Test & Measurement Coalition

RoHS Directive Scope Review

Contribution to Öko-Institut study on RoHS substances in EEE
27th March 2008

Introduction to T&M Coalition

The Test & Measurement Coalition represents an ad-hoc grouping of companies active in producing Category 9 type products. The Coalition includes six leading companies in the sector including Agilent Technologies, Anritsu, Fluke Corporation, Keithley Instruments, National Instruments, and Tektronix. We estimate the coalition membership represents roughly 60% of the global production of industrial test and measurement products and other Category 9 equipment including chemical analysers.

The Test & Measurement Coalition participated in the first consultation round organised by Öko-Institut preparing the study on the RoHS substances in EEE. We are pleased now to contribute to the second round and provide comments on the list of substances identified by Öko-Institut.

Preliminary remarks

As per our previous submission, we would like to stress that:

• Any recommendation on adding new substances should be based on solid scientific evaluation of the risk on environment and health and analysis of the socio-economic impact.

• The REACH Regulation already foresees a more appropriate, horizontal system of identifying, assessing and restricting hazardous substances contained in all products, including EEE.

• Products in Category 9 are not currently in the scope of the RoHS Directive. Because of the specificity of the design process and the high reliability requirements, our products are expected to become RoHS compliant by 2018 through our ongoing efforts to eliminate uses of the six RoHS substances.

• If the scope of the revised RoHS Directive is extended to additional substances, Category 9 should be exempted altogether from limits on any additional substances in order to limit negative impact of withdrawal of products on economy and innovation.

Guiding Principles

The Coalition recommends that some guiding principles be used to assess the list of potential candidate substances as follows:

1. **Substances that are not known in EEE**

   Where no applications in EEE are known, inclusion of such substances is not in alignment with the objectives of the Directive, and there would be no environmental benefit to restricting them in RoHS. Inclusion of such substances will result in unnecessary cost burdens of testing in the supply chain to confirm conformance with MCVs – these additional costs will ultimately be passed on to consumers of EEE.

2. **Intermediate chemicals from production processing are not suitable candidates for RoHS**

   Intermediates initiate chemical changes in manufacture and processing yet are not significant in final materials in EEE products.

   Risk of damage to the environment or human safety from intermediates should be addressed by other legislation.

3. **Avoid potential inconsistency with REACH**.

   In REACH, category 1 or 2 carcinogenic substances may be authorized for use by the Commission in applications including EEE depending on producer controls of associated risks. Premature restrictions in RoHS of category 1 or 2 carcinogenic substances will create regulatory confusion. Restricting category 3 carcinogenic substances in EEE is not contradictory to REACH.

   REACH assessments will provide detailed information including risk, applications of use in different sectors and quantities used in each sector. In the short time given by Öko-Institut for this survey, it has not been possible to gather much data on environmental impacts, appropriate risk reduction or quantity of a substance used in EEE.

4. **Special Uses in medical or monitoring and control equipment**

   There is some use of a few Öko-Institut candidate substances in this type of equipment that do not appear normally in other types of EEE due to their high cost. Their use in medical or monitoring and control equipment is determined by lack of alternative material necessary to meet reliability and safety requirements in these sectors. Restricting these substances in RoHS will require many more exemptions for critical examination by the TAC unless blanket exemptions are given for any application in these sectors for socio-economic reasons.

Table I: Hazardous substances in EEE – high priority

T&M Coalition stakeholder input

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;	Equipment housings, mouldings, connectors and many other electrical components		On-going EU risk assessment incomplete. To comply with obligatory fire regulations, Sb_2O_3 must be used with most types of brominated flame retardants and in PVC. There are no substitutes that are as effective. Only brominated flame retardants are suitable for some types of plastic[1]. IARC classifies antimony oxide as a "possible carcinogen" which is the same classification as coffee.
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	Also used as a colorant for ceramics and plastics Antimony oxide is little used in glazes, except to produce yellow stains from combinations of lead and antimony – preferred yellow stains contain vanadium pentoxide as colorant. Antimony oxide can be used to obtain white color but tin oxide or zircon silicate are preferred,		Should be no risk in glass bound ceramic material. Used as hardening agent in lead, used in production of diodes and infrared detectors, and cable sheathing

[1] Danish EPA study – see table 2.2 http://www2.mst.dk/Udgiv/publications/2007/978-87-7052-351-6/pdf/978-87-7052-352-3.pdf

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
3	Arsenic/arsenic compounds	7440-38-2	T; R23/25 N; R50-53	III-V group semiconductor substrate (GaAs) Flame retardant	Semiconductor devices and lasers. Also in photodiodes and thermal imaging – Category 9 applications) Integrated Circuits – high speed		There are no alternatives for most applications. In ICs it is faster and more expensive than Silicon.
4	Beryllium metal Beryllium compound other than BeO	7440-41-7	Carc. Cat. 2; R49 T+; R26 T; R25-48/23 Xi; R36/37/38 R43 Carc. Cat. 2; R49 T+; R26 T; R25-48/23 Xi; R36/37/38 R43 N; R51-53	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	2-3 %in copper alloys. Precision co-axial connectors to meet high reliability (thousands connects) standard IEEE Std 287-2007 to 110 Ghz. CuBe is used in spring contacts in relays Because beryllium metal is transparent to x-rays, it is widely used as the window on high-resolution x-ray machines used for mammography. A useful property of copper beryllium is its corrosion resistance. CuBe housings are specifically used in under-water applications to protect the electronics from the corrosive effects of		No known use outside medical or monitoring and control equipment. Be is more expensive than steel or phosphor bronze (inferior substitutes) and so is used only if there is no alternative. Compounds of Be (other than BeO) have Hazard classification with suffix R51-53 Be in copper alloys has exceptional qualities of thermal conductivity, electrical conductivity, elasticity and rigidity. Furthermore it is non-magnetic. One characteristic of BeCu that contributes to its robust performance is the unique ability to be precipitation hardened from a soft, formable, low hardness condition to a high strength, high hardness condition. For coaxial connector components this is important because the component can be turned in a soft state where it is easier to machine and then later precipitation hardened to its final condition to achieve the desired

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					Specification of use: component(s) in which substance is contained	Quantity	General comments
					seawater. Due to its nuclear and mechanical properties, beryllium metal is also used in fusion reactors. .		mechanical properties. Note Be compounds & alloy have lower risk (Carc. Cat. 2; R49 T+; R26 T; R25-48/23 Xi; R36/37/38 R43 N; R51-53) than Be metal
5	Beryllium oxide BeO	1304-56-9	Carc. Cat. 2; R49 T+; R26 T; R25-48/23 Xi; R36/37/38 R43	In ceramics, as cooling device; Thermally conductive electrical insulator	Ceramic insulator		BeO has the highest thermal conductivity of any electrically insulating material. Its thermal conductivity is similar to that of copper and so is used as an insulator on high power semiconductors to conduct heat away from the device. The next best material is aluminium nitride which has a thermal conductivity only one half that of BeO. BeO is expensive and so is used only if there are no alternatives. BeO on its own should not be ingested or inhaled. That is not possible when bound in ceramic material vitrified at > 1000 ^{o}C
6	Tetrabromo bisphenol A and related compounds (see Table II)	79-94-7	Dangerous to the environment	Flame retardant	Reactive FR in PCB laminates to meet UL94 v-0 flammability		EU risk assessment carried out. Recommendations reported are in reactive form, TPPA does not need

ID	Substance name	CAS-Nr.	Hazard	Main use in EEE	Stakeholder Input		
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			N; R50/53		rating - only traces present. Additive FR in ABS. Some possible alternatives exist		restricting in product legislation. Report[2] from EBFRIP. Risk minimal and should be dealt with by REACH. Reactive TBBP-A is the widely-used industry standard flame retardant material and is present in circuit board materials in trace amounts. Restriction of its use in PWB would provide only limited benefits while forcing redesign or premature retirement from the EU market of many Category 9 products due to the inability to substitute alternate materials without affecting safety requirements and sensitive electrical characteristics fundamental to high-performance test and measurement applications. Non-reactive TBBP-A use, which appears to be more hazardous, is likely to be eliminated by substitution.
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	Used in polycarbonates that are not in EEE		No known use in EEE EU risk assessment carried out. Recommendations should be covered by REACH since it is used in many other non electrical applications.
8	Diethylhexylphthalate (DEHP)	117-81-7	Repr. Cat. 2; R60-61	Plasticizer in PVC cables	Capacitors		Not in common use in EEE because many non-phthalate plasticisers available. Dielectric fluid in capacitors.

[2] http://www.bsef.com/newsmanager/uploads/most_used_flame_retardant_tbbpa_approved_by_eu.pdf

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					Specification of use: component(s) in which substance is contained	Quantity	General comments
9	Butylbenzylphthalate (BBP)	85-68-7	Repr. Cat.2; R61 Repr. Cat.3; R62 N; R50-53	Plasticizer in PVC cables			Not in common use in EEE because many non-phthalate plasticisers available.
10	Dibutylphthalate (DBP)	84-74-2	Repr. Cat. 2; R61 Repr. Cat. 3; R62 N; R50	Plasticizer in PVC cables			Not in common use in EEE because many non-phthalate plasticisers available.
11	Dioctylphthalate (DOP)	117-84-0	Dangerous to the Environment	Plasticizer in PVC cables	Almost no DNOP is used in EEE applications that we are aware of because very little is produced and it is never used by itself anyway		DOP should actually be DNOP for DI-N-Octylphthalate (CAS number is correct - name is wrong) Alternatives for plasticizers in cables are available but all are not fully tested so the risks are not known
12	Dimethylformamide (DMF)	68-12-2	Repr. Cat. 2; R61 Xn; R20/21 Xi; R36	Electrolyte capacitors	High voltage/capacity aluminium foil electrolytic capacitors		Uncommon or rare solvent for electrolytic capacitors. Most electrolytic capacitors use glycols.
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)			Not known in EEE Other legislation where used in preservatives and resins may be more appropriate.
14	Gallium arsenide	1303-00-0	Human carcinogen*	Power amplifiers, semiconductors	High speed, photo-diode and high power semiconductors Radiation-hardened applications		GaAs semiconductor uses less power, is less susceptible to heat and is much faster than silicon. It is therefore used for very high frequency ICs and other devices. GaAs is however difficult to make and so much more expensive than silicon. As a result it is always used only if there is no alternative. GaAs is a radiation hardened material. Its use in satellites is not degraded by cosmic radiation.

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
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			Not in common use in EEE On-going EU risk assessment. Mainly used in fabrics so uncommon in electrical equipment so better to control risk via REACH which would include all products put on EU market.
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			Liquid crystals are believed to be non-hazardous. 4-methoxybenzylidene-4-butylaniline); 5CB (4-pentyl-4-cyanobiphenyl are no longer the preferred choice of liquid crystal material. LCD displays are more energy efficient than other technologies in the market place.
17	Medium-chained chlorinated paraffins (MCCP) (Alkanes, C14-17, chloro)	85535-85-9		secondary plasticisers in PVC (cable) flame retardant plasticisers in rubbers			EU risk assessment completed and recommendations in the draft Risk Reduction Strategy should be followed.
18	Nickel[3]	7440-02-0	Carc. Cat. 3; R40 R43	Stainless steel, plating; Decorative metal finishes, barrier layers	Nickel-steel alloys		Nickel and its compounds are already regulated in applications where it may come into prolonged contact with skin. There are associated EU standards - Nickel finishes that release greater than 0.5 µg/cm2/week

[3] Only in those applications where nickel is likely to result in direct and prolonged skin exposure

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
							must not be used on the external surface of any product designed to be frequently handled or carried by the user (or intended to be in direct and prolonged skin contact). Measurement to be performed using EN 1811:1998. Most uses cannot be replaced by alternatives. The only risk identified for nickel metal is already controlled by item 27 of Annex XVII of REACH.
19	Nonylphenol Nonylphenolpolyglycolethers (Nonylphenolethoxylates)	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	Both substances are not used in EEE as already restricted in EU by 76/769EEC (item 46 of Annex XVII of REACH) Nonylphenol is not a surfactant. It is an intermediate and is not used as such as an antioxidant in plastics Nonylphenol ethoxylates are surfactants and can be used in formulations to clean printed circuit boards. However, with the introduction of 76/769/EEC those uses have been phased out since January 2005.		Not used in electrical equipment as already restricted in EU by 76/769/EEC (item 46 of Annex XVII of REACH).

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
20	Perfluorooctane sulfonates[4]	1763-23-1	-		Process chemical		No known use in EEE but may exist as a residue from manufacturing. Will be banned by 76/769/EEC from June 2008 and REACH except where no alternatives are available so no need for RoHS to duplicate.
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			PVC itself is not hazardous. It may become a hazardous material depending on the additive mixture. RoHS should focus on PVC additive substances rather than PVC per se. The "*Basel Convention on the Control of the Transboundary Movements of Hazardous Wastes and Their Disposal*" does not consider PVC waste as hazardous. The European Union Commission 's Green Paper on the "Environmental Issues of PVC" published in July 2000 states further that "at the current levels of chlorine in municipal waste, there does not seem to be a direct quantitative relationship between chlorine content and dioxin formation".
22	PCBs Polychlorinated Biphenyls	1336-36-3 and various others	R33 N; R50-53	Flame retardant in PVC plastic cable; capacitors			Already restricted in EU legislation No longer used in electrical equipment – Could be restricted in

[4] Restriction 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 non-decorative hard chromium (VI) plating; 4) wetting agents for use in controlled electroplating systems

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
			Dioxin/furan formation during incineration				RoHS if the purpose is to ensure non re-introduction
23	PCT Polychlorinated Terphenyls	61788-33-8 and various others		Electrical insulation medium, Plasticizers, fire retardants, coatings for electrical wire and cable, dielectric sealants			Already restricted in EU legislation No longer used in electrical equipment – Could be restricted in RoHS if the purpose is to ensure non re-introduction
24	Polychlorinated Naphthalenes	70776-03-3		lubricant, paint, stabilizer (electric characteristic, flame-resistant, water-resistant) insulator, flame retardant			Already restricted in Asia No longer used in electrical equipment – Could be restricted in RoHS if the purpose is to ensure non re-introduction
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	Uses include alloy additive, in glass, light detection semiconductors such as infrared detectors (category 9). Rarely used in rectifiers. Selenium rectifiers used principally as spare parts, not used in new equipment.		Selenium is an essential mineral in the human diet and so trace quantities in the environment are normal and beneficial.
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	Not relevant for polymers SCCP are no longer used in PVC Only used in EEE for metal working (molding, etc), but not in final products		Not in common use in EEE EU risk assessment completed and recommendations should be followed

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
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	Used as thermal insulation & needed for ovens, heaters		Already regulated in applications where particles < 6 microns. Special test methodology is required The difficulties of verification in RoHS where other substances are restricted above concentration levels must not be under-estimated. Non destructive testing of particle size is not possible. Separation of test samples is commonly done by laser ablation which is likely to change the particle size on outer surfaces of the sample or even worse vitrify the surface making analysis of silicon fibre particle size extremely difficult.
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			Already restricted by 76/769/EC and REACH (item 20 of Annex XVII).
29	Tributyl Tin Oxide (TBTO)	56-35-9	No classification according to 67/548	antiseptic, antifungal agent, paint, pigment, antistaining, refrigerant, foaming agent, extinguishant,			Already restricted by 76/769/EC and REACH (item 20 of Annex XVII).
30	dinickel trioxide	1314-06-3	Carc. Cat. 1; R49 R43 R53	May be used as an electrolyte			Use as battery electrolyte is outside scope of RoHS otherwise Not in use in EEE Ceramic materials are more likely to use green nickel oxide than black

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
							dinickel trioxide to mute bright colorants. By themselves both forms of nickel oxide result in unpredictable colorant effects in ceramics Already restricted by item 27 of Annex XVII of REACH.
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			No known use in EEE This is a starting point chemical for production of arsenic compounds. and is no longer used in glass.
32	4,4'-methylenedi-o-toluidine	838-88-0	Carc. Cat. 2; R45 Xn; R22 R43 N; R50-53	Potential use as a dye			No known use in EEE This is an intermediate used to make dyes but this compound should not be present in products except as impurity. Consider adding to list of azo dyes that are restricted by 76/769/EEC and REACH.
33	Petrolatum; Petrolatum	8009-03-8	Carc. Cat. 2; R45	Used in solder fluxes/pastes			Petrolatum (petroleum jelly) has no known uses in EEE. Potential for residues left from human skin contact in production or use. Most petroleum jelly today is consumed as an ingredient in skin lotions and cosmetics. Petroleum jelly is used to moisten plasticine, as part of a mix of hydrocarbons including greater (paraffin wax) and lesser (mineral oil) molecular weights. Petroleum jelly is commonly used as a personal lubricant.
34	nickel dihydroxide	12054-48-7	Carc. Cat. 3; R40 Xn; R20/22	May be present in certain plastics, metallic- or ceramic			This form of nickel called fibre nickel is also a battery electrolyte in NiCd

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
			R43 N; R50-53	materials			batteries that are outside scope of RoHS otherwise the coalition is not aware of use in EEE There is no known use in ceramics. Nickel compounds are already restricted by item 27 of Annex XVII of REACH.
35	tributyl phosphate	126-73-8	Carc.Cat.3; R40 Xn; R22 Xi; R38	May be present in certain plastics, metallic- or ceramic materials			The UNEP toxicology report states there are no uses in consumer products of tributyl phosphate. The coalition is also not aware of use in EEE
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			Only use of V_2O_5 in electrical equipment is as a heat detector such as in microbolometers (category 9). V_2O_5 is used in glazes to produce sculptural texture finish with yellow coloration
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			A free-flowing fine crystal, Nickel Sulphate ($NiSO_4.6H_2O$) is a high-purity product that meets normal plating bath specifications and international standards. It is commonly used in electro-less nickel plating to deposit nickel on metallic surfaces and does not remain in EEE products in this form. Comments on item 18 apply. Nickel compounds already restricted by item 27 of Annex XVII of REACH.

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
38	cobalt oxide	1307-96-6	Xn; R22 R43 N; R50-53	May be present in certain plastics, metallic- or ceramic materials			Cobalt oxide (and carbonate) is a strong blue colorant in ceramics when fired to 1000 °C or higher. Use as a black colorant at lower temperatures is uncommon due to very high cost. Carbon black is the most frequently used black colorant in plastics or moulding compounds. The coalition is aware only of potential use in EEE as blue colorant marking on ceramic insulators. The coalition is not aware of use in metallic or plastics in EEE
39	cobalt	7440-48-4	R42/43 R53	May be present in certain plastics, metallic- or ceramic materials	Specialty alloys		Metal alloyed with iron, nickel and other metals to make Alnico, an alloy of unusual magnetic strength with many important uses (jet engines and gas turbine engines) Used in magnet steels and stainless steels used in alloys used in jet turbines and gas turbine generators used in electroplating because of its appearance, hardness, and resistance to oxidation cobalt-60, an artificial isotope, is an important γ ray source, and is extensively used as a tracer and a radiotherapeutic agent.
40	2-ethylhexyl acrylate	103-11-7	Xi; R37/38 R43	2-Ethylhexyl acrylate is used as a monomer in the chemical			Used as chemical intermediate so better to control by REACH.

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
				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 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			Used as a wood preservative and pesticide. No known use in EEE.
42	phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide	162881-26-7	R43 R53	May be present in certain plastics, metallic- or ceramic materials			A visible light photopolymerizable composition comprising a) an aryliodonium salt and b) an acylphosphine oxide compound. These compositions can be used together with an epoxy resin as a dental composition. No known use in EEE.
43	thallium	7440-28-0	T+; R26/28 R33 R53	May be present in certain plastics, metallic- or ceramic materials			Originally used in treating ringworm and other skin infections. Its use was limited because of the narrow margin between toxicity and therapeutic benefits Has been used in photocells and infrared detectors but these have largely phased out.
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			Bromobenzylbromotoluene (DBBT) is a flame retardant in plastics. The

ID	Substance name	CAS-Nr.	Hazard	Main use in EEE	Stakeholder Input		
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							Coalition recommends identification of risks under REACH before any RoHS action.
45	2,2'-(ethylenedioxy)diethyl diacrylate; triethylene glycol diacrylate	1680-21-3	Xi; R36/38 R43	May be used in carton materials			This monomer is not classified as carcinogenic nor as a PBT Carton materials are more appropriate for addressing under the packing directive
46	Rosin; colophony [1]	8050-09-7 [1] 8052-10-6 [2] 73138-82-6 [3]	R43	Used in solder fluxes/pastes	Used in solder paste for both lead and lead-free solder paste.		Used as rosin for stringed instruments. Used as solder paste in EEE.

T&M Coalition comments on table II.

The hazardous properties and risks of most brominated and non-brominated flame retardants are not fully known. Restricting one type of flame retardant forces manufacturers to use others which, if not fully tested, could pose a greater risk to health or the environment[5]. It would therefore be preferable to wait until REACH has progressed to a stage where full data on all potential alternatives is available so that manufacturers can choose the safest materials that meet their fire retardant and other requirements.

The Joint Industry Guide list of brominated flame retardants other than PBBs and PBDEs is based on need for identification of non-restricted BFRs within material declarations in the supply chain.

T&M Coalition comments on table III.

These very hazardous chemicals are already banned in community legislation. It should be noted that assigning MCVs in RoHS to substances that should not be present introduces new regulatory problems of definition, testing methods for ozone depleting substances and enforcement.

[5] See also ECB report (page 17, 3rd of paragraph section 5) http://ecb.jrc.it/documents/Existing-Chemicals/Review_on_production_process_of_decaBDE.pdf

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

Brominated Flame Retardants (other than PBBs or PBBEs)	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