

## BOMcheck List of Restricted and Declarable Substances

[www.BOMcheck.net](http://www.BOMcheck.net) is an industry collaboration sharing one web database system to manage supply chain compliance to substance regulations around the world. The list is managed by the BOMcheck Substance List Working Group and is aligned with the IPC 1752A Standard for Materials Declaration Management (<http://www.ipc.org/ContentPage.aspx?pageid=Materials-Declaration>) and the IEC 62474 screening of REACH Candidate List Substances. BOMcheck was appointed as co-chair of the IPC 1752A Standard in December 2010. BOMcheck was appointed as the UK National Expert for the IEC 62474 standard in June 2012 and took on the role of EMEA regional coordinator in December 2012. The IEC 62474 database of restricted and declarable substances replaced the Joint Industry Guide (JIG) in January 2014.

An international team of industry experts in North America, Europe and Asia Pacific identifies new regulatory requirements around the world which are applicable to articles (e.g. parts, components, sub-assemblies etc) which are supplied for use in hardware products and electrical and electronic equipment, and carries out extensive research through trade associations and industry groups to develop detailed technical information on all known uses of the new regulated substances. The BOMcheck Regulatory Compliance Declaration tool uses this information to provide concise chemicals guidance which suppliers can rely on to identify materials and parts which are at risk of containing regulated substances. If the BOMcheck guidance indicates that the supplier parts are not at risk for a regulated substance (for example, because the substance is used in PVDF plastic and the supplier parts do not contain this type of plastic) then the supplier can claim compliance without additional efforts.

All substances in the BOMcheck Full Materials Declaration tool are colour coded to show the substances that are regulated today around the world and the substances that are at risk of becoming regulated in the next few years. The confidentiality tools enable suppliers to restrict access to their Regulatory Compliance Declarations and/or Full Materials Declarations to certain customers, and to add new customers to these confidentiality settings at any time. Suppliers can also attach test reports or other documentation to support their material declarations.

### 1. Product restrictions

#### Restriction of Certain Hazardous Substances (RoHS) Directive 2011/65/EU

The RoHS substance restrictions apply to every individual homogenous material in the part. BOMcheck is aligned with the IPC 1752A substance category list EUROHS-0508. The BOMcheck Full Materials Declaration tool provides the CAS numbers, common chemical names, synonyms and trade names for the substances which are included in each RoHS substance group.

Appendix A provides the list of exemptions to the RoHS Directive which are permitted under Commission Decision 2010/571/EU published on 24 September 2010 and Commission Decision 2011/534/EU published on 8 September 2011. Appendix B provides the list of exemptions published in Annex IV of the RoHS Directive 2011/65/EU, which apply specifically to medical devices and monitoring and control instruments.

Substance group	Maximum concentration of the substance in any individual homogenous material in the part
Cadmium/cadmium compounds	0.01% by weight (100 ppm) of homogeneous materials
Hexavalent Chromium compounds	0.1% by weight (1 000 ppm) of homogeneous materials
Lead/lead compounds	0.1% by weight (1 000 ppm) of homogeneous materials
Mercury/mercury compounds	0.1% by weight (1 000 ppm) of homogeneous materials
PBBs	0.1% by weight (1 000 ppm) of homogeneous materials
PBDEs	0.1% by weight (1 000 ppm) of homogeneous materials

## Registration Evaluation Authorisation and Restriction of Chemicals (REACH) Regulation 1907/2006 (as amended)

### REACH Candidate List substances found in hardware articles and electrotechnical products

REACH Article 33 requires all suppliers to inform their customers if the article they supply contains any of the substances in the Candidate List in concentrations > 0.1% w/w of the article. An article is a product which has a special shape, surface or design which determines its function to a greater degree than its chemical composition. The article that the supplier supplies can be very simple (e.g. a screw, resistor, housing) or very complicated (e.g. a computer). In all cases, the concentration threshold of 0.1% applies to the weight of the supplied article.

There are 161 Substances of Very High Concern (SVHCs) on the current REACH Candidate List published 17 December 2014 at [http://echa.europa.eu/chem\\_data/authorisation\\_process/candidate\\_list\\_table\\_en.asp](http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp). The BOMcheck Substance List Working Group has determined that 94 of these SVHCs are not normally found in concentrations > 0.1% w/w in materials or parts supplied for use in hardware articles and electrical and electronic equipment. If parts and materials are manufactured using conventional industry processes, then the supplier can rely on the BOMcheck guidance and screen out these 94 SVHCs (BOMcheck will set the supplier's Regulatory Compliance Declaration to 'compliant' for these SVHCs). If any parts or materials are manufactured in a very unusual way (for example, using a secret process or unique ingredients) then the supplier must address each of the 161 SVHCs individually.

The CAS numbers published by ECHA for the 67 REACH Candidate List substances which can normally be found in hardware articles and electrotechnical equipment are included in the table below. Note that ECHA has not published CAS numbers for some REACH Candidate List Substances. The BOMcheck Full Materials Declaration tool provides the CAS numbers, common chemical names, synonyms and trade names for all of the REACH Candidate List substances. BOMcheck is aligned with the IPC 1752A substance category list EUREACH-1214.

<b>REACH Candidate List Substances which can normally be found in hardware articles</b>	<b>CAS number(s) published by ECHA</b>	<b>Maximum concentration of the substance in the supplied product</b>
<b><i>Included in REACH Candidate List on 28 October 2008</i></b>		
Benzyl butyl phthalate (BBP)	85-68-7	0.1% by weight (1 000 ppm) of the product
Dibutyl phthalate (DBP)	84-74-2	0.1% by weight (1 000 ppm) of the product
Bis (2-ethylhexyl) phthalate (DEHP)	117-81-7	0.1% by weight (1 000 ppm) of the product
Hexabromocyclododecane (HBCDD) and all major diastereoisomers	25637-99-4, 3194-55-6, 134237-50-6, 134237-51-7, 134237-52-8	0.1% by weight (1 000 ppm) of the product
Shortchain chlorinated paraffins (C10 – C13)	85535-84-8	0.1% by weight (1 000 ppm) of the product
Cobalt dichloride (CoCl <sub>2</sub> )	7646-79-9	0.1% by weight (1 000 ppm) of the product
Diarsenic pentoxide	1303-28-2	0.1% by weight (1 000 ppm) of the product
Diarsenic trioxide	1327-53-3	0.1% by weight (1 000 ppm) of the product
Tributyl tin oxide (TBTO)	56-35-9	0.1% by weight (1 000 ppm) of the product
<b><i>Included in REACH Candidate List on 13 January 2010</i></b>		
Tris (2-chloroethyl) phosphate (TCEP)	115-96-8	0.1% by weight (1 000 ppm) of the product
Lead chromate	7758-97-6	0.1% by weight (1 000 ppm) of the product
Lead chromate molybdate sulfate red (C.I. Pigment Red 104)	12656-85-8	0.1% by weight (1 000 ppm) of the product
Lead sulfochromate yellow (C.I. Pigment Yellow 34)	1344-37-2	0.1% by weight (1 000 ppm) of the product

Diisobutyl phthalate (DIBP)	84-74-2	0.1% by weight (1 000 ppm) of the product
<b>Included in REACH Candidate List on 18 June 2010</b>		
Disodium tetraborate, anhydrous	1303-96-4, 1330-43-4, 12179-04-3	0.1% by weight (1 000 ppm) of the product
Tetraboron disodium heptaoxide, hydrate	12267-73-1	0.1% by weight (1 000 ppm) of the product
Boric acid	10043-35-3, 11113-50-1	0.1% by weight (1 000 ppm) of the product
<b>Included in REACH Candidate List on 20 June 2011</b>		
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)	68515-42-4	0.1% by weight (1 000 ppm) of the product
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP)	71888-89-6	0.1% by weight (1 000 ppm) of the product
<b>Included in REACH Candidate List on 19 December 2011</b>		
2,2'-dichloro-4,4'-methylenedianiline	101-14-4	0.1% by weight (1 000 ppm) of the product
Bis(2-methoxyethyl) phthalate	117-82-8	0.1% by weight (1 000 ppm) of the product
Bis(2-methoxyethyl) ether	111-96-6	0.1% by weight (1 000 ppm) of the product
Aluminosilicate Refractory Ceramic Fibres	No CAS number(s) provided	0.1% by weight (1 000 ppm) of the product
Zirconia Aluminosilicate Refractory Ceramic Fibres	No CAS number(s) provided	0.1% by weight (1 000 ppm) of the product
<b>Included in REACH Candidate List on 18 June 2012</b>		
Diboron trioxide	1303-86-2	0.1% by weight (1 000 ppm) of the product
1,2-bis(2-methoxyethoxy)ethane (TEGDME; triglyme)	112-49-2	0.1% by weight (1 000 ppm) of the product
1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)	110-71-4	0.1% by weight (1 000 ppm) of the product
<b>Included in REACH Candidate List on 19 December 2012</b>		
Bis(pentabromophenyl) ether (decabromodiphenyl ether; DecaBDE)	1163-19-5	0.1% by weight (1 000 ppm) of the product
1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	0.1% by weight (1 000 ppm) of the product
Diisopentylphthalate	605-50-5	0.1% by weight (1 000 ppm) of the product
N-pentyl-isopentylphthalate	776297-69-9	0.1% by weight (1 000 ppm) of the product
Dibutyltin dichloride (DBTC)	683-18-1	0.1% by weight (1 000 ppm) of the product

Lead oxide sulfate	12036-76-9	0.1% by weight (1 000 ppm) of the product
[Phthalato(2-)]dioxotrilead	69011-06-9	0.1% by weight (1 000 ppm) of the product
Dioxobis(stearato)trilead	12578-12-0	0.1% by weight (1 000 ppm) of the product
Fatty acids, C16-18, lead salts	91031-62-8	0.1% by weight (1 000 ppm) of the product
Lead dinitrate	10099-74-8	0.1% by weight (1 000 ppm) of the product
Pentalead tetraoxide sulphate	12065-90-6	0.1% by weight (1 000 ppm) of the product
Sulfurous acid, lead salt, dibasic	62229-08-7	0.1% by weight (1 000 ppm) of the product
Tetralead trioxide sulphate	12202-17-4	0.1% by weight (1 000 ppm) of the product
Trilead dioxide phosphonate	12141-20-7	0.1% by weight (1 000 ppm) of the product
Orange lead (lead tetroxide)	1314-41-6	0.1% by weight (1 000 ppm) of the product
Lead cyanamidate	20837-86-9	0.1% by weight (1 000 ppm) of the product
Pyrochlore, antimony lead yellow	8012-00-8	0.1% by weight (1 000 ppm) of the product
4-Aminoazobenzene	60-09-3	0.1% by weight (1 000 ppm) of the product
1,2-Diethoxyethane	629-14-1	0.1% by weight (1 000 ppm) of the product
Silicic acid (H <sub>2</sub> Si <sub>2</sub> O <sub>5</sub> ), barium salt (1:1), lead-doped	68784-75-8	0.1% by weight (1 000 ppm) of the product
N,N-dimethylformamide; dimethyl formamide	68-12-2	0.1% by weight (1 000 ppm) of the product
Lead titanium trioxide	12060-00-3	0.1% by weight (1 000 ppm) of the product
Lead titanium zirconium oxide	12626-81-2	0.1% by weight (1 000 ppm) of the product
<b>Included in REACH Candidate List on 20 June 2013</b>		
4-Nonylphenol, branched and linear, ethoxylated [ <i>substances with a linear and/or branched alkyl chain with a carbon number of 9 covalently bound in position 4 to phenol, ethoxylated covering UVCB- and well-defined substances, polymers and homologues, which include any of the individual isomers and/or combinations thereof</i> ]	No CAS number(s) provided	0.1% by weight (1 000 ppm) of the product
Ammonium pentadecafluorooctanoate (APFO)	3825-26-1	0.1% by weight (1 000 ppm) of the product
Pentadecafluorooctanoic acid (PFOA)	335-67-1	0.1% by weight (1 000 ppm) of the product

Cadmium	7440-43-9	0.1% by weight (1 000 ppm) of the product
Cadmium oxide	1306-19-0	0.1% by weight (1 000 ppm) of the product
Dipentyl phthalate (DPP)	131-18-0	0.1% by weight (1 000 ppm) of the product
<b>Included in REACH Candidate List on 16 December 2013</b>		
Disodium 4-amino-3-[[4'-[(2,4-diaminophenyl)azo][1,1'-biphenyl]-4-yl]azo] -5-hydroxy-6-(phenylazo)naphthalene-2,7-disulphonate (C.I. Direct Black 38)	1937-37-7	0.1% by weight (1 000 ppm) of the product
Trixylyl phosphate	25155-23-1	0.1% by weight (1 000 ppm) of the product
Disodium 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis(4-aminonaphthalene-1-sulphonate) (C.I. Direct Red 28)	573-58-0	0.1% by weight (1 000 ppm) of the product
Dihexyl phthalate	84-75-3	0.1% by weight (1 000 ppm) of the product
Imidazolidine-2-thione; (2-imidazoline-2-thiol)	96-45-7	0.1% by weight (1 000 ppm) of the product
Cadmium sulphide	1306-23-6	0.1% by weight (1 000 ppm) of the product
<b>Included in REACH Candidate List on 16 June 2014</b>		
1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	0.1% by weight (1 000 ppm) of the product
<b>Included in REACH Candidate List on 17 December 2014</b>		
2-Benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)	3846-71-7	0.1% by weight (1 000 ppm) of the product
2-(2H-Benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)	25973-55-1	0.1% by weight (1 000 ppm) of the product
2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE)	15571-58-1	0.1% by weight (1 000 ppm) of the product
Reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate and 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE and MOTE)	No CAS number(s) provided	0.1% by weight (1 000 ppm) of the product

REACH substance restrictions applicable to hardware articles and electrotechnical products

REACH Article 67 contains over 64 different substance restrictions. However, the BOMcheck Substance List Working Group has screened-out 44 of these substance restrictions because they are not relevant to parts and materials normally found in hardware articles and electrical and electronic equipment. BOMcheck enables suppliers to declare against the following 21 restricted substances which can be present above the threshold levels in parts and materials normally found in hardware articles and electrical and electronic equipment.

The BOMcheck Regulatory Compliance Declaration tool provides information sheets for each individual substance restriction. The BOMcheck Full Materials Declaration tool provides the CAS numbers, common chemical names, synonyms and trade names for these restricted substances. BOMcheck is aligned with the IPC 1752A substance category list EUREACH-ARTICLE67-1272/2013.

<b>REACH restricted substances which can normally be found in hardware articles</b>	<b>Threshold</b>
Asbestos	No intentionally added content
Selected Phthalates Group 1 (BBP, DBP, DEHP)	0.1% w/w of plasticised material when used in toys and childcare articles
Selected Phthalates Group 2 (DIDP, DINP, DNOP)	0.1% w/w of plasticised material when used in toys and childcare articles which can be placed in the mouth
Dibutyltin (DBT)	0.1% by weight of tin in a material
Diocetyl tin (DOT)	0.1% by weight of tin in a material
Polychlorinated terphenyls (PCTs)	No content permitted
Monomethyl dibromodiphenyl methane	No content permitted
Monomethyl dichlorodiphenyl methane	No content permitted
Monomethyl tetrachlorodiphenyl methane	No content permitted
Azo colourants containing certain amines	Not permitted in textile and leather articles which may come into direct and prolonged contact with skin
Nickel and nickel alloys	Must not be used in applications with direct and prolonged skin contact and where the rate of nickel release is > 0.5 micro gms per cm <sup>2</sup> per week
Tri (2,3-dibromo-propyl) phosphate	Not permitted in textile articles which may come into contact with skin
Tris (aziridiny) phosphinoxide	Not permitted in textile articles which may come into contact with skin
Dimethyl Fumarate	No intentionally added content
Tri-substituted organostannic compounds	0.1 % by weight of tin in a material
Pentachlorophenol	0.1% w/w in any substance or preparation
Tar oils and creosotes	No content permitted in wood
Benzene	Concentration must be < 0.0005% w/w in toys and < 0.1% w/w in any substance or preparation
1,2,4 Trichlorobenzene	Concentration must be < 0.1% w/w

Nonylphenol and nonylphenol ethoxylates	Concentration must be < 0.1% w/w
Any individual PAH compound	0.0001% by weight (1 ppm) in plastic or rubber material that come into direct, prolonged or repetitive skin or oral cavity contact
Any individual PAH compound – toys and childcare articles	0.00005% by weight (0.5 ppm) in plastic or rubber material in toys and childcare articles that come into direct, prolonged or repetitive skin or oral cavity contact

### Substances which are restricted or declarable by other legislation

BOMcheck includes substances which are restricted or declarable in legislation in all parts of the world, including North America, Asia Pacific and Europe. The BOMcheck Substance List Working Group has screened-out substance restrictions or declaration requirements which are not relevant to parts and materials normally found in hardware articles and electrical and electronic equipment. BOMcheck enables suppliers to declare against the following substances which can be present above the threshold levels in parts and materials normally found in hardware products and electrical and electronic equipment.

The BOMcheck Regulatory Compliance Declaration tool provides information sheets for each individual substance restriction or declaration requirement, including the applicable legislation and information on alternative substances. The BOMcheck Full Materials Declaration tool provides the CAS numbers, common chemical names, synonyms and trade names for these regulated substances.

Substances which can normally be found in hardware articles	Threshold
Formaldehyde	No intentionally added content in composite wood products or components (plywood, particle board and MDF) and textiles
Lead/lead compounds in cables/cords with thermoset or thermoplastic coatings	0.03% w/w in the surface coating of the cable/cord
Lead/lead compounds in consumer products designed or intended primarily for children 12 years of age	0.01% w/w in accessible parts in toys and childcare articles
Lead/lead compounds in paint and similar surface coatings of toys and other articles intended to be used by children	0.009% w/w in paint in toys and childcare articles
Sulfur Hexafluoride	No intentionally added content
Ozone depleting substances	No intentionally added content
PFOS	0.1% w/w
Polychlorinated and polybrominated dioxins and furans	No intentionally added content
Polychlorinated biphenyls (PCBs)	No intentionally added content
Radioactive substances	No intentionally added content
Di-isodecyl phthalate (DIDP)	No intentionally added content
Di-n-hexyl phthalate (DnHP)	No intentionally added content
Polychloronaphthalenes	No intentionally added content

Alkanes, C10-13, chloro	No intentionally added content
Bisphenol A	No content permitted in food containers marketed to children under three years old
Bisphenol A	Declare if manufactured from raw materials using BPA or derived from BPA, and if used in medical devices and part comes into contact with patient or patient fluids
Perfluorooctanoic acid (PFOA) and individual salts and esters of PFOA	0.1% by weight (1 000 ppm) in a material
Perfluorooctanoic acid (PFOA) and individual salts and esters of PFOA - textiles	Intentionally added
Tris (2-chloroethyl) phosphate (TCEP)	No content permitted in toys and childcare products
Tris (1,3-dichloro-2-propyl) phosphate (TDCPP)	No content permitted in toys and childcare products
Tris(2-chloro-1-methylethyl) phosphate (TCPP)	No content permitted in toys and childcare products
Diisononyl phthalate (DiNP)	Intentionally added

#### Batteries substance restrictions

The following restrictions apply to all batteries. The BOMcheck Full Materials Declaration tool provides the CAS numbers, common chemical names, synonyms and trade names for these restricted substances.

Substances	Maximum concentration in the battery
Cadmium/cadmium compounds	0.001 % by weight (10 ppm) of battery
Mercury/mercury compounds	0.0001% by weight (1 ppm) of battery
Lead/lead compounds	0.004% by weight (40 ppm) of battery

#### Industry restricted and declarable substances

The following substances are restricted by leading OEMs to comply with product safety standards in Germany and to reduce severe environmental or health and safety impacts. Suppliers can check the information pages in the BOMcheck tool to find out which OEMs require their suppliers to comply with particular industry substance restrictions.

Substances which can normally be found in hardware articles	Threshold
Beryllium and Beryllium compounds	0.1% if feasible technical alternatives exist
Phenols	0.1% w/w
Antimony compounds in glass	0.1% w/w in glass in lamps
Arsenic compounds in glass	0.1% w/w in glass in lamps
Polycyclic Aromatic Hydrocarbons (PAH)	0.005% in potting material in electronic or magnetic ballast for lamps
Azo Colourants	30 ppm if part comes into contact with skin



Benzoapyrene in contact with skin	0.002% if short duration skin contact 0.0001% if long duration skin contact
Sum of all PAHs	0.02% if short duration skin contact, 0.001% if long duration skin contact
Brominated flame retardants (other than PBBs, PBDEs or HBCDD)	Declare if > 0.1% w/w total bromine content from BFRs
Brominated flame retardants (other than PBBs, PBDEs or HBCDD)	Declare if > 0.09% total bromine content from BFRs in printed wiring board laminate
Chlorinated flame retardants	Declare if > 0.1% w/w total chlorine content from CFRs
Chlorinated flame retardants	Declare if > 0.09% total chlorine content from CFRs in printed wiring board laminate
PVC and PVC copolymers	Declare if > 0.1% w/w total chlorine content from PVC
Antimony trioxide in plastic materials	Declare if > 0.1% w/w in plastic parts
Phthalates	Declare if > 0.1% w/w

## 2. Packaging restrictions

### Packaging Directive 94/62/EC

Substances	Maximum concentration in the supplied packaging
Sum of all heavy metals (Cd, Hg, Cr(VI) and Pb)	0.01% in the supplied packaging

### Registration Evaluation Authorisation and Restriction of Chemicals (REACH) Regulation 1907/2006 (as amended)

#### REACH Candidate List substances found in packaging

REACH Article 33 requires all suppliers to inform their customers if the article they supply contains any of the substances in the Candidate List in concentrations > 0.1% w/w of the article. An article is a product which has a special shape, surface or design which determines its function to a greater degree than its chemical composition. The REACH regulation defines that packaging is an article.

There are 161 Substances of Very High Concern (SVHCs) on the current REACH Candidate List published 17 December 2014. The BOMcheck Substance List Working Group has determined that 124 of these SVHCs are not normally found in concentrations > 0.1% w/w in packaging. BOMcheck enables suppliers to screen-out these 124 substances and instead requires suppliers to declare against the following 37 substances which can be present in concentrations > 0.1% w/w in packaging.

REACH Candidate List Substances which can normally be found in packaging	CAS number(s) published by ECHA	Maximum concentration of the substance in the supplied product
<i>Included in REACH Candidate List on 28 October 2008</i>		
Benzyl butyl phthalate (BBP)	85-68-7	0.1% by weight (1 000 ppm) of the product

Dibutyl phthalate (DBP)	84-74-2	0.1% by weight (1 000 ppm) of the product
Bis (2-ethylhexyl) phthalate (DEHP)	117-81-7	0.1% by weight (1 000 ppm) of the product
Hexabromocyclododecane (HBCDD) and all major diastereoisomers	25637-99-4, 3194-55-6, 134237-50-6, 134237-51-7, 134237-52-8	0.1% by weight (1 000 ppm) of the product
Cobalt dichloride (CoCl <sub>2</sub> )	7646-79-9	0.1% by weight (1 000 ppm) of the product
Tributyl tin oxide (TBTO)	56-35-9	0.1% by weight (1 000 ppm) of the product
<b><i>Included in REACH Candidate List on 13 January 2010</i></b>		
Tris (2-chloroethyl) phosphate (TCEP)	115-96-8	0.1% by weight (1 000 ppm) of the product
Diisobutyl phthalate (DIBP)	84-74-2	0.1% by weight (1 000 ppm) of the product
<b><i>Included in REACH Candidate List on 18 June 2010</i></b>		
Disodium tetraborate, anhydrous	1303-96-4, 1330-43-4, 12179-04-3	0.1% by weight (1 000 ppm) of the product
Tetraboron disodium heptaoxide, hydrate	12267-73-1	0.1% by weight (1 000 ppm) of the product
Boric acid	10043-35-3, 11113-50-1	0.1% by weight (1 000 ppm) of the product
<b><i>Included in REACH Candidate List on 20 June 2011</i></b>		
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)	68515-42-4	0.1% by weight (1 000 ppm) of the product
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2,2'-dichloro-4,4'-methylenedianiline	101-14-4	0.1% by weight (1 000 ppm) of the product
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Diboron trioxide	1303-86-2	0.1% by weight (1 000 ppm) of the product
<b><i>Included in REACH Candidate List on 19 December 2012</i></b>		
Bis(pentabromophenyl) ether (decabromodiphenyl ether; DecaBDE)	1163-19-5	0.1% by weight (1 000 ppm) of the product
1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	0.1% by weight (1 000 ppm) of the product
Diisopentylphthalate	605-50-5	0.1% by weight (1 000 ppm) of the product
N-pentyl-isopentylphthalate	776297-69-9	0.1% by weight (1 000 ppm) of the product

Dibutyltin dichloride (DBTC)	683-18-1	0.1% by weight (1 000 ppm) of the product
Lead oxide sulfate	12036-76-9	0.1% by weight (1 000 ppm) of the product
[Phthalato(2-)]dioxotrilead	69011-06-9	0.1% by weight (1 000 ppm) of the product
Dioxobis(stearato)trilead	12578-12-0	0.1% by weight (1 000 ppm) of the product
Fatty acids, C16-18, lead salts	91031-62-8	0.1% by weight (1 000 ppm) of the product
Lead dinitrate	10099-74-8	0.1% by weight (1 000 ppm) of the product
Pentalead tetraoxide sulphate	12065-90-6	0.1% by weight (1 000 ppm) of the product
Sulfurous acid, lead salt, dibasic	62229-08-7	0.1% by weight (1 000 ppm) of the product
Tetralead trioxide sulphate	12202-17-4	0.1% by weight (1 000 ppm) of the product
Trilead dioxide phosphonate	12141-20-7	0.1% by weight (1 000 ppm) of the product
<b>Included in REACH Candidate List on 20 June 2013</b>		
Dipentyl phthalate (DPP)	131-18-0	0.1% by weight (1 000 ppm) of the product
<b>Included in REACH Candidate List on 16 December 2013</b>		
Dihexyl phthalate	84-75-3	0.1% by weight (1 000 ppm) of the product
Imidazolidine-2-thione; (2-imidazoline-2-thiol)	96-45-7	0.1% by weight (1 000 ppm) of the product
<b>Included in REACH Candidate List on 16 June 2014</b>		
1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	0.1% by weight (1 000 ppm) of the product
<b>Included in REACH Candidate List on 17 December 2014</b>		
2-Benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)	3846-71-7	0.1% by weight (1 000 ppm) of the product
2-(2H-Benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)	25973-55-1	0.1% by weight (1 000 ppm) of the product
2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE)	15571-58-1	0.1% by weight (1 000 ppm) of the product
Reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate and 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE and MOTE)	No CAS number(s) provided	0.1% by weight (1 000 ppm) of the product

REACH substance restrictions applicable to packaging articles

REACH Article 67 contains over 64 different substance restrictions. However, the BOMcheck Substance List Working Group has screened-out 61 of these substance restrictions because they are not relevant to parts and materials normally found in hardware articles and electrical and electronic equipment. BOMcheck enables suppliers to declare against the following 3 restricted substances which can be present above the threshold levels in packaging articles.

<b>Substances which can normally be found in packaging articles</b>	<b>Threshold</b>
Arsenic compounds	No intentionally added content
Formaldehyde	0.1% in the supplied packaging
Dimethyl Fumarate	No intentionally added content

**Industry restricted and declarable substances**

These substances are restricted by leading OEMs to comply with retailer restrictions on PVC in packaging and use of EPS in consumer products. Suppliers can check the information pages in the BOMcheck tool to find out which OEMs require their suppliers to comply with particular industry substance restrictions.

<b>Substances which can be found in packaging articles</b>	<b>Maximum concentration of the substance in the supplied packaging</b>
PVC	0.1% in supplied packaging
EPS material in any consumer product	Not permitted

**Appendix A: Exemptions to the RoHS Directive (2011/65/EU), as published in Commission Decision 2010/571/EU of 24 September 2010, which are still valid as at December 2014.**

Number	Description
1(a)	Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):For general lighting purposes < 30 W: 2.5 mg
1(b)	Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):For general lighting purposes ≥ 30 W and < 50 W; 3.5 mg
1(c)	Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):For general lighting purposes ≥ 50 W and < 150 W; 5 mg
1(d)	Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):For general lighting purposes ≥ 150 W; 15 mg
1(e)	Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):For general lighting purposes with circular or square structural shape and tube diameter ≤ 17 mm ; 7 mg
1(f)	Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):For special purposes: 5 mg
1(g)	Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):For general lighting purposes < 30 W with a lifetime equal or above 20,000 h: 3.5 mg
2(a)(1)	Mercury in double-capped linear fluorescent lamps for generation lighting purposes not exceeding (per lamp):Tri-band phosphor with normal lifetime and a tube diameter < 9 mm (e.g. T2) : 4 mg
2(a)(2)	Mercury in double-capped linear fluorescent lamps for generation lighting purposes not exceeding (per lamp):Tri-band phosphor with normal lifetime and a tube diameter ≥ 9 mm and ≤ 17 mm (e.g. T5): 3 mg
2(a)(3)	Mercury in double-capped linear fluorescent lamps for generation lighting purposes not exceeding (per lamp):Tri-band phosphor with normal lifetime and a tube diameter > 17 mm and ≤ 28 mm (e.g. T8): 3.5 mg
2(a)(4)	Mercury in double-capped linear fluorescent lamps for generation lighting purposes not exceeding (per lamp):Tri-band phosphor with normal lifetime and a tube diameter > 28 mm (e.g. T12):3.5 mg
2(a)(5)	Mercury in double-capped linear fluorescent lamps for generation lighting purposes not exceeding (per lamp):Tri-band phosphor with long lifetime (≥ 25,000 h): 5 mg
2(b)(2)	Mercury in other fluorescent lamps not exceeding (per lamp):Non-linear halophosphate lamps (all diameters): 15 mg
2(b)(3)	Mercury in other fluorescent lamps not exceeding (per lamp):Non-linear tri-band phosphor lamps with tube diameter > 17 mm (e.g. T9) : 15 mg
2(b)(4)	Mercury in other fluorescent lamps not exceeding (per lamp):Lamps for other general lighting and special purposes (e.g. induction lamps) : 15 mg
3(a)	Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp): Short length (≤ 500 mm) : 3.5 mg
3(b)	Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp): Medium length (> 500 mm and ≤ 1,500 mm) : 5 mg
3(c)	Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp): Long length (> 1,500 mm) : 13 mg
4(a)	Mercury in other low pressure discharge lamps (per lamp) : 15 mg
4(b)-I	Mercury in High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner) in lamps with improved colour rendering index Ra > 60: P ≤ 155 W : 30 mg
4(b)-II	Mercury in High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner) in lamps with improved colour rendering index Ra > 60: 155 W < P ≤ 405 W : 40 mg
4(b)-III	Mercury in High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner) in lamps with improved colour rendering index Ra > 60: P > 405 W : 40 mg

4(c)-I	Mercury in High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner): $P \leq 155 \text{ W}$ : 25 mg
4(c)-II	Mercury in High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner): $155 \text{ W} < P \leq 405 \text{ W}$ : 30 mg
4(c)-III	Mercury in High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner): $P > 405 \text{ W}$ : 40 mg
4(d)	Mercury in High Pressure Mercury (vapour) lamps (HPMV)
4(e)	Mercury in metal halide lamps (MH)
4(f)	Mercury in other discharge lamps for special purposes not specially mentioned in this Annex
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.
5(a)	Lead in glass of cathode ray tubes
5(b)	Lead in glass of fluorescent tubes not exceeding 0.2% by weight
6(a)	Lead as an alloying element in steel for machining purposes and in galvanized steel containing up to 0.35% lead by weight
6(b)	Lead as an alloying element in aluminum containing up to 0.4% lead by weight
6(c)	Copper alloy containing up to 4% lead by weight
7(a)	Lead in high melting temperature type solders (i.e. lead-based alloys containing 85% by weight or more lead)
7(b)	Lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signalling, transmission, and network management for telecommunications
7(c)-I	Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound
7(c)-II	Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher
7(c)-IV	Lead in PZT based dielectric ceramic materials for capacitors being part of integrated circuits or discrete semiconductors
8(b)	Cadmium and its compounds electrical contacts
9	Hexavalent chromium as an anticorrosion agent of the carbon steel cooling system in absorption refrigerators up to 0.75% by weight in the cooling solution
9(b)	Lead in bearing shells and bushes for refrigerant-containing compressors for heating, ventilation, air conditioning and refrigeration (HVACR) applications
13(a)	Lead in white glasses used for optical applications
13(b)	Cadmium and lead in filter glasses and glasses used for reflectance standards
15	Lead in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit flip chip packages
17	Lead halide as radiant agent in high intensity discharge (HID) lamps used for professional reprography applications
18(b)	Lead 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 ( $\text{BaSi}_2\text{O}_5\text{:Pb}$ )

21	Lead and cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glasses
24	Lead in solders for the soldering to machined through hole discoidal and planar array ceramic multilayer capacitors
25	Lead oxide in surface conduction electron emitter displays (SED) used in structural elements, notably in the seal frit and frit ring
29	Lead bound in crystal glass as defined in Annex I (Categories 1, 2, 3 and 4) of Council Directive 69/493/EEC
30	Cadmium alloys as electrical/mechanical solder joints to electrical conductors located directly on the voice coil in transducers used in high-powered loudspeakers with sound pressure levels of 100 dB (A) and more
31	Lead in soldering materials in mercury free flat fluorescent lamps (which e.g. are used for liquid crystal displays, design or industrial lighting)
32	Lead oxide in seal frit used for making window assemblies for Argon and Krypton laser tubes
33	Lead in solders for the soldering of thin copper wires of 100 µm diameter and less in power transformers
34	Lead in cermet-based trimmer potentiometer elements
37	Lead in the plating layer of high voltage diodes on the basis of a zinc borate glass body
38	Cadmium and cadmium oxide in thick film pastes used on aluminium bonded beryllium oxide
41	Lead 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 of the Council(*)

### Appendix B: Exemptions published in Annex IV to the RoHS Directive (2011/65/EU) which apply specifically to medical devices and monitoring and control instruments

Number	Description
1	Lead, cadmium and mercury in detectors for ionising radiation
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.
1d	Mercury in reference electrodes: low chloride mercury chloride, mercury sulphate and mercury oxide.
2	Lead bearings in X-ray tubes.
3	Lead in electromagnetic radiation amplification devices: micro-channel plate and capillary plate.
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.
5	Lead in shielding for ionising radiation.
6	Lead in X-ray test objects.
7	Lead stearate X-ray diffraction crystals.
8	Radioactive cadmium isotope source for portable X-ray fluorescence spectrometers.

9	Cadmium in helium-cadmium lasers.
10	Lead and cadmium in atomic absorption spectroscopy lamps.
11	Lead in alloys as a superconductor and thermal conductor in MRI.
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. Expires on 30 June 2021.
13	Lead in counterweights.
14	Lead in single crystal piezoelectric materials for ultrasonic transducers.
15	Lead in solders for bonding to ultrasonic transducers.
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.
17	Lead in solders in portable emergency defibrillators.
18	Lead in solders of high performance infrared imaging modules to detect in the range 8-14 $\mu\text{m}$ .
19	Lead in Liquid crystal on silicon (LCoS) displays.
20	Cadmium in X-ray measurement filters.
21	Cadmium in phosphor coatings in image intensifiers for X-ray images until 31 December 2019 and in spare parts for X-ray systems placed on the EU market before 1 January 2020.
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. Expires on 30 June 2021.
23	Lead as an alloying element for bearings and wear surfaces in medical equipment exposed to ionising radiation. Expires on 30 June 2021.
24	Lead enabling vacuum tight connections between aluminium and steel in X-ray image intensifiers. Expires on 31 December 2019.
25	Lead in the surface coatings of pin connector systems requiring nonmagnetic connectors which are used durably at a temperature below $-20^{\circ}\text{C}$ under normal operating and storage conditions. Expires on 30 June 2021.
26	Lead in solders on printed circuit boards, termination coatings of electrical and electronic components and coatings of printed circuit boards, solders for connecting wires and cables, solders connecting transducers and sensors, that are used durably at a temperature below $-20^{\circ}\text{C}$ under normal operating and storage conditions. Expires on 30 June 2021.
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 isocenter 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. Expires on 30 June 2020.
28	Lead in solders for mounting cadmium telluride and cadmium zinc telluride digital array detectors to printed circuit boards. Expires on 31 December 2017.
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. Expires on 30 June 2021.
30	Hexavalent chromium in alkali dispensers used to create photocathodes in X-ray image intensifiers until 31 December 2019 and in spare parts for X-ray systems placed on the EU market before 1 January 2020. Top of Form Bottom of Form
31	Lead, cadmium and hexavalent chromium in reused spare parts, recovered from medical devices placed on the market before 22 July 2014 and used in category 8 equipment placed on the market before 22 July 2021, provided that reuse takes place in auditable closed-loop business-to-business return systems, and that the reuse of parts is notified to the consumer. Expires on 21 July 2021.
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. Expires on 31 December 2019.
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. Expires on 30 June 2016 for class IIa and on 31 December 2020 for class IIb.



34	Lead as an activator in the fluorescent powder of discharge lamps when used for extracorporeal photopheresis lamps containing BSP (BaSi2O5:Pb) phosphors. Expires on 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. Expires on 21 July 2024.
36	Lead used in other than C-press compliant pin connector systems for industrial monitoring and control instruments. Expires on 31 December 2020. May be used after that date in spare parts for industrial monitoring and control instruments placed on the market before 1 January 2021.
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; (c) measurements of conductivities above 100 mS/m that must be performed with portable instruments. Expires on 31 December 2018.
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. Expires on 31 December 2019. May be used after that date in spare parts for CT and X-ray systems placed on the market before 1 January 2020.
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: (i) a response time shorter than 25 ns; (ii) a sample detection area larger than 149 mm <sup>2</sup> ; (iii) a multiplication factor larger than $1.3 \times 10^3$ . (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 $4.0 \times 10^7$ . The exemption expires on the following dates: (a) 21 July 2021 for medical devices and monitoring and control instruments; (b) 21 July 2023 for in-vitro diagnostic medical devices; (c) 21 July 2024 for industrial monitoring and control instruments.
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. Expires on 31 December 2020. May be used after that date in spare parts for industrial monitoring and control instruments placed on the market before 1 January 2021.