

Table I: Hazardous substances in EEE – high priority / Draft Version of Input Electro-mechanicals / 26th March 2008

| ID | Substance name | CAS-Nr. | Hazard | Main use in EEE | Stakeholder Input | | |
|----|---------------------------|-----------|--|---|--|------------------|------------------|
| | | | | | Specification of use: component(s) in which substance is contained | Quantity | General comments |
| 1 | Antimony trioxide | 1309-64-4 | Carc Cat. 3 R40 | Synergist brominated flame retardants; | Pocan DP 7244 grau, CRASTIN SK 645 | < 5,0% < 6,5% | |
| 2 | Antimony compounds | - | Xn; R20/22 N; R51-53 | Flame retardant; melting agent in CRT glass; solder material (antimony-tin) Melting agent in CRT glass | none | | |
| 3 | Arsenic/arsenic compounds | 7440-38-2 | T; R23/25 N; R50-53 | III-V group semiconductor substrate (GaAs) Flame retardant | none | | |
| 4 | Beryllium metal | 7440-41-7 | Carc. Cat. 2; R49 T+; R26 T; R25-48/23 Xi; R36/37/38 R43 | In alloys; copper-beryllium alloy; Connectors: contact springs, improves elasticity of copper alloy; Finger clips PCs: maintains electrical conductivity in metal housing; Monitors Relays: improves properties of copper contact springs Switches: high strength, high conductivity Laser printers: Rotating mirror, lightweight rigidity for precision instrumentation | CuBe2, CuBe2Pb | < 2,1% < 2,0% | |
| 5 | Beryllium oxide BeO | 1304-56-9 | Carc. Cat. 2; R49 T+; R26 T; R25-48/23 Xi; R36/37/38 | In ceramics, as cooling device; Thermally conductive electrical insulator | none | | |

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| | | | R43 | | | | |
| 6 | Tetrabromo bisphenol A and related compounds (see Table II) | 79-94-7 | Dangerous to the environment N; R50/53 | Flame retardant | Printed Circuit Boards | < 3,7% | |
| 7 | Bisphenol A (4,4'-Isopropylidendiphenol) | 80-05-7 | Repr. Cat. 3; R62 Xi; R37-41 R43 | Polycarbonate plastic in electronic devices, medical equipment; in PVC as hardener, catalyst, binding agents, stabiliser; epoxy resin production | none | | |
| 8 | Diethylhexylphthalate (DEHP) | 117-81-7 | Repr. Cat. 2; R60-61 | Plasticizer in PVC cables | NBR 70 | < 2,55 | |
| 9 | Butylbenzylphthalate (BBP) | 85-68-7 | Repr. Cat.2; R61 Repr. Cat.3; R62 N; R50-53 | Plasticizer in PVC cables | none | | |
| 10 | Dibutylphthalate (DBP) | 84-74-2 | Repr. Cat. 2; R61 Repr. Cat. 3; R62 N; R50 | Plasticizer in PVC cables | none | | |
| 11 | Diethylphthalate (DOP) | 117-84-0 | Dangerous to the Environment | Plasticizer in PVC cables | none | | |
| 12 | Dimethylformamide (DMF) | 68-12-2 | Repr. Cat. 2; R61 Xn; R20/21 Xi; R36 | Electrolyte capacitors | none | | |
| 13 | Formaldehyde | 50-00-0 | Carc. Cat. 3; R40 T; R23/24/25 C; R34 R43 | Preservatives, monomer (e.g. phenol resin and melamine resin) | Delrin | < 0,005% | |
| 14 | Gallium arsenide | 1303-00-0 | Human carcinogen* | Power amplifiers, semiconductors | none | | |

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| 15 | Hexabromocyclododecane (HBCDD) and further brominated flame retardants (see table II) | 3194-55-6 | not (yet) classified in the Annex I of Directive 67/548/EEC; proposal: R33, R64, N R50-53; PBT | Flame retardant | none | | |
| 16 | Liquid crystals e.g. MBBA (4-methoxybenzylidene-4-butylaniline); 5CB (4-pentyl-4-cyanobiphenyl) | | | Electroactive layer in liquid crystal displays of cellular phones, notebooks, PC monitors | none | | |
| 17 | Medium-chained chlorinated paraffins (MCCP) (Alkanes, C14-17, chloro) | 85535-85-9 | | secondary plasticisers in PVC (cable) flame retardant plasticisers in rubbers | none | | |
| 18 | Nickel ¹ | 7440-02-0 | Carc. Cat. 3; R40 R43 | Stainless steel, plating; Decorative metal finishes, barrier layers | CuNi18Zn20 X5CrNi18-10 | < 19,0% < 10,5% | |
| 19 | Nonylphenol Nonylphenolpolyglycoethers (Nonylphenoethoxylates) | 25154-52-3 9016-45-9 | Repr.Cat.3; R62 Repr.Cat.3; R63 Xn; R22 C; R34 N; R50-53 | Surfactants, antioxidant in plastics | none | | |
| 20 | Perfluorooctane sulfonates ² | 1763-23-1 | - | | none | | |

¹ Only in those applications where nickel is likely to result in direct and prolonged skin exposure

² iRestriction does not apply to the following applications or processes: 1) photoresists or antireflective coatings for photolithography processes; 2) photographic coatings applied to films, papers, or printing plates; 3) mist suppressants for nondecorative hard chromium (VI) plating; 4) wetting agents for use in controlled electroplating systems

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| 21 | PVC | 9002-86-2 | Dependent on the additives (stabilizers and plasticizer) used; Dioxin formation during incineration; Source of organic bound chlorine | Sleeve material (of capacitors), cables, tubing films labels and gaskets, insulator, chemical resistance, transparency, sheath material | Printed Circuit Boards | < 0,11% | |
| 22 | PCBs Polychlorinated Biphenyls | 1336-36-3 and various others | R33 N; R50-53 Dioxin/furan formation during incineration | Flame retardant in PVC plastic cable; capacitors | none | | |
| 23 | PCT Polychlorinated Terphenyls | 61788-33-8 and various others | | Electrical insulation medium, Plasticizers, fire retardants, coatings for electrical wire and cable, dielectric sealants | none | | |
| 24 | Polychlorinated Naphthalenes | 70776-03-3 | | lubricant, paint, stabilizer (electric characteristic, flame-resistant, water-resistant) insulator, flame retardant | none | | |
| 25 | Selenium | 7782-49-2 | T; R23/25 R33 R53 Toxic/ Danger of cumulative effects / Environment** | Rectifiers and detector instruments, photoreceptor, semiconductor material, light receiving element, photocell | none | | |

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| 26 | Short-chained chlorinated paraffins (SCCP) (Alkanes, C10-13, chloro) | 85535-84-8 | Carc. Cat. 3; R40 N; R50-53 | plasticisers in PVC (cable) flame retardant plasticisers | none | | |
| 27 | Synthetic vitreous fibres -glass fibres - mineral wool - refractory ceramic fibre (RCFs) | 142844-00-6 | RCF: Carc. Cat. 2; | Thermal insulation materials in domestic electrical appliances | none | | |
| 28 | Tributyl Tin (TBT) compounds Triphenyl Tin (TPT) compounds | various | T; R25-48/23/25 Xn; R21 Xi; R36/38 N; R50-53; T; R23/24/25 N; R50-53 | Stabilizer, antioxidant, antibacterial and antifungal agents, antifoulant, antiseptic, anti-fungal agent, paint, pigment, antistaining | none | | |
| 29 | Tributyl Tin Oxide (TBTO) | 56-35-9 | No classification according to 67/548 | antiseptic, antifungal agent, paint, pigment, antistaining, refrigerant, foaming agent, extinguishant, | none | | |
| 30 | dinickel trioxide | 1314-06-3 | Carc. Cat. 1; R49 R43 R53 | May be used as an electrolyte | none | | |
| 31 | diarsenic trioxide; arsenic trioxide | 1327-53-3 | Carc. Cat. 1; R45 T+; R28 C; 34 N; R50-53 | May be used in certain glass-materials, less than 5000ppm | none | | |
| 32 | 4,4'-methylenedi-o-toluidine | 838-88-0 | Carc. Cat. 2; R45 Xn; R22 R43 N; R50-53 | Potential use as a dye | none | | |
| 33 | Petrolatum; Petrolatum | 8009-03-8 | Carc. Cat. 2; R45 | Used in solder fluxes/pastes | none | | |

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| 34 | nickel dihydroxide | 12054-48-7 | Carc. Cat. 3; R40 Xn; R20/22 R43 N; R50-53 | May be present in certain plastics, metallic- or ceramic materials | none | | |
| 35 | tributyl phosphate | 126-73-8 | Carc.Cat.3; R40 Xn; R22 Xi; R38 | May be present in certain plastics, metallic- or ceramic materials | none | | |
| 36 | divanadium pentaoxide; vanadium pentoxide | 1314-62-1 | Muta. Cat. 3; R68 Repr. Cat. 3; R63 T; R48/23 Xn; R20/22 Xi; R37 N; R51-53 | May be present in certain plastics, metallic- or ceramic materials | none | | |
| 37 | nickel sulphate | 7786-81-4 | Carc. Cat. 3; R40 Xn; R22 R42/43 N; R50-53 | May be present in certain plastics, metallic- or ceramic materials | none | | |
| 38 | cobalt oxide | 1307-96-6 | Xn; R22 R43 N; R50-53 | May be present in certain plastics, metallic- or ceramic materials | none | | |
| 39 | cobalt | 7440-48-4 | R42/43 R53 | May be present in certain plastics, metallic- or ceramic materials | St2 CuBe2 | < 0,001% < 0,3% | |
| 40 | 2-ethylhexyl acrylate | 103-11-7 | Xi; R37/38 R43 | 2-Ethylhexyl acrylate is used as a monomer in the chemical industry for the production of polymers and copolymers, which are mainly processed further to aqueous polymer dispersions. The polymers and polymer dispersions are used in adhesives and as binders for paints. Other applications include coatings raw materials and uses in the plastics and | none | | |

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| | | | | textiles industries. | | | |
| 41 | Naphthenic acids, copper salts; copper naphthenate | 1338-02-9 | R10 Xn; R22 N; R50-53 | May be present in certain plastics, metallic- or ceramic materials | none | | |
| 42 | phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide | 162881-26-7 | R43 R53 | May be present in certain plastics, metallic- or ceramic materials | none | | |
| 43 | thallium | 7440-28-0 | T+; R26/28 R33 R53 | May be present in certain plastics, metallic- or ceramic materials | none | | |
| 44 | bromobenzylbromotoluene , mixture of isomers | 99688-47-8 | Xn; R48/22 R43 N; R50-53 | May be present in certain plastics, metallic- or ceramic materials | none | | |
| 45 | 2,2'-(ethylenedioxy)diethyl diacrylate; triethylene glycol diacrylate | 1680-21-3 | Xi; R36/38 R43 | May be used in carton materials | none | | |
| 46 | Rosin; colophony [1] | 8050-09-7 [1] 8052-10-6 [2] 73138-82-6 [3] | R43 | Used in solder fluxes/pastes | none | | |

Table II: Brominated flame retardants (other than PBBs or PBDEs) (JIG, 2007)

| Brominated Flame Retardants (other than PBBs or PBDEs) | CAS Numbers |
|--|--------------------|
| Brominated flame retardant which comes under notation of ISO 1043-4 code number FR(14) [Aliphatic/alicyclic brominated compounds] | - |
| Brominated flame retardant which comes under notation of ISO 1043-4 code number FR(15) [Aliphatic/alicyclic brominated compounds in combination with antimony compounds] | - |
| Brominated flame retardant which comes under notation of ISO 1043-4 code number FR(16) [Aromatic brominated compounds excluding brominated diphenyl ether and biphenyls] | - |
| Brominated flame retardant which comes under notation of ISO 1043-4 code number FR(17) [Aromatic brominated compounds excluding brominated diphenyl ether and biphenyls] in combination with antimony compounds] | - |
| Brominated flame retardant which comes under notation of ISO 1043-4 code number FR(22) [Aliphatic/alicyclic chlorinated and brominated compounds] | - |
| Brominated flame retardant which comes under notation of ISO 1043-4 code number FR(42) [Brominated organic phosphorus compounds] | - |
| Poly(2,6-dibromo-phenylene oxide) | 69882-11-7 |
| Tetra-decabromo-diphenoxy-benzene | 58965-66-5 |
| 1,2-Bis(2,4,6-tribromo-phenoxy) ethane | 37853-59-1 |
| 3,5,3',5'-Tetrabromo-bisphenol A (TBBA) | 79-94-7 |
| TBBA, unspecified | 30496-13-0 |
| TBBA-epichlorhydrin oligomer | 40039-93-8 |
| TBBA-TBBA-diglycidyl-ether oligomer | 70682-74-5 |
| TBBA carbonate oligomer | 28906-13-0 |
| TBBA carbonate oligomer, phenoxy end capped | 94334-64-2 |
| TBBA carbonate oligomer, 2,4,6-tribromo-phenol terminated | 71342-77-3 |
| TBBA-bisphenol A-phosgene polymer | 32844-27-2 |
| Brominated epoxy resin end-capped with tribromophenol | 139638-58-7 |
| Brominated epoxy resin end-capped with tribromophenol | 135229-48-0 |
| TBBA-(2,3-dibromo-propyl-ether) | 21850-44-2 |
| TBBA bis-(2-hydroxy-ethyl-ether) | 4162-45-2 |
| TBBA-bis-(allyl-ether) | 25327-89-3 |
| TBBA-dimethyl-ether | 37853-61-5 |
| Tetrabromo-bisphenol S | 39635-79-5 |
| TBBS-bis-(2,3-dibromo-propyl-ether) | 42757-55-1 |
| 2,4-Dibromo-phenol | 615-58-7 |
| 2,4,6-tribromo-phenol | 118-79-6 |
| Pentabromo-phenol | 608-71-9 |
| 2,4,6-Tribromo-phenyl-allyl-ether | 3278-89-5 |
| Tribromo-phenyl-allyl-ether, unspecified | 26762-91-4 |
| Bis(methyl)tetrabromo-phtalate | 55481-60-2 |
| Bis(2-ethylhexyl)tetrabromo-phtalate | 26040-51-7 |
| 2-Hydroxy-propyl-2-(2-hydroxy-ethoxy)-ethyl-TBP | 20566-35-2 |
| TBPA, glycol-and propylene-oxide esters | 75790-69-1 |
| N,N'-Ethylene -bis-(tetrabromo-phthalimide) | 32588-76-4 |
| Ethylene-bis(5,6-dibromo-norbornane-2,3-dicarboximide) | 52907-07-0 |
| 2,3-Dibromo-2-butene-1,4-diol | 3234-02-4 |
| Dibromo-neopentyl-glycol | 3296-90-0 |
| Dibromo-propanol | 96-13-9 |
| Tribromo-neopentyl-alcohol | 36483-57-5 |
| Poly tribromo-styrene | 57137-10-7 |
| Tribromo-styrene | 61368-34-1 |

Table III: Hazardous substances in EEE already regulated by existing legislation

| Substance name | CAS-Nr. | Main use in EEE | Hazard | Key Legal and Regulatory Information |
|---|---|--|-----------------------------|---|
| Asbestos | 12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5 | Brake lining pad, insulator, filler, abrasive, insulator, filler, pigment, paint, talc, adiabatic material | Carc. Cat. 1; R45 T; R48/23 | 76/769/EEC, Marketing and Use of Dangerous Substances and amendments: (83/478/EEC; 85/610/EEC; 87/217/EEC; 91/659/EEC; 99/77/EEC) |
| Specific Azocolourants and azodyes (which form certain aromatic amines) | Various | Pigment, dyes, colorants | | 76/769/EEC, Marketing and Use of Dangerous Substances and amendments: (2002/61/EC; 2003/03/EEC). |
| Ozone Depleting Substances and Hydrochlorofluorocarbons | Various | Refrigerant, foaming agent, insulation extinguishant | | Regulation (EC) No. 2037/2000 on substances that deplete the ozone layer |