 8		See footnote 4
		Cat 9 other than industrial Cat 9 industrial	TBD: Under Review	
2	Lead bearings in X-ray tubes.	Cat 8		See footnote 4
		Cat 9 other than industrial Cat 9 industrial	TBD: Under Review 21 July 2024	
3	Lead in electromagnetic radiation amplification devices: micro-channel plate and capillary plate.	Cat 8		See footnote 4
		Cat 9 other than industrial Cat 9 industrial	TBD: Under Review	
4	Lead in glass frit of X-ray tubes and image intensifiers and lead in glass frit binder for assembly of gas lasers and for vacuum tubes that convert electromagnetic radiation into electrons.	Cat 8 Cat 9 other than industrial	Expired	See footnote 4
		Cat 9 industrial	TBD: Under Review	
5	Lead in shielding for ionizing radiation.	Cat 8		See footnote 4
		Cat 9 other than industrial Cat 9 industrial	TBD: Under Review	
6	Lead in X-ray test objects.	Cat 8		See footnote 4
		Cat 9 other than industrial Cat 9 industrial	Expired 21 July 2024	
7	Lead stearate X-ray diffraction crystals.	Cat 8		See footnote 4
		Cat 9 other than industrial Cat 9 industrial	Expired 21 July 2024	
8	Radioactive cadmium isotope source for portable X-ray fluorescence spectrometers.	Cat 8		See footnote 4
		Cat 9 other than industrial Cat 9 industrial	Expired 21 July 2024	
Sensors, detectors and electrodes				
1a	Lead and cadmium in ion selective electrodes including glass of pH electrodes.			
1b	Lead anodes in electrochemical oxygen sensors.			
1c	Lead, cadmium and mercury in infra-red light detectors.			

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No.	EU Directive 2011/65/EU Exemptions from Annex IV for Electrical and Electronic Equipment Categories 8 and 9 only	Category	EU Expiration Date	Comments
1d	Mercury in reference electrodes: low chloride mercury chloride, mercury sulphate and mercury oxide.			
	Others			
9	Cadmium in helium-cadmium lasers.	Cat 8		See footnote 4
		Cat 9 other than industrial	Expired	
		Cat 9 industrial	TBD: Under Review	
10	Lead and cadmium in atomic absorption spectroscopy lamps.	Cat 8		See footnote 4
		Cat 9 other than industrial	Expired	
		Cat 9 industrial	TBD: Under Review	
11	Lead in alloys as a superconductor and thermal conductor in MRI.	Cat 8		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	
		Cat 9 industrial	21 July 2024	
12	Lead and cadmium in metallic bonds creating superconducting magnetic circuits in MRI, SQUID, NMR (Nuclear Magnetic Resonance) or FTMS (Fourier Transform Mass Spectrometer) detectors.	Cat 8		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	See footnote 4
		Cat 9 industrial	TBD: Under Review	
13	Lead in counterweights.	Cat 8		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	
		Cat 9 industrial	21 July 2024	
14	Lead in single crystal piezoelectric materials for ultrasonic transducers.	Cat 8		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	
		Cat 9 industrial	21 July 2024	
15	Lead in solders for bonding to ultrasonic transducers.	Cat 8		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	
		Cat 9 industrial	21 July 2024	
16	Mercury in very high accuracy capacitance and loss measurement bridges and in high frequency RF switches and relays in monitoring and control instruments not exceeding 20 mg of mercury per switch or relay.	Cat 8		See footnote 4
		Cat 9 other than industrial	Expired	
		Cat 9 industrial	21 July 2024	

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17	Lead in solders in portable emergency defibrillators.	Cat 8		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	
		Cat 9 industrial	21 July 2024	
18	Lead in solders of high performance infrared imaging modules to detect in the range 8-14 $\mu\text{m}$ .	Cat 8		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	
		Cat 9 industrial	21 July 2024	
19	Lead in Liquid crystal on silicon (LCoS) displays.	Cat 8		See footnote 4
		Cat 9 other than industrial	Expired	
		Cat 9 industrial	21 July 2024	
20	Cadmium in X-ray measurement filters.	Cat 8		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	
		Cat 9 industrial	21 July 2024	
21	Cadmium in phosphor coatings in image intensifiers for X-ray images.	Cat 8 & 9	Expired 31 December 2019	Allowed in spare parts for X-ray systems placed on the EU market before 1 Jan 2020. See footnote 4
22	Lead acetate marker for use in stereotactic head frames for use with CT and MRI and in positioning systems for gamma beam and particle therapy equipment.	Cat 8 & 9	Expired 30 June 2021	See footnote 4
23	Lead as an alloying element for bearings and wear surfaces in medical equipment exposed to ionizing radiation.	Cat 8 & 9	Expired 30 June 2021	See footnote 4
24	Lead enabling vacuum tight connections between aluminum and steel in X-ray image intensifiers.	Cat 8 & 9	Expired 31 December 2019	See footnote 4
25	Lead in the surface coatings of pin connector systems requiring nonmagnetic connectors which are used durably at a temperature below $-20\text{ }^{\circ}\text{C}$ under normal operating and storage conditions.	Cat 8 & 9	30 June 2021	See footnote 4
26	Lead in the following applications that are used durably at a temperature below $-20\text{ }^{\circ}\text{C}$ under normal operating and storage conditions: (a) solders on printed circuit boards; (b) termination coatings of electrical and electronic components and coatings of printed circuit boards; (c) solders for connecting wires and cables; (d) solders connecting transducers and sensors. Lead in solders of electrical connections to temperature measurement sensors in devices which are designed to be used periodically at temperatures below $-150\text{ }^{\circ}\text{C}$ .	Cat 8		See footnote 4

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No.	EU Directive 2011/65/EU Exemptions from Annex IV for Electrical and Electronic Equipment Categories 8 and 9 only	Category	EU Expiration Date	Comments
		Cat 9 other than industrial	TBD: Under Review	
		Cat 9 industrial	21 July 2024	
27	Lead in — solders, — termination coatings of electrical and electronic components and printed circuit boards, — connections of electrical wires, shields and enclosed connectors, which are used in (a) magnetic fields within the sphere of 1 m radius around the isocentre of the magnet in medical magnetic resonance imaging equipment, including patient monitors designed to be used within this sphere, or (b) magnetic fields within 1 m distance from the external surfaces of cyclotron magnets, magnets for beam transport and beam direction control applied for particle therapy.	All		
28	Lead in solders for mounting cadmium telluride and cadmium zinc telluride digital array detectors to printed circuit boards.	All	Expired 31 December 2017	This exemption is not allowed for IBM Deliverables
29	Lead in alloys, as a superconductor or thermal conductor, used in cryo-cooler cold heads and/or in cryo-cooled cold probes and/or in cryo-cooled equipotential bonding systems, in medical devices (category 8) and/or in industrial monitoring and control instruments.	Cat 8		See footnote 4
		Cat 9 other than industrial	TBD: Under Review	See footnote 4
		Cat 9 industrial	Expired	
30	Hexavalent chromium in alkali dispensers used to create photocathodes in X-ray image intensifiers.	All	Expired 31 December 2019	Allowed in spare parts for X-ray systems placed on the EU market before 1 Jan 2020.
31a	Lead, cadmium, hexavalent chromium, and polybrominated diphenyl ethers (PBDE) in spare parts recovered from and used for the repair or refurbishment of medical devices, including <i>in vitro</i> diagnostic medical devices, or electron microscopes and their accessories, provided that the reuse takes place in auditable closed-loop business-to-business return systems and that each reuse of parts is notified to the customer.	8 other than <i>in vitro</i>	Not allowed	This exemption is not allowed for IBM Deliverables. See footnote 4
31a-i	See exemption 31a above.	9 other than industrial	Not allowed	This exemption is not allowed for IBM Deliverables.
31a-ii	See exemption 31a above.	8 <i>in vitro</i>	Not allowed	This exemption is not allowed for IBM Deliverables. See footnote 4

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31a-iii	See exemption 31a above.	Cat 9 industrial	Not allowed	This exemption is not allowed for IBM Deliverables.
32	Lead in solders on printed circuit boards of detectors and data acquisition units for Positron Emission Tomographs which are integrated into Magnetic Resonance Imaging equipment.	All	Expired 31 December 2019	This exemption is not allowed for IBM Deliverables
33	Lead in solders on populated printed circuit boards used in Directive 93/42/EEC class IIa and IIb mobile medical devices other than portable emergency defibrillators.		See below for specific date by category and subcategory	
33-i	See exemption 33 above.		Expired	
33-ii	See exemption 33 above.		Expired	
34	Lead as an activator in the fluorescent powder of discharge lamps when used for extracorporeal photopheresis lamps containing BSP (BaSi <sub>2</sub> O <sub>5</sub> : Pb) phosphors.		Expired 22 July 2021	
35	Mercury in cold cathode fluorescent lamps for back-lighting liquid crystal displays, not exceeding 5 mg per lamp, used in industrial monitoring and control instruments placed on the market before 22 July 2017.		Expired 21 July 2024	Not allowed in IBM Deliverables
36	Lead used in other than C-press compliant pin connector systems for industrial monitoring and control instruments.		Expired 31 December 2020	See footnote 4
37	Lead in platinized platinum electrodes used for conductivity measurements where at least one of the following conditions applies: (a) wide-range measurements with a conductivity range covering more than 1 order of magnitude (e.g. range between 0.1 mS/m and 5 mS/m) in laboratory applications for unknown concentrations; (b) measurements of solutions where an accuracy of +/- 1 % of the sample range and where high corrosion resistance of the electrode are required for any of the following: (i) solutions with an acidity < pH 1; (ii) solutions with an alkalinity > pH 13; (iii) corrosive solutions containing halogen gas; © Measurements of conductivities above 100 mS/m that must be performed with portable instruments.	All		
38	Lead in solder in one interface of large area stacked die elements with more than 500 interconnects per interface which are used in X-ray detectors of computed tomography and X-ray systems.		Expired 31 December 2019	May be used after 31 Dec 2019 in spare parts for CT and X-ray systems placed on the market before 1 January 2020

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No.	EU Directive 2011/65/EU Exemptions from Annex IV for Electrical and Electronic Equipment Categories 8 and 9 only	Category	EU Expiration Date	Comments
39	Lead in micro-channel plates (MCPs) used in equipment where at least one of the following properties is present: (a) a compact size of the detector for electrons or ions, where the space for the detector is limited to a maximum of 3 mm/MCP (detector thickness + space for installation of the MCP), a maximum of 6 mm in total, and an alternative design yielding more space for the detector is scientifically and technically impracticable; (b) a two-dimensional spatial resolution for detecting electrons or ions, where at least one of the following applies: - a response time shorter than 25 ns; - a sample detection area larger than 149 mm <sup>2</sup> ; - a multiplication factor larger than 1.3 × 10 <sup>3</sup> . (c) a response time shorter than 5 ns for detecting electrons or ions; (d) a sample detection area larger than 314 mm <sup>2</sup> for detecting electrons or ions; (e) a multiplication factor larger than 4.0 × 10 <sup>7</sup> .		See expiration dates below	
39-i	See exemption 39 above.	Cat 8		See footnote 4
39-ii	See exemption 39 above.	Cat 9 other than industrial	TBD: Under Review	
39-iii	See exemption 39 above.	Cat 9 industrial	TBD: Under Review	
40	Lead in dielectric ceramic in capacitors for a rated voltage of less than 125 V AC or 250 V DC for industrial monitoring and control instruments.	Cat 9 industrial	Expired 31 December 2020	
41	Lead as a thermal stabilizer in polyvinyl chloride (PVC) used as base material in amperometric, potentiometric and conductometric electrochemical sensors which are used in <i>in-vitro</i> diagnostic medical devices for the analysis of blood and other body fluids and body gases.		Expired March 31, 2022.	
42	Mercury in electric rotating connectors used in intravascular ultrasound imaging systems capable of high operating frequency (> 50 MHz) modes of operation.		30 June 2019	This exemption is not allowed for IBM Deliverables
43	Cadmium anodes in Hersch cells for oxygen sensors used in industrial monitoring and control instruments, where sensitivity below 10 ppm is required.		Expired 15 July 2023	
44	Cadmium in radiation tolerant video camera tubes designed for cameras with a center resolution greater than 450 TV lines which are used in environments with ionising radiation exposure exceeding 100 Gy/hour and a total dose in excess of 100kGy.	8 other than in vitro		See footnote 4
		9 other than industrial 9 industrial		

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Batteries are exempt from the EU RoHS Directive but have their own requirements for material restrictions in other EU Directives and legal requirements in other jurisdictions. See IBM Engineering Specification 46G3772 for material restrictions for batteries.

## 2.4 Lead (Pb) and Lead (Pb) Compounds

### 2.4.1 Acceptable Lead (Pb) - Free Finishes for Electronic Components

The table below lists finishes that are acceptable per this specification. Finishes not designated in the following table may be acceptable pending review and approval by IBM Development Engineering. Contact IBM Procurement Engineering for information about this review. Typical applications include, but are not limited to, lead-frames, heat sinks, and connectors. The minimum tin or tin alloy thickness is determined by the applications.

#### Acceptable Finishes for Electronic Components

Finish	Notes
Palladium-Nickel (PdNi) with gold (Au) flash	For connectors, gold (Au) flash is 5-10 microinches.
Palladium-Nickel (PdNi) without gold (Au) flash	For connectors, IBM approval is required if gold (Au) flash is omitted from the mating or termination areas.
Electroless Nickel under Electroless Palladium under Immersion Gold Flash (ENEPIG)	Typically used as a printed wiring board pad finish option. Can be used as a connector surface finish and may have limited applicability as a Solderable finish. IBM approval is required.
Fused, dipped or reflowed 100% Tin (Sn) or Tin (Sn) Alloys	Acceptable without additional mitigation. Alloying elements include silver (Ag), bismuth (Bi), copper (Cu), zinc (Zn), and nickel (Ni).
Tin over nickel underlay (Sn/Ni)	Connectors require 1.25 microns nickel (Ni) thickness. Non-connector applications require 1.0 micron minimum nickel (Ni) thickness. Nickel (Ni) films with less than 1.0 micron thickness require IBM Development Engineering approval. Both bright and matte tins are acceptable with Nickel (Ni) underlay.
Annealed Tin (Sn) (matte, bright, or alloyed) over copper (Cu) base metal	Annealing temperature must be greater than 120°C for one hour or more. Annealing must occur within two weeks after plating. Anneal is not required if lead/pin pitch is > 1mm. For connectors: no forming after annealing.
Tin (Sn) over Alloy 42 (Fe/Ni) base metal, with or without Copper (Cu) underlay	Annealing is not required.
Tin alloy: Tin-Bismuth (SnBi) Nominal Bismuth (Bi) concentration: 2 - 4%. Total Bismuth (Bi) range: 1 - 5%	All other Bismuth (Bi) contents require IBM approval. Acceptable over copper, nickel, and Alloy 42 (FeNi). For connectors, specific IBM approval required for any Tin-bismuth (SnBi) usage.
Tin alloy: Tin-Silver (SnAg). Minimum Silver (Ag) concentration: 1%	All other silver (Ag) contents require IBM approval. Acceptable over copper, nickel, and Alloy 42 (FeNi).
Tin alloy Tin-Copper (SnCu) annealed over a copper (Cu) base metal and Tin-copper (SnCu) over Nickel (Ni) underlay	Tin-copper (SnCu) over Copper (not annealed), and Tin-copper (SnCu) over Alloy 42 (FeNi) are not unconditionally acceptable as a finish. Requires IBM Development Engineering approval.
Noble Metals: Gold (Au)	For connector applications there must be a nickel underlay. The gold (Au) thickness is determined by the application.
Noble Metals: Silver (Ag)	All silver (Ag) finishes require IBM Development Engineering approval.
Immersion Tin	Does not require additional mitigation. Has been approved for heat sinks. Requires approval based on test data.
Nickel (Ni)	Unconditionally acceptable for non-soldered surfaces, generally very difficult to solder.

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Solderable finishes which are conditionally acceptable for electronic components, are listed in IBM Procurement Specification 873444.

**2.4.2 Printed Circuit Boards**

Except for the specific exemptions listed in Section 2.3, printed circuit boards must not contain lead (Pb) in amounts greater than those shown in Table 1 including printed circuit board finishes. The RoHS-compatible finishes listed in the table below must also pass further IBM standard qualifications outside the scope of this specification. IBM designed cards using the finishes listed below, require approval from IBM Printed Circuit Board (PCB) Procurement Engineering.

**RoHS Compatible Surface Finish Materials for Printed Circuit Boards**

Finish	Notes
Immersion Tin	Requires approval from IBM PCB Procurement Engineering.
Organic Solder Preservatives (OSPs)	Preferred, for example benzotriazole (BTA). Refer to IBM Procurement Specification 53P4082 for guidelines in selecting the appropriate OSP.
HASL (Hot Air Solder Leveled) Tin or Tin Alloy	Requires approval from IBM PCB Procurement Engineering.
Immersion Silver	Requires approval from IBM PCB Procurement Engineering.
Electroless Nickel Immersion Gold	Requires approval from IBM PCB Procurement Engineering.
Electrolytic Nickel with noble metal over plate, e.g., Electroless Nickel under Electroless Palladium under Immersion Gold Flash (ENEPIG)	Requires approval from IBM PCB Procurement Engineering. For connectors, IBM approval of gold thickness is required.

Laminate material must be compatible with the Lead (Pb)-free assembly process and temperatures. The surface finish must be compatible with the Lead (Pb) - free solder alloys. Note that other IBM specifications may be applicable to the qualification of a PCB supplier’s use of any surface finish on a PCB used for IBM. Contact IBM PCB Procurement Engineering for further information.

**2.4.3 Ball and Column Grid Array (BGA and CGA)**

All solder bumps/balls and solder column technology must be Lead (Pb) free and must be approved by IBM Procurement Engineering to ensure compatibility with entire Lead (Pb) - free solder system.

**2.4.4 Cables and Connectors**

Cable assembly components (e.g., jacket material, over molding materials, housings, tapes, shrink tubing, latches, thumbscrews) will be free of lead (Pb) compounds such as lead-based stabilizers and pigments, except where concentrations in the homogeneous material are less than the maximum concentration values cited in Table 1 or have an applicable exemption as cited in Section 2.3. Connectors/cable assemblies must be compatible with the appropriate lead-free assembly and rework processes, including SMT reflow with a minimum body temperature exposure of 245°C, or PTH wave solder with a nominal solder bath temperature of 265°C. Interconnects not meeting these criteria require approval from IBM Procurement Engineering.

**2.4.5 Acceptable Non-lead (Pb) Solders for Paste, Wave and Rework Solder**

Use of non-lead (Pb) solders for paste, wave, rework, and assembly is required, and the specific solders require both qualification and approval from IBM Procurement Engineering.

**2.5 Hexavalent Chromium (Cr<sup>+6</sup>) and Hexavalent Chromium (Cr<sup>+6</sup>) Compounds**

Hexavalent chromium and its compounds must not be used 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. Hexavalent chromium and its compounds must

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not be used in leather articles or articles containing leather parts coming into contact with skin in concentrations equal to or greater than 3mg/kg (0.0003% by weight) of the total dry weight of the leather.

**2.5.1 Acceptable Substitutes for Metal Finishes**

Acceptable substitutes for hexavalent chromium finishes may include but are not limited to the list below. Note: The following list cites finishes that are compliant to RoHS requirements. Other requirements such as aesthetics may be necessary for parts. The part print is the master document which cites the material code to be used.

IBM Material Code information is located at: <https://www.ibm.com/procurement/plmeasi/>

- IBM Material Code 06-091D, E and F: Hot dip galvanized steel sheet without chromate
- IBM Material Code 06-091H: Steel, galvanized, commercial quality, coating designation Z120/G30, hot dipped galvanized, minimum spangled, temper passed (extra smooth) with hexavalent chromium-free chemical treatment, not oiled
- IBM Material Codes 06-131C: Steel, low carbon, commercial quality, electrogalvanized with hexavalent chromium-free chemical treatment, class B (ASTM A591)
- IBM Material Codes 07-xxx: Steels, alloy
- IBM Material Code 41-020 - Nickel plating
- IBM Material Code 41-027: Nickel-phosphorous electroless plating; specify thickness and class: decorative (alphabetic) and heat-treat (numeric). Post-plating processes which may include hexavalent chromium compounds are not permitted. Note: After 12/01/04, all electroless nickel bath chemistries must not employ Lead (Pb) or Cadmium (Cd) compounds in their formulation
- IBM Material Code 41-091 Type 2A: Zinc plating, black, 5-10 micrometers zinc with Type 2 black chromate must be hexavalent chromium-free, 0.7 grams per square meter
- IBM Material Code 41-091 Type 3: Zinc plating, black, non-conductive black finish
- IBM Material Code 41-093: Zinc plating, includes supplementary yellow or clear chromate conversion coating as specified below:
  - Type 1A: 5 micrometers zinc minimum with yellow iridescent chromate conversion coating which must be hexavalent chromium-free
  - Type 2A: 5 micrometers zinc minimum with clear chromate conversion coating which must be hexavalent chromium-free
  - Type 3A: (for thread-forming fasteners) 5-8 micrometers nickel alloy, 5-8 micrometers zinc with yellow iridescent coating which must be hexavalent chromium-free
- IBM Material Code 41-217A: Hexavalent chromium-free chromate conversion coating: tan on aluminum alloys
- IBM Material Code 41-218A, Hexavalent chromium-free chromate conversion coating: clear on aluminum alloys
- IBM Material Code 41-219A, Hexavalent chromium- free conversion coating for magnesium alloys
- IBM Material Code 41-225A, Hexavalent chromium-free conversion coating: black on aluminum alloys, 0.45 grams per square meter
  - Steel with electroplated chromium finishes must be reviewed and approved by the IBM Development organization responsible for this hardware application
  - Anodization is considered to be a compliant process
  - IBM Material Code 61-0956 Electro-coating process, Black.

**2.5.2 Base Materials**

The following are considered to be compliant to this specification and RoHS as long as the lead (Pb) content does not exceed the maximum concentration value referenced in Table 1 - 0.1% by weight in a homogeneous material. There is an additional exemption for the lead (Pb) content in steel, aluminum and copper alloys referenced below, see Section 2.3 for maximum allowable lead (Pb) content in these alloys. Future releases of this specification will

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eliminate the exemptions for lead (Pb) as an alloying element in steel and aluminum and in copper alloys as these exemptions are eliminated by the EU RoHS Directive.

If a surface coating is specified, it must also be compliant with this specification and RoHS. Surface coatings include plating and surface treatments such as passivation of steel. Please note surface coatings are not required for every application of a base metal.

- 06-XXX: Carbon steels that are not RoHS compliant are marked as such in the IBM Materials Bulletin. Surface coatings must be specified and must be RoHS compliant also (see Section 2.4.1.)
- 07-XXX: Stainless steels.
- 06-080 - Steel, aluminized, type 1 or 2: either oiled or RoHS compliant chemical treatment; shall not contain any hexavalent chromium (Cr+6) in surface treatment.
- 06-081A - Steel, aluminized, type 1, commercial quality, coating designation T1-40: either oiled or RoHS compliant chemical treatment; shall not contain any hexavalent chromium (Cr+6) in surface treatment
- 06-081B - Steel, aluminized, type 1, commercial quality, coating designation T1-25: either oiled or RoHS compliant chemical treatment; shall not contain any hexavalent chromium (Cr+6) in surface treatment
- 06-082A - Steel, aluminized, type 1, drawing quality, coating designation T1-25: either oiled or RoHS compliant chemical treatment; shall not contain any hexavalent chromium (Cr+6) in surface treatment
- 06-082B - Steel, aluminized, type 1, drawing quality, coating designation T1-25: either oiled or RoHS compliant chemical treatment; shall not contain any hexavalent chromium (Cr+6) in surface treatment
- 06-083A - Steel, aluminized, type 2, commercial quality, coating designation T2-100: either oiled or RoHS compliant chemical treatment; shall not contain any hexavalent chromium (Cr+6) in surface treatment
- 06-083B - Steel, aluminized, type 2, commercial quality, coating designation T2-65: either oiled or RoHS compliant chemical treatment; shall not contain any hexavalent chromium (Cr+6) in surface treatment
- 01-XXX: Aluminum and aluminum alloys. Surface coatings must be specified and compliant
- 03-XXX: Copper and copper alloys. Surface coatings must be specified and compliant
- 12- XXX: Magnesium and magnesium alloys. Surface coatings must be specified and compliant
- 15-510, 511 and 512: Titanium and titanium alloys. Surface coatings must be specified and compliant
- 14-100, 101, 102, 110, 120, and 130: Zinc die cast alloys.

## 2.6 Cadmium (Cd) and Cadmium (Cd) compounds

Cadmium and its compounds and alloys must not be used in processes for or on IBM Deliverables (except where concentrations on or in the homogeneous material are less than the maximum concentration values cited in Table 1 or an exemption is allowed in Tables 2 and 3) See IBM specification 46G3772 for additional restrictions. Examples of prohibited uses include but are not limited to the following applications:

- Coloration pigments, for example in cable conductor insulation or cable jacket material
- Stabilizers, for example in polyvinyl chloride (PVC) cables.

## 2.7 PBBs and PBDEs

Polybrominated biphenyls and polybrominated diphenyl ethers must not be used in IBM Deliverables. Examples of prohibited uses include but are not limited to the following applications:

- Flame retardants in printed circuit boards, components, gaskets and plastic resin parts.

This ban applies to all 209 congeners of PBBs and all 209 congeners of PBDEs including, but not limited to the following:

Polybrominated Biphenyls (PBBs)	Chemical Abstracts Service (CAS) #
2-Bromobiphenyl	2052-07-05
3-Bromobiphenyl	2113-57-7
4-Bromobiphenyl	92-66-0
Decabromobiphenyl	13654-09-06

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<b>Polybrominated Biphenyls (PBBs)</b>	<b>Chemical Abstracts Service (CAS) #</b>
Dibromobiphenyl	92-86-4
Heptabromobiphenyl	59080-40-9
Hexabromobiphenyl	59080-40-9
Hexabromo-1,1-biphenyl	36355-01-8,
Nonabromobiphenyl	27753-52-2
Octabromobiphenyl	61288-13-9
Pentabromobiphenyl	56307-79-0
Polybrominated Biphenyl	59536-65-1
Tetrabromobiphenyl	40088-45-7
Tribromobiphenyl	59080-34-1
Firemaster FF-1	67774-32-7

<b>Polybrominated Diphenyl Ethers (PBDEs)</b>	<b>CAS #</b>
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

### 3.0 References

CENELEC EN 50581:2012, EN IEC 63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

EU Directive 93/42/EEC of 14 June 1993 concerning medical devices.

EU Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast) and all amendments.

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).

EU Regulation 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices.

EU Regulation 2017/746 of the European Parliament and of the Council of 5 April 2017 on *in vitro* diagnostic medical devices.

IBM Engineering Specification 46G3772: Baseline Environmental Requirements for Materials, Parts, and Products for IBM Logo Hardware Products:

<http://www.ibm.com/ibm/environment/products/especs.shtml> or  
<https://www.ibm.com/procurement/ossi>

IBM Information for Suppliers web site:  
<https://www.ibm.com/procurement/ossi>

IBM Material Codes Directory.

IEC 62321, Electrotechnical products - Determination of Levels of Six Regulated Substances, International Electrotechnical Commission <http://www.iec.ch>.

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Nilsson, Nils H., Malmgren-Hansen, B, and Ivan Christensen. *Denmark Development and use of screening methods to determine chromium (IV) and brominated flame retardants in electrical and electronic equipment*. Environmental Project No. 1292 2009 <http://www2.mst.dk/udgiv/publications/2009/978-87-7052-987-7/pdf/978-87-7052-988-4.pdf>.

## Appendix A. Revision History

Date	EC Level	Changes
2023-06-06	EC P45379A	Title Page – changed owner from Debbie Horn to Pam Lembke Table 2. Exemptions noted as in renewal process: 6a/6a-I, 6b/6b-I, 6b-II, 6c, 7a, 7c-I, 7c-II, Pack 23: 4f, 8b/8b-I, 9a-II, 13a, 13b/13b-I/13b-II/13b-III, 15/15a . Added Category column in Table 2 and 3 for clarity and simplification. Noted in Section 1.1 medical device text is included for reference only and is no longer maintained. Changed any text references to medical devices grey color.
2020-09-01	ECO P45188	Title Page - <a href="https://www.ibm.com/procurement/ossi.wss">https://www.ibm.com/procurement/ossi.wss</a> changed to <a href="https://www.ibm.com/procurement/ossi">https://www.ibm.com/procurement/ossi</a> Section 2.1 - Standard number EN 50581: 2012 updated to EN IEC 63000:2018IEC. Table 2. Exemption 7(c)-IV noted as not possible for renewal. Exemption 9 amended for categories 8, 9 and 11. Exemptions 9(a)-I and 9(a)-II added. Table 3. Added expiration date for exemptions 37 and 41. Added exemption 44. Section 3.0 References – <a href="https://www.ibm.com/procurement/ossi.wss">https://www.ibm.com/procurement/ossi.wss</a> changed to <a href="https://www.ibm.com/procurement/ossi">https://www.ibm.com/procurement/ossi</a> . Standard number EN 50581: 2012 updated to EN IEC 63000:2018IEC
2020-02-15	ECO P44877	Table 1. Removed reference for DEHP, BBP, DIBP and DBP for more restrictive limit in 46G3772. Table 2. Added exemptions 43 and 44.
2019-06-03	ECO P44752	Table 2. Date changed from February 20, 2010 to February 25 2019 for Annex III exemptions 8b, 15 and 21.
2019-02-13	ECO P44680	Table 2. RoHS exemptions updated with new exemption wording and expiration dates for exemptions 7cII, 7cIV, 8b, 15, 18, 18b, 21, 29, 32, 37, and 42.
2018-06-11	ECO P44540	Table 2. RoHS Exemptions – EU Directive 2011/65/EU <u>Annex III</u> for Electrical and Electronic Equipment <u>Categories 1 through 11</u> updated with new exemption wording and expiration dates for exemptions 6abc 6(a)-1, 6(b)-1, 6(b)-II, 7a, 7cI 24, 34 and 39. Exemption 7cIV expiration date has been removed until further notice from the European Union.
2017-08-15	ECO N36785	Section 1.1 - Four phthalates added to the list of RoHS substances. Section 1.2 Definitions added - Battery or accumulator, Electrical and electronic equipment, Industrial monitoring and control instruments, <i>In vitro</i> diagnostic medical device, Medical Devices, and WEEE. Reference added for Homogeneous Material. Section 1.3 - Required sections for electric tools were updated. Section 2.1 - Four phthalates added to substance list. List of RoHS jurisdictions removed. Table 1 - Four phthalates added. Section 2.2 - Added. Section 2.3 Changed to list Exemptions - altered to distinguish between Annex III and Annex IV exemptions and use. Table 2. Updated. Table 3. Annex IV exemptions - Added. Table 3 (old table) changed to Table 4. Sections renumbered. Section 2.4.1 - ENEPIG and examples of gold finish added to table. Section 2.4.2 - ENEPIG added to table. Section 2.6 - Added a reference to 46G3772 for more restrictions on cadmium use. Section 2.5.1 - Added a reference that an IBM ID needs to be created to access Material Code Bulletin. Section 3 – Updated. Appendix B – Added.

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2014-12-19	EC N46906	<p>Title Page – Removed ‘Note’ regarding this specification not allowing for the use of exemption ‘7(b)’.</p> <p>Title Page – Updated ‘Approved and Reviewed by’ from Derrick Scott to Leroy Vivian</p> <p>Contents – Refreshed due to revisions</p> <p>Section 1.1 – Added statement regarding PCD update and requirement of new Deliverables to abide by this EC release of the specification after January 15<sup>th</sup>, 2015.</p> <p>Section 1.3 – Removed statement regarding “IBM Systems and Technology Group (STG) RoHS Analysis Guideline SG-D-0417”. Section 1.4 already includes details regarding IEC 62321 and EN50581-2012.</p> <p>Section 2.1 – Updated list of RoHS jurisdictions</p> <p>Table 2 – Updated table from 3 to 4 columns for improved clarity. Updated table to reflect new PCD (version 05/16/2014) and RoHS Phase 3 impacts.</p> <p>Table 2 – Added exemptions 1(g), 4(g), and 41</p> <p>Section 2.4 – Added hexavalent chromium restriction for leather.</p> <p>Section 2.4.1 – Updated the URL for the IBM Material Codes website</p> <p>Section 3.0 – Added the following Commission Delegated Directives:</p> <ul style="list-style-type: none"> <li>- 2014/14/EU of 18 Oct 2013, amending, for the purpose of adapting to technical progress, the Annex III to Directive 2011/65/EU</li> <li>- 2014/76/EU of 13 March 2014 amending, for the purposes of adapting to technical progress, Annex III to Directive 2011/65/EU</li> <li>- 2014/72/EU of 13 March 2014 amending, for the purposes of adapting to technical progress, Annex III to Directive 2011/65/EU</li> <li>- Updated URLs for the following: <ul style="list-style-type: none"> <li>o IBM Material Codes</li> <li>o Louisiana Mercury Risk Reduction Act of 2006</li> <li>o Norway Product Control Regulation Chapter 2</li> <li>o CENELEC, EN 50581-2012</li> <li>o IEC 62321</li> </ul> </li> </ul>
2012-11-26	EC L38199	<p>Title Page – Changed ‘Written by’ to ‘Owner’.</p> <p>Title Page – Updated ‘Owner’ information from Debbie Horn to Jason Stoll.</p> <p>Section 1.2 – Updated definition for ‘RoHS’, removing citation of 2002 Directive.</p> <p>Section 1.3 – Removed reference to ‘ink cartridges’ which is deemed as EEE per the published EU ‘RoHS 2 FAQ’ (15 June 2012).</p> <p>Section 2.1 – Added test methodology requirement in accordance to IEC 62321.</p> <p>Section 2.1 – Added “India” to list of additional jurisdictions.</p> <p>Section 2.2 – Added statement regarding exemptions without defined expirations dates will expire on July 21<sup>st</sup>, 2016 unless notification is received by the EU.</p> <p>Section 2.2 – Updates to Table 2 per Directive 2011/65/EU of the European Parliament of 8 June 2011 (recast)</p> <p>Table 2 – Updates to the following application numbers due to passage of expiration dates: 2(b)(1), 7(c)-III, 11(b), 39, and 40.</p> <p>Section 3.0 – Removed the following items repealed per Directive 2011/65/EU, ANNEX VII Part A:</p> <ul style="list-style-type: none"> <li>- EU Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.</li> <li>- EU Commission Decision 2005/618/EC of 18 August 2005 amending Directive 2002/95/EC</li> <li>- EU Commission Decision 2005/717/EC of 13 October 2005 amending the Annex to Directive 2002/95/EC</li> <li>- EU Commission Decision 2005/747/EC of 21 October 2005 amending the Annex to Directive 2002/95/EC</li> <li>- EU Commission Decision 2010/571/EU of 24 September 2010 amending the Annex to Directive 2002/95/EC</li> <li>- EU Corrigendum to Commission Decision 2010/571/EU of 24 September 2010 amending the Annex to Directive 2002/95/EC</li> </ul> <p>Section 3.0 – Added CENELEC, EN 50581:2012.</p> <p>Section 3.0 – Added IEC 62321.</p>
2011-11-1	EC N48383	<p>Section 1.2 – Definition of homogeneous material altered to match new ROHS recast. Definition of RoHS amended to include reference to new RoHS recast.</p> <p>Section 2.1 – New jurisdictions added with RoHS requirements.</p> <p>Section 2.2 – Exemptions 7cIV and 40 added. Lower restrictions for mercury in exemptions 3a, 3b and 3c now effective. Exemption expiration dates added for 14, 18a, 19, 20, 26, 27, and 36.</p>
2010-10-29	EC N22230	<p>Section 1.1 – Reference to Oko-Institute study removed.</p> <p>Section 1.3 – Reference to a separate deviation process for OEM equipment removed. OEM equipment must now follow same process as IBM logo equipment.</p> <p>Section 2.1 - Additional RoHS jurisdictions added.</p> <p>Section 2.2 - Reference to Oko-Institute study removed.</p> <p>Table 2 – Updated to show exemption status for Commission Decision 2010/571/EU and Corrigenda.</p> <p>Section 2.3.4 – Requirement for connectors and cables to be compatible with lead-free assembly and rework processes. Interconnects not meeting these criteria require approval.</p> <p>Appendix B – Deleted.</p>

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2009-05-04	EC L36753	<p><u>Section 1.1</u> - Information added to show this revision includes the 2009 exemptions.</p> <p><u>Section 1.2</u> - Definition for "Not Detected" edited.</p> <p><u>Section 2.1</u> - Other RoHS jurisdictions added and clarification that not all are cited and may have differing scope and requirements.</p> <p><u>Table 1</u> - Reportable level for mercury edited.</p> <p><u>Table 2</u> - Added to clearly define new 2009 RoHS exemption status and sunset the use of exemptions 8a, 11a, 12, 14, 22 and 23 for IBM products and parts released after May 4, 2009.</p> <p><u>Section 2.2</u> -Table 2 added to show altered exemptions for 2009 changes. Exemptions 30, 31 and 32 added.</p> <p><u>Section 2.4.3</u> - Section detailing information about the modular refrigeration unit was deleted.</p> <p><u>Appendix B</u> - Added to show the recommended 2009 changes from the Öko-Institut report.</p>
2007-11-26	EC L35908	<p>Section 1.1 - Paragraph added to clarify that most restrictive requirement applies.</p> <p>Section 1.2 - Definitions added for Deliverable, Intentionally Added or Intentional Addition, Materials, Not Detected, Parts, and Products. The Deliverable replaced the words "material", "part", "product", and "assembly" in multiple locations throughout the specification.</p> <p>Section 1.3 - Specification deviation process changed.</p> <p>Table 1 - Additional material restrictions required by other laws than EU RoHS, which are more restrictive than EU RoHS are now referenced in Engineering Specification 46G3772.</p> <p>Section 2.1 - Additional entries added to the list of jurisdictions with RoHS type requirements.</p> <p>Section 2.2 - The exemption numbers were aligned with the numbers in the EU RoHS Directive and amendments. Exemption 10b was added. Listing of batteries in the exemption list removed and replaced with a paragraph describing the exemption for batteries.</p> <p>Table 3 - Updated the RoHS-Compatible Surface Finish Materials for Printed Circuit Boards.</p> <p>Section 2.6 - PBB Table updated with CAS numbers.</p> <p>Section 3 - Additional references added.</p>
2006-10-31	EC H86911	<p>Title - Expanded scope of regulations to additional jurisdictions.</p> <p>Section 1.3 - Added text referring suppliers may use analytical techniques to confirm results with a reference to the document - IBM STG RoHS Analysis Guideline SG-D-0417 with web location.</p> <p>Section 2.1 - Expanded scope of regulations to other jurisdictions.</p> <p>Section 2.1 - Table 1. Removed reference to an IBM STG RoHS Analysis Guideline. Further clarification for cadmium applications including an exemption for use of cadmium in electrical contacts. Allowable level for cadmium use in pigment, dye and stabilizer applications was raised to 100ppm due to a change in the Denmark Cadmium decree. The levels for PBBs and PBDEs were changed to reflect the requirements in 46G3772 of no intentional addition.</p> <p>Section 2.2 - Additional exemptions were added.</p> <p>Section 2.3 -Table 3 deleted and a reference made to IBM Procurement Specification 873444 for conditionally acceptable finishes.</p> <p>Section 3.0 - Additional references cited.</p>
2006-03-24	H87225	<p>Section 1.2- A sentence was added to the end of the first paragraph to clarify "homogenous". Added "Homogeneous is understood to be of uniform composition throughout."</p> <p>Section 1.3 - Information detailing that electrical and electronic tools are covered, but non electrical tools are not. Consumable items, such as ink cartridges, CDs, DVDs, floppy disks, tape cartridges, customer publications and product packaging are not included. Requirements for deviations from the specification were added.</p> <p>Table 1- A separate line was added for cadmium in plating and the line for cadmium used in relays and circuit breakers was eliminated. Plating was removed from the 75 ppm category and put into a category where cadmium is not allowed in plating or surface coating. A footnote was added to clarify California Prop 65 requirements for frequently handled cables such as mice cables. No intentional addition of lead carbonates and lead sulfates in paints was added to the first footnote. This last requirement mirrors the requirement in 46G3772. In footnote 2 and 4, the supplier is referred to the procurement web site for an IBM document which references IBM recommended testing methodologies for mercury and cadmium. Footnote 5 now clarifies that hexavalent chromium is not allowed "in the manufacturing process."</p> <p>Section 2.2 - the RoHS exemption "Cadmium and its compound in electrical contacts and cadmium plating....." was eliminated due to more stringent laws in Switzerland, The Netherlands and Austria.</p> <p>Section 2.3 - Table 2 for acceptable finishes was broke out into two tables - one for "Acceptable materials for electronic components" and one table for "RoHS-Compatible Materials for Printed Circuit Boards." Table 3 has additional acceptable finishes for Tantalum Niobium and Niobium Oxide Capacitors, Actives, Crystal/Oscillators, Resistors/Resistor Networks and Magnetics.</p> <p>Section 2.3.4 - New "Acceptable uses of leaded solder" were added - 1. As a finish for termination based components, 2. Solder/brazing of fins to heatsinks and 3. Lead use in specific part numbers.</p> <p>Section 2.3.2 - Section was rewritten, and Table 4 was created and added to the document. The paragraph after Table 4 was added.</p> <p>Section 2.4 - The wording was updated and clarified. Hexavalent chromium is not to be used in finishing processes for sheet steel, etc.</p> <p>Section 2.6 - The number 209 was added as the number of congeners of PBBs and/or PBDEs.</p> <p>Section 3.0 - New references added.</p>

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**Appendix B. Examples of EEE**

Examples of EEE by relevant category are listed here [Source: EU Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on Waste Electrical and Electronic Equipment]. This listing of examples is not all-inclusive.

**Category 1. Large Household Appliances**

- Large cooling appliances
- Refrigerators
- Freezers
- Other large appliances used for refrigeration, conservation and storage of food
- Washing machines
- Clothes dryers
- Dish washing machines
- Cookers
- Electric stoves
- Electric hot plates
- Microwaves
- Other large appliances used for cooking and other processing of food
- Electric heating appliances
- Electric radiators
- Other large appliances for heating rooms, beds, seating furniture
- Electric fans
- Air conditioner appliances
- Other fanning, exhaust ventilation and conditioning equipment

**Category 2. Small Household Appliances**

- Vacuum cleaners
- Carpet sweepers
- Other appliances for cleaning
- Appliances used for sewing, knitting, weaving and other processing for textiles
- Irons and other appliances for ironing, mangling and other care of clothing
- Toasters
- Fryers
- Grinders, coffee machines and equipment for opening or sealing containers or packages
- Electric knives
- Appliances for hair cutting, hair drying, tooth brushing, shaving, massage and other body care appliances
- Clocks, watches and equipment for the purpose of measuring, indicating or registering time
- Scales

**Category 3. IT and telecommunications equipment**

- Centralized data processing:
  - Mainframes
  - Minicomputers
  - Printer units
- Personal computing:
  - Personal computers (CPU, mouse, screen and keyboard included)
  - Laptop computers (CPU, mouse, screen and keyboard included)
  - Notebook computers
  - Notepad computers
- Printers
- Copying equipment
- Electrical and electronic typewriters
- Pocket and desk calculators
- And other products and equipment for the collection, storage, processing, presentation or communication of information by electronic means
- User terminals and systems
- Facsimile machine (fax)
- Telex
- Telephones
  - Pay telephones
  - Cordless telephones
  - Cellular telephones
  - Answering systems
- and other products or equipment of transmitting sound, images or other information by telecommunications

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**Category 4. Consumer equipment**

Radio sets  
 Television sets  
 Video cameras  
 Video recorders  
 Hi-fi recorders  
 Audio amplifiers  
 Musical instruments  
 and other products or equipment for the purpose of recording or reproducing sound or images, including signals or other technologies for the distribution of sound and image than by telecommunications  
 Photovoltaic panels

**Category 5. Lighting equipment**

Luminaires for fluorescent lamps with the exception of luminaires in households  
 Straight fluorescent lamps  
 Compact fluorescent lamps  
 High intensity discharge lamps, including pressure sodium lamps and metal halide lamps  
 Low pressure sodium lamps  
 Other lighting or equipment for the purpose of spreading or controlling light with the exception of filament bulbs

**Category 6. Electrical and electronic tools**

Drills  
 Saws  
 Sewing machines  
 Equipment for turning, milling, sanding, grinding, sawing, cutting, shearing, drilling, making holes, punching, folding, bending or similar processing of wood, metal and other materials  
 Tools for riveting, nailing or screwing or removing rivets, nails, screws or similar uses  
 Tools for welding, soldering or similar use  
 Equipment for spraying, spreading, dispersing or other treatment of liquid or gaseous substances by other means  
 Tools for mowing or other gardening activities

**Category 7. Toys, Leisure and Sports Equipment**

Electric trains or car racing sets  
 Hand-held video game consoles  
 Video games  
 Computers for biking, diving, running, rowing, etc.  
 Sports equipment with electric or electronic components  
 Coin slot machines

**Category 8. Medical devices**

Radiotherapy equipment  
 Cardiology equipment  
 Dialysis equipment  
 Pulmonary ventilators  
 Nuclear medicine equipment  
 Laboratory equipment for *in vitro* diagnosis  
 Analyzers  
 Freezers  
 Fertilization tests  
 Other appliances for detecting, preventing, monitoring, treating, alleviating illness, injury or disability

**Category 9. Monitoring and control instruments including industrial monitoring and control instruments**

Smoke detector  
 Heating regulators  
 Thermostats  
 Measuring, weighing or adjusting appliances for household or as laboratory equipment  
 Other monitoring and control instruments used in industrial installations (e.g. In control panels)

**Category 10. Automatic Dispensers**

Automatic dispensers for hot drinks  
 Automatic dispensers for hot or cold bottles or cans  
 Automatic dispensers for solid products  
 Automatic dispensers for money  
 All appliances which deliver automatically all kinds of products

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