
# 207:Product Safety—Negotiating the Maze of European Union Requirements

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# Faculty Biographies

**June J. Anderson**

June Andersen manages IBM corporate staffs with responsibility for IBM's product safety program, hardware compliance, and security of sensitive parts. She manages IBM hardware compliance in the areas of product safety, electromagnetic compatibility, compliance standards, IBM's laboratory for telecommunications certification in LaGaude, France, as well as the corporate asset protection competency center. She is a senior technical staff member, member of IBM's Academy of Technology, and past member of the technology council.

Ms. Anderson is the cochair of the 2003 International Symposium for Electronics and the Environment. In 1998, she received the first annual Environmental Management Excellence Award from the Silicon Valley Manufacturing Group and Pacific Industry and Business Association. In 2002 she received an IBM wide award for mentoring technical women.

She holds a BS from the University of Missouri and a Ph.D. in Genetics from Stanford University.

**Suzanne E. Gornick, P.E.**

Suzanne E. Gornick is the corporate environmental management engineer for NMB (USA) Inc., the Americas headquarters of Minebea Co. Ltd., one of the world's leading manufacturers of precision mechanical and electro-mechanical components for the aerospace, automotive, computer, and electronics industries. Ms. Gornick's responsibilities include managing environmental compliance for five factories in the U.S., coordinating remediation efforts, and participation in the regulatory process and legislative business advocacy. Additionally, Ms. Gornick participates with overseas operations by providing input into corporate standards regarding U.S. environmental laws and regulations and providing support to U.S. operations regarding European standards.

Prior to joining NMB, Ms. Gornick served as corporate environmental engineer for E. & J. Gallo Winery, which included managing all aspects of the environmental program for several wineries, a glass plant, and packaging, bottling, and printing operations. Additionally, she has experience in the paint manufacturing, chemical, industrial gas, power, and semiconductor industries.

Ms. Gornick currently serves on the board of directors for the Valley Industry and Commerce Association ("VICA") and cochairs its Environment, Infrastructure and Water ("EIW") Committee. VICA's primary focus is to support the San Fernando Valley business community in finding legislative solutions to the very complex issues faced while doing business in Southern California.

Ms. Gornick achieved a BS from Drexel University in Philadelphia, received a Masters in Environmental Management from the University of San Francisco, and maintains a Professional Engineering License in California.

 

**Bruce Klafter**

Bruce S. Klafter is the director, environmental, health, and safety legal affairs for Applied Materials, Inc. in Santa Clara, California. Mr. Klafter provides counsel to business groups throughout the company on issues relating to strategic environmental management, pollution control, occupational safety, and product safety. Applied Materials is the world's leading supplier of semiconductor manufacturing equipment.

Prior to joining Applied, Mr. Klafter was chair of the environmental group at Orrick, Herrington & Sutcliffe LLP in San Francisco. At Orrick, he was involved in a wide variety of environmental and natural resources matters, including Prop 65 and other citizen suit litigation as well as numerous transactions on behalf of lenders, developers, and corporations. He was involved in numerous complex transactions involving contaminated properties, ranging from former service stations to NPL Superfund sites. Mr. Klafter began his career as a deputy attorney general for the State of California, Natural Resources Law Section. He also represented the Department of Forestry and Fire Protection, the Department of Fish & Game, the State Water Resources Control Board, and other state agencies in diverse enforcement and defensive proceedings.

Mr. Klafter has been a member of ACCA's Environmental Law Committee's executive committee for three years and is presently chair of the section. He also served as cochair of the Bar Association of San Francisco's environmental law section.

Mr. Klafter received a BS *magna cum laude* from Tufts University. He earned his JD from the University of California-Davis School of Law and served as an editor of the *UC-Davis Law Journal* and as editor of *Environs* (a publication of the Environmental Law Society).

**David G. Mueller**

David G. Mueller is senior counsel with CNH Global N.V. located in Lake Forest, Illinois. He has worldwide legal responsibility for environmental, health, and safety matters as well as real estate, land-use planning, construction contracting, customs, and procurement/outsourcing in North America. He has managed major facility closures, decommissioning, remediation, and redevelopment throughout the world.

Mr. Mueller's private practice consisted of environmental litigation, counseling environmental compliance, and representing clients in real estate and corporate transactions. Prior to becoming an attorney, Mr. Mueller worked as an environmental consultant. His governmental experience includes the Illinois Attorney General's Office, the United States Environmental Protection Agency, and the Illinois Pollution Control Board. Mr. Mueller has litigated a wide variety of environmental issues in state and federal courts throughout the country for national clients. Mr. Mueller has extensive experience working with clients and environmental consultants to investigate properties, remediate contamination, and structure corporate and real estate transactions to shift and reduce environmental liabilities.

Mr. Mueller is a member of numerous professional organizations including the Chicago Bar Association and ABA. He is past chair of the Chicago Bar Association's environmental law committee and past vice chair of the ABA's environmental subcommittee on alternative dispute

resolution. He is a frequent speaker on environmental topics to legal, industrial, environmental, and community groups.

Mr. Mueller received a BS from the University of Michigan, School of Natural Resources, where he was a member of the National Forestry Honors Society, *Xi Sigma Pi.* He received his JD from DePaul University College of Law and was a visiting student at the University of Illinois College of Law.

 

# IT Product Certification Requirements in the European Union

ACCA Conference
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June Andersen, Ph.D.
Corporate Manager, Product Safety and Hardware Compliance
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# EU Regulatory Framework

- **EU "New Approach" Directives**
  - An excellent resource – www.newapproach.org
  - Each Directive requires development of specific national legislation in each country that fulfill the Directives' requirement.
- Each EU Directive stipulates **essential requirements** which must be met prior to placing a product on the market
  - Essential Requirements form the basis for Harmonized standards
  - Notified or Competent Bodies are identified by each country as experts for each directive.

## Protocols to the Europe Agreements on Conformity Assessment (PECA)

- The EU also maintains agreements (know as PECAs) with each future member. PECA's drive non-member regulatory programs to match EU requirements.
  - This process is managed under the PECA agreements
  - Candidates for EU members are required to have regulations that fully implemented before joining the EU

## From Essential Requirements to Harmonized Standards

- EU Directives contain high level **'essential' requirements** which must be fulfilled in order to be placed on the market.
- The essential requirements are then developed into one or more **harmonized standards** which can be used to demonstrate conformity with the directive

## How are Harmonized Standards Created?

- International Standards are frequently adopted
- One of the three European Standards Organizations* is mandated by the European Commission to develop a standard.
- The standard is developed and validated (public consultation, voting procedures)
- These harmonized standards are typically called European Norms or EN's (e.g., EN55024 or EN60950)
- Once its reference is published in the Official Journal of the European Commission, the standard can be said to provide presumption of conformity with the Directive's Essential Requirements.

## European Standards Organizations

- **CEN: European Committee for Standardization**
  - Responsible for non-electrical standards (ISO based)
- **CENELEC: European Committee for Electrotechnical Standardization**
  - Responsible for all electrotechnical standards (IEC based)
- **ETSI: European Telecommunications Standards Institute**
  - Responsible for telecommunications and communication protocol standards (ITU based)

## The Harmonized Standards

- **Harmonized Standards** are **not compulsory**
  - The requirement is to comply with the Essential Requirements of each Directive, not with the harmonized standards.
  - Directives provide details on methods available should a manufacturer decide not to use a Harmonized Standards or in situations where a Harmonized Standard is not available.
  - The use of Harmonized Standards however is the most predominant method used by IT industry today.

## Steps of the Self Compliance Route

- Determine which directives apply to the product
- Assess the product against the essential requirements each directive by either
  - Testing to harmonized standards (ENs) or
  - Creating a Technical Construction File (TCF) that can be approved by a Notified or Competent body
- Generate & sign an EC Declaration of Conformity
- Apply the CE Marking to the equipment

## EC Declaration of Conformity

- Content:
  - Description of apparatus
  - Reference of Directives and ENs applied
  - Signatory empowered to bind manufacturer or authorized rep.
  - Date the CE Marking was first applied to the equipment
- Records retention for 10 years after end of sale within the European Union.
- Technical Files and the Declaration must be made available to EC authorities upon request

## Post-Market Activities

- Once a product is fairly and legally placed on the market or into service within the EU, Manufacturers must also consider other EU Directives that provide requirements for:
  - Notification of non-compliance (safeguard)
  - National Market Surveillance
  - Product Liability

## Safeguard Clause Notifications

- Some Directives (e.g., Low Voltage Directive) require notification should product non-compliance be identified
- The Safeguard Clause:
  - Permits member states to prohibit unsafe products
  - Provides the necessary oversight
  - Provides obligatory notifications among all member states for all non-conforming products.
    - ✓ Compliance issues – product does not comply with a standard
    - ✓ Standards issues – deficiency between the standard and the essential requirements is identified
    - ✓ Safety issues – injury or damage to property is identified
- Any national authority can ban or withdraw products based on non-compliance: bans or product recalls must be notified to the European Commission.

## Market surveillance

- Member states nominate authorities responsible for market surveillance activity
- The Market Authority proves the non compliances (to the directive and to the claimed standards)
- These authorities must be technically competent and be independent of the Notified Bodies to ensure impartiality.
- Controls and surveillance mechanisms are country dependent
  - Test campaigns
  - Controls of the markings, user information
  - Triggered by complaints
  - Magazine reviews
  - 3rd Party reports, etc…
  - Incident tracking

## Product Safety for Consumer Products

- Product Safety for all consumer products is covered under the General Product Safety Directive:
  - Product safety recall
  - Means of enforcement
  - Specific surveillance requirements
  - Essential requirements for products outside the scope of sector specific New Approach directives

## Product Liability is covered under the Product Liability Directive (1985/374/EEC):

- Producer responsibility for damage caused by product defects
- Requires injured parties to prove a causal relationship between damage and defect
- Multiple and joint liability
- Responsibility can be determined based on
  - ✓ Anticipated and intended use of the product
  - ✓ Time the product was placed on the market
- Timeframes for reporting and seeking of damages due to injury caused by a product defect

# Low Voltage Directive

## Scope and History

- 1973/27/EEC - Safety of Electrical Equipment supplied by voltages between 50V and 1000V AC.
- The LVD was established long before the "New Approach". Updated to include provisions for CE marking, etc. in 1993.
- The LVD is undergoing the first major re-write in 30 years. The new LVD is expected in 2004 or 2005.


# LVD Essential Requirements

- General conditions
  - Essential characteristics marked on the equipment
  - Manufacturers name clearly printed on equipment
  - Equipment should be made to be safely and properly assembled and connected.
  - Equipment should be designed to ensure protection against hazards

    ✓electrical contact
    ✓ temperatures, arcs or radiation
    ✓non-electrical dangers

  - Insulation must be suitable for foreseeable conditions.

## LVD Essential Requirements (continued)

- Protection against hazards caused by external influences:
  - ✓mechanical requirements
  - ✓non-mechanical influences
  - ✓overload.

## Harmonized Standards for IT

- The following standards are currently available to use for IT Product Safety.
  - EN60950:2000 (Based on IEC60950:1999)
  - EN60950-1:2001 (Based on IEC60950-1:2001)
  - Official List for all products http://europa.eu.int/comm/enterprise/newapproach/standardization/harmstds/reflist/lvd.html
- These standards are based on IEC60950 which forms the base IT product safety standard for countries worldwide.

## Electromagnetic Compatibility (EMC) Directive-89/336/EEC

- Electromagnetic disturbance (emissions)
- Intrinsic immunity to electromagnetic disturbance
  - Amended by:
    - ✓ 92/31/EEC
    - ✓ 93/68/EEC
    - ✓ 98/13/EC


## EN 55022 – ITE Emissions

- Radiated E-Field
  - 30 MHz to >1000 MHz
- Powerline Cable Conducted Emissions
  - 150kHz to 30 MHz
- Telecom/LAN Cable Conducted Emissions
  - 150kHz to 30 MHz

## EN 55024 – ITE Immunity

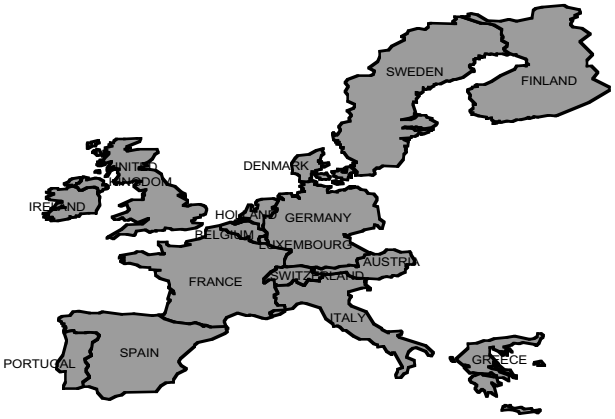
- Immunity Phenomena
  - EN 61000-4-2 Electrostatic Discharge
  - EN 61000-4-3 Radiated Electromagnetic Fields
  - EN 61000-4-4 Electrical Fast Transient/Burst
  - EN 61000-4-5 Surge
  - EN 61000-4-6 Conducted Disturbances
  - EN 61000-4-8 Power Frequency Magnetic Field
  - EN 61000-4-11 Voltage Dips, Interruptions, Variations
- Specifies the limit values for EN 61000-4-X measurement methods

## EN Standards Development

- International standards body
  - International Electrotechnical Commission (IEC)
    - ✓TC 77 - IEC 61000-X-X:date
    - ✓CISPR - CISPR XX:date
  - 51 voting member countries
- European standards body
  - International Special Committee on Radio Interference (CENELEC)
    - ✓Based upon IEC/CISPR standards
    - ✓EN 61000-X-X:date
    - ✓EN 550XX:date
  - 22 voting member countries

## The Radio and Telecommunication Terminal Equipment Directive

- The R&TTE Directive applies to IT equipment which connects to the public telecom system-wired and wireless




## The Essential Requirements

- The R&TTE directive refers to **Essential Requirements** (in article 3) :
  - 3.1(a) Health and Safety
  - 3.1(b) EMC
  - 3.2 Effective use of the spectrum
  - 3.3(a) Interworking
  - 3.3(b) No harm to the network
  - 3.3(c) Safeguard of data and privacy of the user
  - 3.3(d) Avoidance of fraud
  - 3.3(e) Access to emergency services
  - 3.3(f) Users with disability

## Can I chose between the R&TTE directive and the EMC + LVD directives ?

- No. All radio and Telecom equipment is in the scope of the R&TTE directive
- Only the **assessment procedures** of the EMC and LVD directives can be used to demonstrate compliance with articles 3.1(a) (b) of the R&TTE directive

## The Approval process

Four procedures are defined in the directive. All of them rely on the manufacturer, who:

- Builds a Technical documentation and keeps it 10 years after the end of life of the product.
- Seeks the opinion of a Notified Body (accredited third party) on the Technical documentation , when required.
- Issues a Declaration of Conformity
- Notifies the national Radio Agencies when the product uses a frequency band which use is not harmonised throughout the European Union
- Implements the correct labelling and user information on the packaging , user documentation and product.

## Geographies

- **Countries fully accepting the R&TTE directive:**
  - **European Union**: Austria, Belgium, Denmark, Finland, France, Germany, Greece,Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain,Sweden, UK
  - **European Free Trade Association:** Iceland, Liechtenstein, Norway, Switzerland
- **Countries implementing the R&TTE directive (**final approval is still national):
  - Cyprus, Czech republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia , Bulgaria, Romania, Turkey are adapting their legislation to that of the European Union.

## *Questions and Answers*

Thank you!

# Backup

# EN60950 standards Development

- International standards body
  - International Electrotechnical Commission (IEC)
    - ✓ TC 74 is traditionally responsible IEC60950 based standard
      - TC74 was formed to blend European and North American international office product (IEC380, UL114), data processing (IEC435, UL478) and telecom (UL1459) into a international ITE product standard that was published in 1986.
    - ✓ In 2002, TC74 was merged with TC92 (Consumer Electronics) to form TC108 which will develop all future IT and Consumer Electronics Standards
    - ✓ TC108 has begun work on a new type of product safety standard for IT and CE, know as a Hazard Based Engineering Standard. The benefits of this standard include
      - Technology independence
      - Design flexibility
      - Requirements based specifically on the hazards that result from safeguard failure.
- European standards body
  - CENELEC oversees all EN60950 based standards under a parallel voting and adoption procedure with the IEC Technical committee. CENLEC maintains
    - ✓ An IEC60950 shadow committee (CENELEC TC108)
    - ✓ An standing list of interpretations (CENELEC's Notified Body Operation Staff Decisions)
    - ✓ Responsibility for setting dor (ratification), dop (publication), and dow (withdrawal) for all EU based standards development organizations.

# Harmonized Standards (ENs) for EMC

- Posted in the EC Official Journal (O.J.)
  (Current posting - 2003-03-26)
  http://europa.eu.int/comm/enterprise/newapproach/standardization/harmstds/reflist/emc.html

- For ITE:

| | | date of withdrawal * | |
|---|---|---|---|
| o | EN 55022:1994 +A1:1995 +A2:1997 | 1998-12-31 (emissions) | |
| o | EN 55022:1998 | ** 2003-08-01 | (emissions) |
| o | EN 55022:1998 +A1:2000 | ** 2003-08-01 (emissions) | |
| o | EN 55024:1998 | 2001-07-01 (immunity) | |
| o | EN 55024:1998 +A1:2001 | 2004-10-01 (immunity) | |
| o | EN 61000-3-2:1995 +A1:1998 +A2:1998 | 2001-01-01 (harmonics) | |
| o | EN 61000-3-2:1995 +A1:1998 +A2:1998 +A14:2000 | 2004-01-01 (harmonics) | |
| o | EN 61000-3-2:2000 | 2004-01-01 (harmonics) | |
| o | EN 61000-3-3:1995 | 2001-01-01 (flicker) | |
| o | EN 61000-3-3:1995 +A1:2001 | 2004-05-01 (flicker) | |
| o | EN 61000-3-11:2000 | 2003-11-01 (flicker) | |

* date of withdrawal (dow):
mandatory date when prior dated versions can no longer be used to prove or declare conformity
** Will be delayed 2 years to 2005-08-01

## Protocols to the Europe Agreements on Conformity Assessment and the Acceptance of Industrial Products

- **bilatteral** agreements, which allow, on a **sector by sector** basis, gradual participation in the **Single Market** even **before accession** to the European Union**.**
- **Status**

| Sector / Country | CZ | HU | LV | EE | LT | SK | SLO | PL | BG | RO | MT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Electrical safety | C | C | C | I | C | I | I | P | P | P | I |
| Electromagnetic compatibility | C | C | C | I | C | I | I | P | P | P | I |
| Radio & telecommunications terminal equipment | P | P | | | P | P | P | P | | | I |

**C** - sectors includedthat havebeen concluded by the Council
**I** - sectors initialled by the Commission but not yet adopted
**P** - sectors proposed, under assessment or under negotiation

The table is a subset of the scope of the agreements

# The Declaration Of Conformity

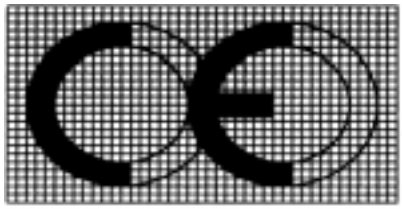
- Shall include at least
  - name and address of the informant
  - identification of the product
  - relevant requirements (1999/5/EC)
  - assessement procedure with ID of the Notified Body (when applicable)
  - standards used (with version or date)
  - date of the declaration
  - Signature with name and title
  - Information that the declaration is made under the sole responsibility of the informant
  - Address where the TCF is available

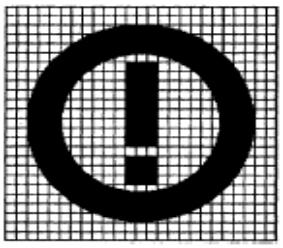
Source: Guide to the implementation of directives based on the New Approach and the Global Approach (from the EU commission) and EN 45014.

# Example of packaging info

## Placing on the Market 2/2





- The Apparatus shall bear the EC conformity marking.
  - CE mark ( + NB ID number) for class 1 equipment
  - CE mark ( + NB ID number) + Alert sign for class 2 equipment

## Notifications to the Radio Agencies

- Applies when the equipment uses **frequency bands** whose use is **not harmonised** throughout the Community.
- The manufacturer, his authorised representative or the person placing the product on the market must **notify** the national radio agencies (in charge of the spectrum management)
- The notification must be done at least **4 weeks** before placing the product on the market

| Hazardous Substance | Identification (CAS #)[1] | Banned Applications | Common Uses | Source (raw material, process, or final product) | Concentration |
|---|---|---|---|---|---|
| **1,3-Butadiene** | 106-99-0 | ABS and other copolymers (in contact with food stuffs) | | | |
| **2,2-Bis(bromomethyl)-1,3-propanediol** | 3296-90-0 | | flame retardant | | |
| **2,4,5-Trimethylaniline** | 137-17-7 | total ban | dyes, colorants | | |
| **2,4-Diaminoanisole** | 615-05-4 | total ban | dyes, colorants | | |
| **2-Naphthylamine** | 91-59-8 | total ban | dyes, colorants | | |
| **3,3-Dimethylbenzidene** | 119-93-7 | total ban | dyes, colorants | | |
| **4,4'-Oxydianiline** | 101-80-4 | total ban | dyes, colorants | | |
| **4,4'-Thiodianiline** | 139-65-1 | total ban | dyes, colorants | | |
| **4-Chloro-o-toluidine** | 95-69-2 | total ban | dyes, colorants | | |
| **Acrylonitrile** | 107-13-1 | | ABS, SAN and other copolymers (in contact with food stuffs) and adhesives, plastics, rubbers. | | |
| **Airborne particles of respirable size (glasswool fibers, ceramic fibers, crystalline silica)** | N/A | | adhesive | | |
| **Aliphatic chlorinated hydrocarbons (CHCs)** | see list | total ban | | | |
| **Amines, Amides** | see list | | electrolytic capacitor liquids | | |
| **Antimony & its compounds** | 7440-36-0 (antimony) | | Solder alloy. Antimony trioxide flame retardant. | | |

1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

## Global Manufacturing Hazardous Substance Limitations

| Hazardous Substance | Identification (CAS #)[1] | Banned Applications | Common Uses | Source (raw material, process, or final product) | Concentration |
|---|---|---|---|---|---|
| **Arsenic & Arsenic Compounds** | 7440-38-2 (arsenic) | paints, plastics, preservatives, semiconductor dopant (MS) | paints, plastics, preservatives, semiconductor dopant | | |
| **Asbestos & Asbestos Materials** | 1332-21-4 (asbestos) | total ban | fillers, insulation | | |
| **Azo-based dyes & colorants with carcinogenic amino compounds** | see list | total ban | paints, dyes | | |
| **Benzene** | 71-43-2 | | | | |
| **Benzidene & its salts** | 92-87-5 | total ban | paints, dyes | | |
| **Beryllium & its compounds** | 7440-41-7 (beryllium) | | Used as alloy with copper for electrical contacts and springs, substrate for integrated circuits, lightweight housings. Berrylium oxide as insulator. | | |
| **Brominated dioxins/furans** | 1746-01-6 | total ban | contamination from combustion by-products | | |
| **Cadmium & Cadmium Compounds** | 7440-43-9 (cadmium) | total ban | PVC/plastic additives, colorants, surface finish on circuit boards, silver cadmium oxide electrical contact alloys for relays and switches, surface coating/plating | | |
| **Certain ethylene glycol ethers** | see list | product & process | solvents | | |
| **Chlorinated dioxins/furans** | 51207-31-9 | total ban | contamination from combustion by-products | | |

1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

## Global Manufacturing Hazardous Substance Limitations

| Hazardous Substance | Identification (CAS #)[1] | Banned Applications | Common Uses | Source (raw material, process, or final product) | Concentration |
|---|---|---|---|---|---|
| **Chlorofluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Halons & Ozone Depleting Substances banned per Montreal Protocol Annex A, B, C** | 75-69-4, 75-71-8, 75-72-9, 354-56-3, 76-12-0, 354-58-5 | solvents, cleaning agents, compressed gas packages, refrigerants, foam plastics | solvents, cleaning agents, compressed gas packages, refrigerants, foam plastics | | |
| **Chloroparaffins with chain length 10-13 C atoms, chlorine content >50% by weight** | 85535-84-8 | total ban | plastic material additives | | |
| **Cobalt & its compounds** | 7440-48-4 (cobalt) | | | | |
| **Copper & its materials** | 7440-50-8 (copper) | | electrical interconnect | | |
| **Creosotes (tar oils)** | 8001-58-9 | total ban | wood preservatives | | |
| **Cyanides** | | | | | |
| **Epichlorohydrin (monomer)** | 106-89-8 | | plastic oriented materials | | |
| **Ethylene glycol monoethyl ether** | 110-80-5 | | | | |
| **Ethylene glycol monoethyl ether acetate** | 111-15-9 | | | | |
| **Ethylene glycol monomethyl ether** | 109-86-4 | | | | |
| **Ethylene glycol monomethyl ether acetate** | 110-49-6 | | | | |
| **Ethylene gycol ethers & acetates** | see list | | electrolytic capacitor liquids | | |

1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

| Hazardous Substance | Identification (CAS #)[1] | Banned Applications | Common Uses | Source (raw material, process, or final product) | Concentration |
|---|---|---|---|---|---|
| **Flame retardant substances** | see list | | | | |
| **Formaldehyde** | 50-00-0 | | wooden materials and furniture; detergents, cleaning agents, and polishes | | |
| **Gold & its materials** | 7440-57-8 (gold) | | PWB finish, gold fingers and wires | | |
| **Halogenated aromatic compounds (banned substances excluded)** | see list | | plastic oriented materials | | |
| **Hexavalent chromium (chromium VI) & hexavalent chromium compounds** | 18540-29-9 (chromium VI) | total ban | paints, dyes, colorants, surface finishes, anti-corrosion treatment | | |
| **Lead & Lead Compounds** | 7439-92-1 (lead) | If used in plastics (parts > 25 grams), will not be recommended supplier. Also, info will be published in the media. | polyvinylchloride (PVC)/plastic additives, paints, electrical interconnect, plastic stabilizer, plastic molding agent | | |
| **Lead, cadmium, mercury & hexavalent chromium** | see list | contained in packaging and/or packaging components | contained in packaging and/or packaging components | | |
| **Magnesium & its compounds (metal or alloy only, not compounds)** | 7439-95-4 (magnesium) | | surface coating, computer casings | | |

1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

## Global Manufacturing Hazardous Substance Limitations

| Hazardous Substance | Identification (CAS #)[1] | Banned Applications | Common Uses | Source (raw material, process, or final product) | Concentration |
|---|---|---|---|---|---|
| **Mercury & Mercury Compounds** | 7439-97-6 | total ban | switches, lamps, displays, packagings/inks, switches and batteries | | |
| **Nickel & its compounds** | 7440-02-0 (nickel) | | surface finish, anti-corrosion, seed layer for immersion-less gold surface finish, stainless steel components | | |
| **o-Aminoazotoluene** | 97-56-3 | | | | |
| **Organictin & its compounds** | see list | paints, inks | paints, inks | | |
| **Organophosphorous compounds** | see list | | flame retardants | | |
| **Other halogenated aliphatic compounds** | see list | | plastic oriented materials | | |
| **o-Toluidine** | 95-53-4 | | | | |
| **Palladium & its materials** | 7440-05-3 (palladium) | | PWB surface finish, component lead finish, electroless operations | | |
| **p-Chloroaniline** | 106-47-8 | | | | |
| **p-Cresidene** | 120-71-8 | | | | |
| **p-Dichlorobenzene** | 106-46-7 | | ink | | |

1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

| Hazardous Substance | Identification (CAS #)[1] | Banned Applications | Common Uses | Source (raw material, process, or final product) | Concentration |
|---|---|---|---|---|---|
| **Pentachlorophenol (PCP) & compounds** | 87-86-5 (PCP) | total ban | wood preservatives | | |
| **Phenol (monomer)** | 108-95-2 | | | | |
| **Phenyl glycidyl ether** | 122-60-1 | | adhesive, resin, plastics | | |
| **Phthalates** | see list | | plasticizer, plastic oriented materials | | |
| **Picric acid** | 88-89-1 | | electrolytic capacitor liquids | | |
| **Polybrominated biphenyls (PBB)s, Polybrominated biphenyl ethers (PBBEs) & oxides (PBBOs)** | 13654-09-6, 32534-81-9, 32536-52-0, 1163-19-5, 36483-60-0, 59080-40-9 | total ban | flame retardants | | |
| **Polychlorinated biphenyls (PCBs) & Polychlorinated terphenyls (PCTs)** | 1336-36-3 (PCBs), 61788-33-8 (PCTs) | total ban | capacitors, electrical transformer fliuds | | |
| **Polycyclic aromatic hydrocarbons** | | | | | |
| **Polyvinyl chloride (and blends)** | 9002-86-2 (PVC) | total ban (product packaging only) | plastic oriented materials | | |
| **Radioactive materials** | N/A | total ban | detectors | | |
| **Selenium & its compounds** | 7782-49-2 (selenium) | | diodes, light detectors (lead selenide), photoelectric coating | | |

1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

## Global Manufacturing Hazardous Substance Limitations

| Hazardous Substance | Identification (CAS #)[1] | Banned Applications | Common Uses | Source (raw material, process, or final product) | Concentration |
|---|---|---|---|---|---|
| **Silver & its materials** | 7740-22-4 (silver) | | surface treatment, conductive epoxies, electrical interconnect, solder paste | | |
| **Talc containing asbestiform fibers** | 14807-96-6 (talc) | | adhesive | | |
| **Tellurium & its compounds** | 13494-80-9 (tellurium) | | | | |
| **Tetrabromobisphenol (TBBA) & Tetrabromobisphenol-A-carbonate-oligomer** | 79-94-7, 94334-64-2 | limit applies to mechanical plastic parts and all offered products greater than 25 grams | flame retardant | | |
| **Tetrafluoroethylene** | 116-14-3 | | electrical wire clothes, sealing & packing rings | | |
| **Thallium & its compounds** | 7740-28-0 (thallium) | | | | |
| **Tin (organic compounds)** | N/A | | paints, dyes, colorants | | |
| **Toluene** | 108-88-3 | | | | |
| **Tributytin methacrylate, triphenytin hydroxide** | 2115-70-6, 76-87-9 | | adhesive, stabilizer | | |
| **Vinylchloride** | 75-01-4 | PVC (in contact with food stuffs) | plastic oriented materials | | |
| **Xylenes** | 95-47-6, 108-38-3, 106-42-3 | | | | |
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| **Abbreviation Key:** | | | | | |
| | | | | | |
| **TBD = To be determined** | | | | | |
| **N/A = not applicable** | | | | | |
| **EIA - Electronic Industry Alliance** | | | | | |
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1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

## Global Manufacturing Hazardous Substance Limitations

| Hazardous Substance | Identification (CAS #)[1] | Banned Applications | Common Uses | Source (raw material, process, or final product) | Concentration |
|---|---|---|---|---|---|
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| **Notes on European test methods:** | | | | | |
| Methods from the UK Standing Committee for Analysts (SCA) located at www.chemex.co.uk/laboratories. | | | | | |
| Methods from the European Chemicals Bureau (ECB) located at http://ecb.jrc.it/testing-methods/. | | | | | |
| European Committee for Standardization (CEN) main website is http://www.cenorm.be. | | | | | |
| | "Safety of Toys" method for metals (EN 71-3) located at www.cenorm.be/catweb/97.200.50.htm. | | | | |
| | "Plastics" testing methods (EN 1122) located at http://www.cenorm.be/catweb/83.080.01.htm. | | | | |

1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

## Global Manufacturing Hazardous Substance Limitations

| Hazardous Substance | Test Method[2] | Lowest Customer Limit | European Community (EC) Limit | Threshold Limit for Prop 65 (US) Notice |
|---|---|---|---|---|
| **1,3-Butadiene** | TBD | | 200 ppm | 0.4 mcg/day |
| **2,2-Bis(bromomethyl)-1,3-propanediol** | TBD | | N/A | listed, no limit developed |
| **2,4,5-Trimethylaniline** | TBD | | 30 ppm | listed, no limit developed |
| **2,4-Diaminoanisole** | TBD | | 30 ppm | 30 mcg/day |
| **2-Naphthylamine** | TBD | | 30 ppm | 0.4 mcg/day |
| **3,3-Dimethylbenzidene** | TBD | | 30 ppm | listed, no limit developed |
| **4,4'-Oxydianiline** | TBD | | 30 ppm | 5 mcg/day |
| **4,4'-Thiodianiline** | TBD | | 30 ppm | 0.05 mcg/day |
| **4-Chloro-o-toluidine** | TBD | | 30 ppm | 3 mcg/day |
| **Acrylonitrile** | TBD | | 200 ppm | 0.7 mcg/day |
| **Airborne particles of respirable size (glasswool fibers, ceramic fibers, crystalline silica)** | TBD | | N/A | listed, no limit developed |
| **Aliphatic chlorinated hydrocarbons (CHCs)** | TBD | | 1000 ppm | N/A |
| **Amines, Amides** | TBD | | N/A | check specific compound |
| **Antimony & its compounds** | TBD | | N/A | antimony trioxide listed, no limit developed |

1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

## Global Manufacturing Hazardous Substance Limitations

| Hazardous Substance | Test Method[2] | Lowest Customer Limit | European Community (EC) Limit | Threshold Limit for Prop 65 (US) Notice |
|---|---|---|---|---|
| **Arsenic & Arsenic Compounds** | TBD | | No limit stated. | 0.06 mcg/day (inh), 10 mcg/day (except inh) |
| **Asbestos & Asbestos Materials** | TBD | | 1000 ppm | 100 fibers/day (inh) |
| **Azo-based dyes & colorants with carcinogenic amino compounds** | TBD | | 30 ppm | |
| **Benzene** | TBD | | 1000 ppm | 7 mcg/day |
| **Benzidene & its salts** | TBD | | 30 ppm | 0.001 mcg/day |
| **Beryllium & its compounds** | TBD | | N/A | berrylium, 0.1 mcg/day; beryllium oxide, 0.1mcg/day; beryllium sulfate, 0.0002 mcg/day |
| **Brominated dioxins/furans** | TBD | | 0.005 ppm | furan listed, no limit developed |
| **Cadmium & Cadmium Compounds** | ENV1122 (acid digestion) followed by EPA 6010, 6020, 7130, or 7131 | | 100 ppm except in fixed batteries for appliances, 25 ppm. | cadmium & cadmium compounds listed; cadmium, 0.05 mcg/day (inh) |
| **Certain ethylene glycol ethers** | TBD | EIA, intentionally added (threshold for disclosure). | N/A | |
| **Chlorinated dioxins/furans** | TBD | | 0.005 ppm | Polychlorinated dibenzofurans & Polychlorinated dibenzo-p-dioxins listed, no limits developed |

1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

## Global Manufacturing Hazardous Substance Limitations

| Hazardous Substance | Test Method[2] | Lowest Customer Limit | European Community (EC) Limit | Threshold Limit for Prop 65 (US) Notice |
|---|---|---|---|---|
| **Chlorofluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Halons & Ozone Depleting Substances banned per Montreal Protocol Annex A, B, C** | TBD | | 10,000 ppm in pressurized gas containers, in cryogenic fluids, in cleaning agents and solvents. | N/A |
| **Chloroparaffins with chain length 10-13 C atoms, chlorine content >50% by weight** | TBD | | No limit stated. | 8 mcg/day (CAS# 108171-26-2) |
| **Cobalt & its compounds** | TBD | | N/A | powder, cobalt [II] oxide, cobalt sulfate heptahydrate listed, no limits developed |
| **Copper & its materials** | TBD | | N/A | N/A |
| **Creosotes (tar oils)** | TBD | | No limit stated. | listed, no limit developed |
| **Cyanides** | TBD | | N/A | N/A |
| **Epichlorohydrin (monomer)** | TBD | | N/A | 9 mcg/day |
| **Ethylene glycol monoethyl ether** | TBD | | N/A | listed, no limit developed |
| **Ethylene glycol monoethyl ether acetate** | TBD | | N/A | listed, no limit developed |
| **Ethylene glycol monomethyl ether** | TBD | | N/A | listed, no limit developed |
| **Ethylene glycol monomethyl ether acetate** | TBD | | N/A | listed, no limit developed |
| **Ethylene gycol ethers & acetates** | TBD | | N/A | |

1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

| Hazardous Substance | Test Method[2] | Lowest Customer Limit | European Community (EC) Limit | Threshold Limit for Prop 65 (US) Notice |
|---|---|---|---|---|
| **Flame retardant substances** | TBD | | No limit stated. | antimony trioxide listed, no limit developed |
| **Formaldehyde** | TBD | | 0.1 ml/$m^3$ | formaldehyde (gas), 40 mcg/day |
| **Gold & its materials** | TBD | EIA, 1000 ppm (threshold for reporting). | N/A | N/A |
| **Halogenated aromatic compounds (banned substances excluded)** | TBD | | N/A | check specific compound |
| **Hexavalent chromium (chromium VI) & hexavalent chromium compounds** | TBD | | No limit stated. | 0.001 mcg/day (inh) |
| **Lead & Lead Compounds** | USEPA 3050 (acid digestion) followed by EPA 6010, 6020, 7420, or 7421 | | No limit stated for lead in paints. Lead for fixed batteries in appliances, 4000 ppm. | lead, 0.5 mcg/day; lead acetate, 3 mcg/day; lead subacetate, 20 mcg/day; lead and lead compounds listed; lead phosphate listed, no limit developed |
| **Lead, cadmium, mercury & hexavalent chromium** | TBD | | 100 ppm | N/A |
| **Magnesium & its compounds (metal or alloy only, not compounds)** | TBD | EIA, 1000 ppm (threshold for reporting). | N/A | N/A |

1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

## Global Manufacturing Hazardous Substance Limitations

| Hazardous Substance | Test Method[2] | Lowest Customer Limit | European Community (EC) Limit | Threshold Limit for Prop 65 (US) Notice |
|---|---|---|---|---|
| **Mercury & Mercury Compounds** | TBD | | 5 ppm | listed, no limit developed |
| **Nickel & its compounds** | TBD | EIA, 1000 ppm (threshold for reporting). | N/A | nickel and certain nickel compounds listed, no limits developed, nickel subsulfide, 0.4 mcg/day |
| **o-Aminoazotoluene** | TBD | | N/A | 0.2 mcg/day |
| **Organictin & its compounds** | TBD | | N/A | N/A |
| **Organophosphorous compounds** | TBD | EIA, 1000 ppm reporting threshold in any part over 25 grams. | No limit stated. | N/A |
| **Other halogenated aliphatic compounds** | TBD | | No limit stated. | check list for specific compound |
| **o-Toluidine** | TBD | | N/A | 4 mcg/day |
| **Palladium & its materials** | TBD | EIA, 1000 ppm (threshold for reporting). | N/A | N/A |
| **p-Chloroaniline** | TBD | | N/A | listed, no limit developed |
| **p-Cresidene** | TBD | | N/A | 5 mcg/day |
| **p-Dichlorobenzene** | TBD | | N/A | 20 mcg/day |

1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

| Hazardous Substance | Test Method[2] | Lowest Customer Limit | European Community (EC) Limit | Threshold Limit for Prop 65 (US) Notice |
|---|---|---|---|---|
| **Pentachlorophenol (PCP) & compounds** | TBD | | 5 ppm (total), 100 ppm (total) in preparations. | 40 mcg/day |
| **Phenol (monomer)** | TBD | | No limit stated. | N/A |
| **Phenyl glycidyl ether** | TBD | | N/A | listed, no limit developed |
| **Phthalates** | TBD | | No limit stated. | DEHP listed (CAS# 117-81-7), 80 mcg/day. |
| **Picric acid** | TBD | | N/A | N/A |
| **Polybrominated biphenyls (PBB)s, Polybrominated biphenyl ethers (PBBEs) & oxides (PBBOs)** | TBD | | No limit stated. | 0.02 mcg/day (for PBBs only) |
| **Polychlorinated biphenyls (PCBs) & Polychlorinated terphenyls (PCTs)** | TBD | | 50 ppm | 0.09 mcg/day (for PCBs only) |
| **Polycyclic aromatic hydrocarbons** | TBD | | N/A | check specific compound |
| **Polyvinyl chloride (and blends)** | TBD | | N/A | listed as vinyl chloride |
| **Radioactive materials** | TBD | | No limit stated. | radionuclides listed, no limit developed |
| **Selenium & its compounds** | TBD | | N/A | selenium sulfide listed, no limit developed |

1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

| Hazardous Substance | Test Method[2] | Lowest Customer Limit | European Community (EC) Limit | Threshold Limit for Prop 65 (US) Notice |
|---|---|---|---|---|
| **Silver & its materials** | TBD | EIA, 1000 ppm (threshold for reporting). | N/A | N/A |
| **Talc containing asbestiform fibers** | TBD | | N/A | listed, no limit developed |
| **Tellurium & its compounds** | TBD | | N/A | N/A |
| **Tetrabromobisphenol (TBBA) & Tetrabromobisphenol-A-carbonate-oligomer** | TBD | | No limit stated. | N/A |
| **Tetrafluoroethylene** | TBD | | N/A | listed, no limit developed |
| **Thallium & its compounds** | TBD | | N/A | N/A |
| **Tin (organic compounds)** | TBD | | No limit stated. | N/A |
| **Toluene** | TBD | | N/A | 7000 mcg/day |
| **Tributytin methacrylate, triphenytin hydroxide** | TBD | | N/A | listed, no limit developed |
| **Vinylchloride** | TBD | | 100 ppm | 3 mcg/day |
| **Xylenes** | TBD | | N/A | N/A |
| | | | | |
| | | | | |
| **Abbreviation Key:** | | | | |
| | | | | |
| **TBD = To be determined** | | | | |
| **N/A = not applicable** | | | | |
| **EIA - Electronic Industry Alliance** | | | | |
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1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

## Global Manufacturing Hazardous Substance Limitations

| Hazardous Substance | Test Method[2] | Lowest Customer Limit | European Community (EC) Limit | Threshold Limit for Prop 65 (US) Notice |
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| **Notes on European test met** | | | | |
| Methods from the UK Standin | | | | |
| Methods from the European C | | | | |
| European Committee for Stan | | | | |
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1See CAS document.

2US methods @ www.epa.gov/region01/oarm/links.html; See notes on last page for EC methods.

| Hazardous Substance | CAS Number |
|---|---|
| | |
| **Asbetos/Asbestos Materials** | |
| Asbestos and Asbestos Materials | 1332-21-4 |
| Actinolite | 77536-66-4 |
| Amosite (Grunerite) | 12172-73-5 |
| Anthophyllite | 77536-67-5 |
| Chrysotile | 12001-29-5 |
| Crocidolite | 12001-28-4 |
| Tremolite | 77536-68-6 |
| | |
| **Class I Ozone Depleting Substances/Isomers*** | |
| Trichlorofluoromethane (CFC 11) | 75-69-4 |
| Dichlorodifluoromethane (CFC12) | 75-71-8 |
| Chlorotrifluoromethane (CFC 13) | 75-72-9 |
| Pentachlorofluoroethane (CFC 111) | 354-56-3 |
| Tetrachlorodifluoroethane (CFC 112) | 76-12-0 |
| Trichlorotrifluoroethane (CFC 113) | 354-58-5 |
| 1,1,2 Trichlorotrifluoroethane | 76-13-1 |
| Dichlorotetrafluoroethane (CFC 114) | 76-14-2 |
| Monochloropentafluoroethane (CFC 115) | 76-15-3 |
| Heptachlorofluoropropane (CFC 211) | 422-78-6, 135401-87-5 |
| Hexachlorodifluoropropane (CFC 212) | 3182-26-1 |
| Pentachlorotrifluoropropane (CFC 213) | 165977, 134237-31-3 |
| Tetrachlorotetrafluoropropane (CFC 214)<br>1,1,1,3-Tetrachlorotetrafluoropropane | 29255-31-0 2268-46-4 |
| Trichloropentafluoropropane (CFC 215)<br>1,1,1-Trichloropentafluoropropane | 1599-41-3 4259-43-2 |
| 1,2,3-Trichloropentafluoropropane | 76-17-5 |
| Dichlorohexafluoropropane (CFC 216) | 661-97-2 |
| Monochloroheptafluoropropane (CFC 217) | 422-86-6 |
| Bromochlorodifluoromethane (Halon 1211) | 353-59-3 |
| Bromotrifluoromethane (Halon 1301) | 75-63-8 |
| Dibromotetrafluoroethane (Halon 2402) | 124-73-2 |
| Carbon Tetrachloride (Tetrachloromethane) | 56-23-5 |
| 1,1,1, - Trichloroethane (methyl chloroform) and its isomers except 1,1,2-trichloroethane | 71-55-6 |
| Bromomethane (Methyl Bromide) | 74-83-9 |
| Bromodifluoromethane and isomers (HBFC's) | 1511-62-2 |
| | |
| *These materials may contain isomers that are not listed here. Isomers with CAS numbers have been included when available. | |
| | |
| **Class II Hydrochlorofluorocarbons/Isomers*** | |
| Dichlorofluoromethane (HCFC 21) | 75-43-4 |
| Chlorodifluoromethane (HCFC 22) | 75-45-6 |
| Chlorofluoromethane (HCFC 31) | 593-70-4 |
| Tetrachlorofluoroethane (HCFC 121)<br>1,1,1,2-tetrachloro-2-fluoroethane (HCFC 121a) | 134237-32-4 354-11-0 |
| 1,1,2,2-tetracloro-1-fluoroethane | 354-14-3 |
| Trichlorodifluoroethane (HCFC 122)<br>1,2,2-trichloro-1,1-difluoroethane | 41834-16-6 354-21-2 |

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|---|---|
| Dichlorotrifluoroethane (HCFC 123)<br>Dichloro-1,1,2-trifluoroethane | 34077-87-7<br>90454-18-5 |
| 2,2-dichloro-1,1,1-trifluroethane 1,2-dichloro-1,1,2-trifluroethane (HCFC-123a) 1,1-dichloro-1,2,2-trifluroethane (HCFC-123b)<br>2,2-dichloro-1,1,2-trifluroethane (HCFC-123b) | 306-83-2 354-23-4 812-04-4 812-04-4 |
| Chlorotetrafluoroethane (HCFC 124) | 63938-10-3 |
| 2-chloro-1,1,1,2-tetrafluoroethane | 2837-89-0 |
| 1-chloro-1,1,2,2-tetrafluoroethane (HCFC 124a) | 354-25-6 |
| Trichlorofluoroethane (HCFC 131) | 27154-33-2; (134237-34-6) |
| 1-Fluoro-1,2,2-trichloroethane | 359-28-4 |
| 1,1,1-trichloro-2-fluoroethane (HCFC131b) | 811-95-0 |
| Dichlorodifluoroethane (HCFC 132) | 25915-78-0 |
| 1,2-dichloro-1,1-difluoroethane (HCFC 132b) | 1649-08-7 |
| 1,1-dichloro-1,2-difluoroethane (HFCF 132c) | 1842-05-3 |
| 1,1-dichloro-2,2-difluoroethane | 471-43-2 |
| 1,2-dichloro-1,2-difluoroethane | 431-06-1 |
| Chlorotrifluoroethane (HCFC 133) | 1330-45-6 |
| 1-chloro-1,2,2-trifluoroethane | 1330-45-6 |
| 2-chloro-1,1,1-trifluoroethane (HCFC-133a) | 75-88-7 |
| Dichlorofluoroethane(HCFC 141) | 1717-00-6; (25167-88-8) |
| 1,1-dichloro-1-fluoroethane (HCFC-141b) | 1717-00-6 |
| 1,2-dichloro-1-fluoroethane | 430-57-9 |
| Chlorodifluoroethane (HCFC 142) | 25497-29-4 |
| 1-chloro-1,1-difluoroethane (HCFC142b) | 75-68-3 |
| 1-chloro-1,2-difluoroethane (HCFC142a) | 25497-29-4 |
| Hexachlorofluoropropane (HCFC 221) | 134237-35-7 |
| Pentachlorodifluoropropane (HCFC 222) | 134237-36-8 |
| Tetrachlorotrifluropropane (HCFC 223) | 134237-37-9 |
| Trichlorotetrafluoropropane (HCFC 224) | 134237-38-0 |
| Dichloropentafluoropropane, (Ethyne, fluoro-) (HCFC 225) | 127564-92-5; (2713-09-9) |
| 2,2-Dichloro-1,1,1,3,3-pentafluoropropane (HCFC 225aa) | 128903-21-9 |
| 2,3-Dichloro-1,1,1,2,3-pentafluoropropane (HCFC 225ba) | 422-48-0 |
| 1,2-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC 225bb) | 422-44-6 |
| 3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC 225ca) | 422-56-0 |
| 1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC 225cb) | 507-55-1 |
| 1,1-Dichloro-1,2,2,3,3-pentafluoropropane (HCFC 225cc) | 13474-88-9 |
| 1,2-Dichloro-1,1,3,3,3-pentafluoropropane (HCFC 225da) | 431-86-7 |
| 1,3-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC 225ea) | 136013-79-1 |
| 1,1-Dichloro-1,2,3,3,3-pentafluoropropane (HCFC 225eb) | 111512-56-2 |
| Chlorohexafluoropropane (HCFC 226) | 134308-72-8 |
| Pentachlorofluoropropane (HCFC 231) | 134190-48-0 |
| Tetrachlorodifluoropropane (HCFC 232) | 134237-39-1 |
| Trichlorotrifluoropropane (HCFC 233) | 134237-40-4 |
| 1,1,1-Trichloro-3,3,3-trifluoropropane | 7125-83-9 |

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|---|---|
| Dichlorotetrafluoropropane (HCFC 234) | 127564-83-4 |
| Chloropentafluoropropane (HCFC 235) | 134237-41-5 |
| 1-Chloro-1,1,3,3,3-pentafluoropropane | 460-92-4 |
| Tetrachlorofluoropropane (HCFC 241) | 134190-49-1 |
| Trichlorodifluoropropane (HCFC 242) | 134237-42-6 |
| Dichlorotrifluoropropane (HCFC 243) | 134237-43-7 |
| 1,1-dichloro-1,2,2-trifluoropropane | 7125-99-7 |
| 2,3-dichloro-1,1,1-trifluoropropane | 338-75-0 |
| 3,3-Dichloro-1,1,1-trifluoropropane | 460-69-5 |
| Chlorotetrafluoropropane (HCFC 244) | 134190-50-4 |
| 3-chloro-1,1,2,2-tetrafluoropropane | 679-85-6 |
| Trichlorofluoropropane (HCFC 251) | 134190-51-5 |
| 1,1,3-trichloro-1-fluoropropane | 818-99-5 |
| Dichlorodifluoropropane (HCFC 252) | 134190-52-6 |
| Chlorotrifluoropropane (HCFC 253) | 134237-44-8 |
| 3-chloro-1,1,1-trifluoropropane (HCFC 253fb) | 460-35-5 |
| Dichlorofluoropropane (HCFC 261) | 134237-45-9 |
| 1,1-dichloro-1-fluoropropane | 7799-56-6 |
| Chlorodifluoropropane (HCFC 262) | 134190-53-7 |
| 2-chloro-1,3-difluoropropane | 102738-79-4 |
| Chlorofluoropropane (HCFC 271) | 134190-54-8 |
| 2-chloro-2-fluoropropane | 420-44-0 |
| | |
| *These materials may contain isomers that are not listed here. Isomers with CAS numbers have been included when available. | |
| | |
| **Polychlorinated Biphenyls (PCBs) and Terphenyls (PCTs)** | |
| Polychlorinated Biphenyls | 1336-36-3 |
| Aroclor | 12767-79-2 |
| Chlorodiphenyl (Aroclor 1260) | 11096-82-5 |
| Kanechlor 500 | 27323-18-8 |
| Aroclor 1254 | 11097-69-1 |
| Terphenyls | 26140-60-3 |
| | |
| **Chloro naphthalene** | |
| Polychlorinated naphthalenes | |
| Pentachlorinated naphthalene | 1321-64-8 |
| | |
| **Polybrominated Biphenyls (PBBs) and their Ethers/Oxides** | |
| Bromobiphenyl and its ethers | 2052-07-5 (2-Bromobiphenyl) |
| | 2113-57-7 (3-Bromobiphenyl) |
| | 92-66-0 (4-Bromobiphenyl) |
| | 101-55-3 (ether) |
| Decabromobiphenyl and its ethers | 13654-09-6 |
| | 1163-19-5 (ether) |
| Dibromobiphenyl and its ethers | 92-86-4 |
| | 2050-47-7 (ether) |
| Heptabromobiphenylether | 68928-80-3 |
| Hexabromobiphenyl and its ethers | 59080-40-9 |
| | 36355-01-8 (hexabromo-1,1'-biphenyl) |

| | |
|---|---|
| | 67774-32-7 (Firemaster FF-1) |
| | 36483-60-0 (ether) |
| Nonabromobiphenylether | 63936-56-1 |
| Octabromobiphenyl and its ethers | 61288-13-9 |
| | 32536-52-0 (ether) |
| Pentabromobidphenyl ether (note: Commercially available PeBDPO is a complex reaction mixture containing a variety of brominated diphenyloxides. | 32534-81-9 (CAS number used for commercial grades of PeBDPO) |
| Polybrominated Biphenyls | 59536-65-1 |
| Tetrabromobiphenyl and its ethers | 40088-45-7 |
| | 40088-47-9 (ether) |
| Tribromobiphenyl ether | 49690-94-0 |
| Polybrominated biphenyl ff-1 | 67774-32-7 |
| | |
| **Certain Ethylene Glycol Ethers** | |
| 2-Ethoxyethanol | 110-80-5 |
| 2-Ethoxyethyl acetate | 111-15-9 |
| 2-Methoxyethanol | 109-86-4 |
| 2-Methoxyethyl acetate | 110-49-6 |
| Diethylene glycol dimethyl ether | 111-96-6 |
| | |
| **Cadmium and its Compounds** | |
| Cadmium | 7440-43-9 |
| **Examples of Common Cadmium Compounds** | |
| Cadmium oxide | 1306-19-0 |
| Cadmium sulfide | 1306-23-6 |
| Cadmiun stearate | 2223-93-0 |
| | |
| **Chromium VI and its Compounds** | |
| Chromium | 7440-47-3 |
| **Examples of Common Chromium Compounds** | |
| Barium chromate | 10294-40-3 |
| Calcium chromate | 13765-19-0 |
| Chromic acetate | 1066-30-4 |
| Chromium trioxide | 1333-82-0 |
| Lead chromate | 7758-97-6 |
| Sodium chromate | 7775-11-3 |
| Sodium dichromate | 10588-01-9 |
| Strontium chromate | 7789-06-2 |
| Zinc chromate | 13530-65-9 |
| | |
| **Lead and its Compounds** | |
| Lead | 7439-92-1 |
| **Examples of Common Lead Compounds** | |
| Lead sulfate | 7446-14-2 |
| Lead carbonate | 598-63-0 |
| Lead hydrocarbonate | 1319-46-6 |
| Lead acetate | 301-04-2 |
| Lead (II) acetate, trihydrate | 6080-56-4 |
| Lead phosphate | 7446-27-7 |
| Lead selenide | 12069-00-0 |
| Lead oxide | 1317-36-8 |
| Lead hydroxycarbonate | 1344-36-1 |
| | |

| | |
|---|---|
| **Mercury and its Compounds** | |
| Mercury | 7439-97-6 |
| **Examples of Common Mercury Compounds** | |
| Mercuric chloride | 33631-63-9 |
| Mercury bichloride | 7487-94-7 |
| Mercuric sulfate | 7783-35-9 |
| Mercuric nitrate | 10045-94-0 |
| Mercuric oxide | 21908-53-2 |
| Mercuric sulfide | 1344-48-5 |
| | |
| **Antimony and its Compounds** | |
| Antimony (metallic) | 7440-36-0 |
| **Examples of Common Antimony Compounds** | |
| Antimony trioxide | 1309-64-4 |
| Antimony pentoxide | 1314-60-9 |
| Antimony pentasulfide | 1345-04 |
| | |
| **Arsenic and its Compounds** | |
| Arsenic | 7440-38-2 |
| **Examples of Common Arsenic Compounds** | |
| Gallium arsenide | 1303-00-0 |
| Calcium arsenate | 7778-44-1 |
| Calcium arsenite | 27152-57-4 |
| Arsenic pentoxide | 1303-28-2 |
| Arsenic trioxide | 1327-53-3 |
| Potassium arsenite | 10124-50-2 |
| Potassium arsenate | 7784-41-0 |
| Lead arsenate | 3687-31-8 |
| Copper acetate arsenite | 12002-03-8 |
| | |
| **Beryllium and its Compounds** | |
| Beryllium | 7440-41-7 |
| **Examples of Common Beryllium Compounds** | |
| Beryllium-aluminum alloy | 12770-50-2 |
| Beryllium chloride | 7787-47-5 |
| Beryllium fluoride | 7787-49-7 |
| Beryllium hydroxide | 13327-32-7 |
| Beryllium oxide | 1304-56-9 |
| Beryllium phosphate | 13598-15-7 |
| Beryllium sulfate | 13510-49-1 |
| Beryllium sulfate tetrahydrate | 7787-56-6 |
| Beryl ore | 1302-52-9 |
| | |
| **Cadmium and its Compounds** | |
| Cadmium | 7440-43-9 |
| **Examples of Common Cadmium Compounds** | |
| Cadmium carbonate (Carbonic acid) | 513-78-0 |
| Cadmium chloride | 10108-64-2 |
| Cadmium fluoroborate | 14486-19-2 |
| Cadmium nitrate (Cadmium salt) | 10325-94-7 |
| Cadmium oxide | 1306-19-0 |
| Cadmium sulfate (Sulfuric acid) | 10124-36-4 |
| Cadmium sulfide | 1306-23-6 |

| | |
|---|---|
| **Chromium VI and its Compounds** | |
| Chromium | 7440-47-3 |
| **Examples of Common Chromium Compounds** | |
| Barium chromate | 10294-40-3 |
| Calcium chromate | 13765-19-0 |
| Chromic acetate | 1066-30-4 |
| Chromium trioxide | 1333-82-0 |
| Lead chromate | 7758-97-6 |
| Sodium chromate | 7775-11-3 |
| Sodium dichromate | 10588-01-9 |
| Strontium chromate | 7789-06-2 |
| Zinc chromate | 13530-65-9 |
| Zinc bichromate | 14018-95-2 |
| | |
| **Lead and its Compounds** | |
| Lead | 7439-92-1 |
| **Examples of Common Lead Compounds** | |
| Lead sulfate | 7446-14-2 |
| Lead carbonate | 598-63-0 |
| Lead hydrocarbonate | 1319-46-6 |
| Lead acetate | 301-04-2 |
| Lead (II) acetate, trihydrate | 6080-56-4 |
| Lead phosphate | 7446-27-7 |
| Lead selenide | 12069-00-0 |
| | |
| **Mercury and its Compounds** | |
| Mercury | 7439-97-6 |
| **Examples of Common Mercury Compounds** | |
| Mercuric chloride | 33631-63-9 |
| Mercury bichloride | 7487-94-7 |
| Mercuric sulfate | 7783-35-9 |
| Mercuric nitrate | 10045-94-0 |
| Mercuric oxide | 21908-53-2 |
| Mercuric sulfide | 1344-48-5 |
| | |
| **Nickel and its Compounds** | |
| Nickel | 7440-02-0 |
| **Examples of Common Nickel Compounds** | |
| Nickel acetate | 373-02-4 |
| Nickel carbonate | 3333-67-3 |
| Nickel carbonyl | 13463-39-3 |
| Nickel hydroxide | 12054-48-7 or 11113-74-9 |
| Nickelocene | 1271-28-9 |
| Nickel oxide | 1313-99-1 |
| Nickel subsulfide | 12035-72-2 |
| Nickel sulfate | 7786-81-4 |
| | |
| **Magnesium and its Compounds** | |
| Magnesium | 7439-95-4 |
| **Examples of Common Magnesium Compounds** | |
| Magnesium oxide | 1309-48-4 |

| | |
|---|---|
| Magnesium sulfate | 7487-88-9 |
| Magnesium (II) nitrate | 10377-60-3 |
| Magnesite | 13717-00-5 |
| | |
| **Selenium and its Compounds** | |
| Selenium and materials | 7782-49-2 |
| **Examples of Common Selenium Compounds** | |
| Hydrogen selenide | 7783-07-5 |
| Sodium selenide | 1313-85-5 |
| Selenium dioxide | 7446-08-4 |
| Sodium selenate | 10112-94-4 |
| Dimethyl selenide | 593-79-3 |
| Selenium oxide | 12640-89-0 |
| | |
| **Copper and its Compounds** | |
| Copper | 7440-50-8 |
| **Examples of Common Copper Materials** | |
| Copper sulfate | 7758-98-7 |
| Cupric carbonate | 1184-64-1 |
| Cupric oxide | 1317-38-0 |
| Copper sulfide | 1317-40-4 |
| | |
| **Gold and its Compounds** | |
| Gold | 7440-57-5 |
| **Examples of Common Gold Materials** | |
| Gold oxide | 1303-58-8 |
| Gold cyanide | 506-65-0 |
| Gold (III) chloride | 13453-07-1 |
| Gold (III) bromide | 10294-28-7 |
| | |
| **Palladium and its Compounds** | |
| Palladium | 7440-05-3 |
| **Examples of Common Palladium Materials** | |
| Palladium (II) chloride | 7647-10-1 |
| Palladium (II) bromide | 13444-94-5 |
| Palladium (II) iodide | 7790-38-7 |
| Palladium (II) oxide | 1314-08-5 |
| | |
| **Silver and its Compounds** | |
| Silver | 7440-22-4 |
| **Examples of Common Silver Materials** | |
| Silver (I) fluoride | 7775-41-9 |
| Silver (II) fluoride | 7783-95-1 |
| Silver (I) chloride | 7783-90-6 |
| Silver (I) bromide | 7785-23-1 |
| Silver (I) iodide | 7783-96-2 |
| Silver (I) oxide | 20667-12-3 |
| Silver (I) peroxide | 25455-73-6 |
| Silver (II) oxide | 1301-96-8 |
| Silver nitrate | 7761-88-8 |
| Silver acetate | 563-63-3 |
| Silver sulfate | 10294-26-5 |
| Silver cyanide | 506-64-9 |

| | |
|---|---|
| **FLAME RETARDANT MATERIALS** | |
| | |
| **Organophosphorous Compounds** | |
| Triaryl Phosphates | Various |
| Trimethyl Phosphates | 512-56-1 |
| Triphenyl Phosphates | 115-86-6 |
| Bisphenol A diphenylphosphate | Various |
| Resourcinol Diphosphate | 57583-54-7 |
| Antimony trioxide | 1309-64-4 |
| Antimony pentoxide | 1314-60-9 |
| Triaryl phosphates ester | NA |
| | |
| **Tetrabromobisphenol A** | |
| Tetrabromobisphenol A (TBBA) | 79-94-7 |
| | |
| **All other organic or inorganic** | |
| **substances used as FRs** | |
| Aluminum hydrate | 21645-51-2 |
| Zinc Borate | 1332-07-6 |
| Melamine | 108-78-1 |
| Red Phosphorus | 7723-14-0 |
| Talc | 14807-96-6 |
| | |
| **Halide Flame Retardants** | |
| Tetrabromoethane | 79-27-6 |
| Hexabromocyclododecane | 3194-55-6 |
| Hexabromobenzen (HBB) | 87-82-1 |
| 2,4,6-tribromoaniline | 147-82-0 |
| 2,4,6-tribromophenol | 118-79-6 |
| Tetrachloro phthalic anhydride | 117-08-8 |
| Tetrabromo phthalic anhydride | 632-79-1 |
| Tris(2-chloroethyl)phosphate (TCEP) | 115-96-8 |
| Tris(chloropropyl)phosphate (TCPP) | 6145-73-9 |
| Tris(dibromopropyl)phosphate (TCPP) | 126-72-7 |
| | |
| | |
| **ORGANIC MATERIALS** | |
| | |
| **Chloroparaffins** | |
| Chloroparaffins | 8029-39-8, 63449-39-8, 85535-84-8 |
| | |
| **Phthalates** | |
| Diisononyl Phthalate (DINP) | 28553-12-0 |
| Di-sec-octyl phthalate (DEHP) | 117-81-7 |
| Dibutyl phthalate (DBP) | 84-74-2 |
| Diisodecyl phthalate | 26761-40-0 |
| Bis(n-octyl) Phthalate (DNOP) | 117-84-0 |
| Butyl benzyl phthalate (BBP) | 85-68-7 |
| Dimetyl phthalate (DMP) | 131-11-3 |
| | |
| **Azo-Based Materials (carcinogenic amines)** | |
| Benzidene and its salts | 92-87-5 |

| | |
|---|---|
| 4-Aminodiphenyl and its salts | 92-67-1 |
| 4-Chloro-o-toluidine (4-chloro-2-methylaniline) | 95-69-2 |
| 2-Naphthylamine | 91-59-8 |
| o-Aminoazotoluene | 97-56-3 |
| 2-Amino-4-nitrotoluene | 99-55-8 |
| p-Chloroaniline | 106-47-8 |
| 2,4-Diaminoanisole | 615-05-4 |
| 4,4'-Diaminodiphenylmethane | 101-77-9 |
| 3,3'-Dichlorobenzidene | 91-94-1 |
| 3,3'-Dimethoxybenzidine | 119-90-4 |
| 3,3,'-Dimethylbenzidene | 119-93-7 |
| 3,3'-Dimethyl-4,4' diaminodiphenylmethane | 838-88-0 |
| p-Cresidene (5-Methyl-o-Anisidine) | 120-71-8 |
| 4,4'Methylenebis-(2-chloroaniline) | 101-14-4 |
| 4,4'-Oxydianiline | 101-80-4 |
| 4,4'-Thiodianilene (4,4'-thiobisbenzenamine) | 139-65-1 |
| o-Toluidine | 95-53-4 |
| 2,4-Toluylenediamine (Toluene-2,4-Diamine) | 95-80-7 |
| 2,4,5-Trimethylaniline | 137-17-7 |
| | |
| **Chlorinated Polymers** | |
| Poly vinyl chloride (PVC) | 9002-86-2 |
| | |
| **Organictin and its compounds** | |
| Tributyltin oxide | 56-35-9 |
| Triphenyltin chloride | 639-58-7 |
| | |
| **Dioxins (CDD)/Furans (CDF)** | |
| 2,3,7,8-tetrachlorodibenzodioxin | 1746-01-6 |
| 1,2,3,6,7,8-Hexachlorodibenzodioxin | 57653-85-7 |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 |
| 1,2,3,7,8,9-Hexachlorodibenzodioxin | 19408-74-3 |
| 1,2,3,4,7,8-Hexachlorodibenzodioxin | |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 |
| 2,3,4,7,8-Pentachlorodibenzofuran | 57117-31-4 |
| 1,2,3,6,7,8-Hexachlorodibenzofuran | 57117-44-9 |

# PRODUCT SAFETY PANEL

## European Union Environmental Directives - What do they mean?

Sue Gornick, P.E.
NMB (USA) Inc.
October 8, 2003

## Overview

- EU Directives
  - RoHS
  - WEEE
- Developing a Program to Comply
- Trials & Tribulations

## EU Directives Background

- Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)
- Waste Electrical and Electronic Equipment (WEEE)
- Precautionary Principle mentioned in both directives

## Directives Aim to Protect

- WEEE Priorities are Prevention, Recycling, and Minimization of Environmental Impacts from treatment and disposal of WEEE
- Responsibility on the Producer, not the Consumer
- RoHS is the long-term solution

## Applicability

- Electrical & Electronic Equipment
  - household appliances
  - IT & telecommunications equipment
  - Consumer equipment
  - Electrical & electronic tools
  - Toys, leisure & sports equipment
  - Automatic dispensers
  - Medical devices & monitoring & control instruments (WEEE only)

## WEEE Compliance

- Compliance by January 1, 2006
- Product design
- Separate collection by producers
- Treatment
- Rates of Recovery
  - re-use and recycling

## Producers Pay

- Collection, treatment, recovery and disposal paid for by producers
- Costs of directive can be revealed to purchasers for 8 years

## Treatment Information Shared

- Producers must provide re-use and treatment information within one year of going to market
- Full disclosure of dangerous substances in components required

## Member States Report

- Annual report of re-use, recycled and recovered WEEE
- Penalties
- Enforcement

## RoHS Materials of Concern

- Mercury
- Lead
- Cadmium
- Hexavalent Chromium
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ehters (PBDE)

## RoHS Compliance

- Compliance date - July 1, 2006
- Criteria  economic and technical feasibility
- Substitutions where appropriate

## RoHs Exemptions

- Mercury in fluorescent lamps
- Lead in glass of cathode ray tubes, electronic components and fluorescent tubes
- Lead in solder
- Cadmium plating
- Hexavalent chromium in absorption refigerators

## RoHS Future Research Areas

- Deca BDE
- Mercury in straight fluorescent lamps
- Lead in solder for servers, storage, network infrastructure equipment, etc.
- Light bulbs

## How to Comply?

- Policy
  - management commitment to meeting directives
- Definition of affected products
  - identity of materials of concern and concentrations
- System to comply
  - supplier surveys
  - accountability at the factory level

## Trials & Tribulations

- Testing method issues in determining types of materials and concentrations present
- Finding material substitutions
- How to meet individual customer needs yet standardize products
  - "certificate of compliance" concept

## Resources

- EICTA
- EECA
- EIA
- EUR-LEX
- European Union Online

| ABC **Division** | **Procedure** | |
|---|---|---|
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**COVER SHEET**

**for**
**Banned Substance Control**

**Table of Contents**



Prepared by:_____ Position _____ Date _____
Approved by: _____ Position _____ Date _____
Authorised by:_____ Position _____ Date_____

Rev. [ A ] Reason of Change : The first issue .

 

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## DOCUMENT CONTROL

1. **This document is a 'Controlled Document'**

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   **Issue To** _____
   **Job Title** _____

   **(Section)**

   **(Department )**

   **(Site )**

2. **This procedure will be updated by the issuance of replacement, or additional pages, as necessary. Section 5 (five) of this procedure lists all changes to the document. All changes, that are made are represented in 'italics'.**

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| ABC Division | Procedure | |
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**1. Purpose**

To establish a document which describes the Banned Substances Control System at Keyboard Division .

**2. Scope**

This procedure are identified the process for Banned Dangerous Substances Control and specify the incharge person for corrective action in case out of control rate .

**3. Reference**

| | |
|---|---|
| 3.1 Analyze Test Schedule for Heavy Metals | QA-02-001-A356 |
| 3.2 Work Instruction for Banned Substances Testing | (T)EN-09-007-E120 |
| 3.3 Supplier Audit Schedule | QA-02-001-A458 |
| 3.4 Supplier Audit Format | QA-02-001-A463 |
| 3.5 ABC Banned Substances Specification | QA-02-001-A462 |

**4. Definition**

Critical Parts : The parts, that will be high risky the Banned dangerous substances consisted .

Non-Critical Parts : The parts which will be less risky Banned dangerous substances consisted than critical parts .

AVL : Approved Vendor List

**5.Procedure**

There are document for Banned Substances control at ABC Division , for identify the segregate parts , The test schedule , supplier controlling , Data Analyse and Banned Substances control for ABC by the following .

5.1 Segregate Parts

Parts are separated by the below items ,

5.1.1 Group A "Critical Parts"

**PVC** :
- Cord Set
- E-Cap
- USB/PS 2 Adapter

**INK** :
- Label
- Tampo Ink
- Packaging
- Skeltor
- Plastic Bag
- Rubber Key Pad ( Top print )
- Tampo Printed Parts
- Manual
- CD-Rom
- Mix Paste
- Mouse

5.1.2 Group B "Non-Critical parts"

The other parts, that not identified as above .

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**5.2 Banned Substances Test Schedule**

5.2.1 Analyze Test Schedule for Heavy Metals (QA-02-001-A356 )

Frequency
Frequency is identified in the schedule test .

Incharge Person
There are the yearly review schedule test by the Incharge person ,Incoming Quality Control member .

5.2.2 The Banned Substances check Items .
The incharged person send samples to R&D for checking follow the below items .
5.2.2.1 Cadmium ( Cd )
5.2.2.2 Lead ( Pb )
5.2.2.3 Chromium IV ( $Cr^{+6}$ )
5.2.2.4 Mercury ( Hg )

5.2.3 Test Method
There are the Banned Substances Test method follow the International testing ,
Lead Analysis : EPA 3050
Cadmium Analysis ( For plastic only ) : EN1122
Analysis condition for instrument : EPA6010 , EPA6020 , EPA7421 , EPA7130 , EPA7131

**5.3 Supplier Auditing**
Supplier Audit Format
There are the various items are consist in the Supplier Audit Form ( QA-02-001-A463 ) . This form are followed by the person , who came to audit at Vendor .
Score Card
There is the Score Card for control by following

Total = 60 Points
(60-45 Points ) Grade "A"
(35-45 Points ) Grade "B"
(27-34 Points ) Grade "C"
( < 26 Points ) " Fail Banned Substances Audit"

Recording Data
After finished audit The Incharge Person , Incoming Quality Control set a meeting for follow-up the audit result and the original record are kept at the IQC room .

**5.4 Data Analysis**
5.4.1 Analyze Test Schedule for Heavy Metals ( QA-02-001-A356 )

 

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Incharge by

After finished the test method , we received the test report from R&D and check the data , if out of spec IQC Member inform to Supplier for make the corrective action and all stocked parts are checked by concern member , IQC , MC/Purchase , Production .

**5.5 Banned Substance Rate Control**

There are the rate control for Banned Substances by following

5.6.1 Banned Substance Specification

There is the Specification of Banned Substances Control for ABC follow the document QA-02-001-A462

Banned Substances Review

If there is the ABC Banned Substances level change ,ECO will be reviewed by incharge person from FJSW and send the information to banned substances concern person .

** **Remark** : The ABC Banned Substances control ( QA-02-001-A462 ) be consisted in the drawing for rate control in case new model , new parts .

**5.6 Approved Vendor List ( AVL )**

5.6.1 Frequency of review

There is the AVL Quarter review by perchasing .

**5.7 Data recording**

5.7.1 Analyze Test Schedule for Heavy Metals ( QA-02-001-A356 ) and report

Period: We keep the original Test result for 1 year at IQC office .

**5.8 Information**

There are the training schedule for Banned substances for Division see ISO14000 training Schedule

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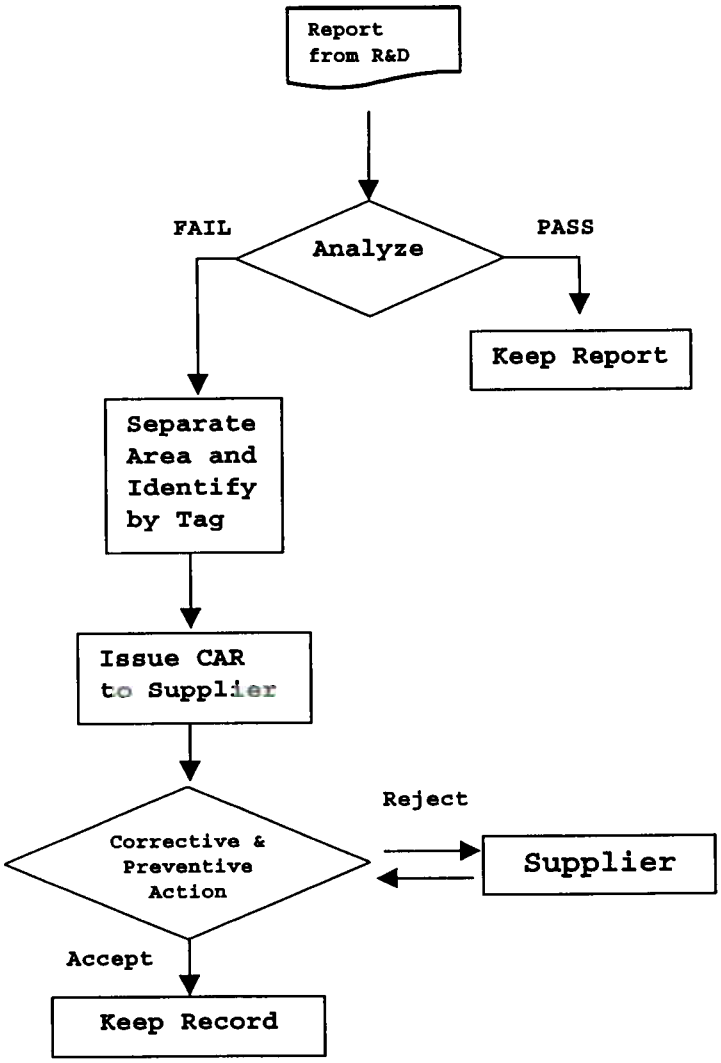
**5.9 The Action Flow for Banned Substances**




| Incharge By: |
|---|
| R&D |
| banned Substances Leader & Member |
| IQC |
| ALL CONCERN MEMBER<br>- IQC<br>- Production<br>- MC/Store<br>- QA<br>- Supplier |
| IQC |
| Supplier |
| IQC |

**6.0 History of the Document**

**May/27/2002 The first issue Rev. A**

| LIST OF DISTRIBUTION | ESTABLISHED June 26, 1996<br>REVISED(C) Apr. 25, 2003<br>ENFORCED May. 07, 2003 | **Control Instruction for Chemical Substances Prohibited in Use** | APPROVED BY | CHECKED BY | ORIGINATED BY |
|---|---|---|---|---|---|
| OF COPIES | 1.Objective<br>1-1 This Instruction has the objective of identifying the chemical substances whose use should be prohibited or restricted to reduce their environmental impacts from the viewpoint that their use is prohibited or restricted by treaties, laws, customer requirements or the voluntary control of the Company.<br><br>2. Scope<br>2-1 This Instruction applies to the business activity, parts, products and services of the Company.<br><br>3. Related Specification<br>3-1 The related environmental management specifications of the Company shall be as follows<br>(1) EM10500 series chemical substances management specifications and related instructions.<br><br>4. Chemical Substances Prohibited in Use within the Company<br>4-1 In accordance with global treaties, agreements, related laws and regulations at home and abroad, etc., the Corporate Environmental Management Committee shall discuss and make decisions or changes concerning the Chemical Substances Prohibited in Use within the Company (hereinafter referred to as the "Chemical Substances"). In addition, the Committee shall also make reports of such decisions or changes to the executive in charge of environmental management<br>4-2 The prohibition of use shall refer to the following:<br>1)To prohibit the inclusion of the Chemical Substances in parts or products when they are purchased or manufactured<br>2)To prohibit the use of the Chemical Substances in manufacturing processes (excluding equipment).<br>3) To prohibit the purchase of parts or products, including the Chemical Substances.<br>4-3 If any of the Chemical Substances is used in air-conditioning equipment, manufacturing equipment, inspection equipment, etc., the Company shall take all possible measures to ensure that the substance does not come to be mixed in its products. | | | |

At the same time, the Company shall also ensure that the substance is replaced with any other substance in response to advances in alternative technology

4-4 An analysis, etc. of the content of the Chemical Substances shall be verified in accordance with the latest chemical technological level, and its numerical values shall be below the detection limit which can be allowed. Verification results shall be recorded and stored by a clearly appointed which responsible person.

5. Disclosure of Chemical Substances Prohibited in Use

5-1 The Chemical Substances that have been decided and revised by the Corporate Environmental Management Committee shall be compiled into Attachment 1, "List of Chemical Substances Prohibited or Restricted in Use by the Company. To ensure the management of the said chemical substances prohibited in use, the Corporate Environmental Management Committee shall disclose the latest version of the List to the public.

5-2 Attachment 1 mentioned in Item 5-1 is the same list as the "List of Chemical Substances Prohibited or Restricted in Use by the Company," Attachment 1 of "EM10506 Control Instruction for Chemical Substances Restricted in Use."

6. Exemption from prohibited use

6-1 In applications of the Chemical Substances that are relating directly to human lives and safety, such as medical care required by customers, aircraft, vehicles, etc., and that do not constitute a violation of laws and regulations at home and abroad, the parties concerned can apply for an exception for applying this Instruction.

6-2 In accordance with designated Form 1, "Application for Exemption from Chemical Substances (Prohibited/Restricted) in Use and Result Report," the Site Environmental Manager/Representative shall submit an application provided for in the preceding item 6-1 to the
Chairman of the Corporate Environmental Management Committee.
The Chairman of the Corporate Environmental Management Committee shall approve or disapprove of such an application in designated Form 1.
This Form and the prescribed Form set forth in item 6-2 of EM10506, "Control Instruction for Chemical Substances Restricted in Use," shall be commonly used.

7. Control and Handling

7-1 The Site Environmental Manager/Representative and each division/group manager shall be responsible for the control and handling of the Chemical Substances Prohibited in Use.

7-2 Concerning raw/processed materials, subsidiary materials, mechanical/electronic parts, etc. used at any business facility, the Site Environmental Manager/Representative and each division/group manager shall always check in the following manner if the inclusion, use or purchase of Chemical Substance Prohibited in Use is in accordance with this Instruction:

(1)Tests of ingredients included in raw/processed materials, subsidiary materials, mechanical/electronic parts.

(2)Obtainment of the latest MSDS

(3) Examinations of existing chemical substances

(4) Examinations of new uses of chemical substances
(5) Patrol at workplaces, etc.

7-3 If the Site Environmental Manager/Representative and each division/group manager judges that the inclusion, use or purchase of any Chemical Substance does not confirm with this Instruction, they shall take one of the following actions:

(1) To make a report to the site General Manager, Chairman of the Site Environmental Management Committee and also to make a report to the environmental management executive through the Chairman of the Corporate Environmental Management Committee and immediately prohibit its use.

(2)To consider taking some kinds of measures, including the collection of Company products.

(3)To consider and implement the necessary measures, such as making a medical examination of all the employees involved in the checking of any Chemical Substance and making an environmental examination of soil, water, etc.; and also to report their results to the site General Manager and the Chairman of the Site Environmental Management Committee. Furthermore, they are also required to report such results to the environmental management executive through the Chairman of the Corporate Environmental Management Committee.

(4)To find out why the Chemical Substance was used, make measures to prevent recurrences of such use, and report their results to the site General Manager and the Chairman of the Site Environmental Management Committee. Furthermore, they are also required to report environmental such results to the management executive through the Chairman of the Corporate Environmental Management Committee..

8. Role in the Corporate Environmental Management Committee

8-1 The Corporate Environmental Management Committee shall collect the latest information, treaties, laws and regulations, customer requirements, etc. relating to chemical substances, and shall maintain updated Attachment 1, "List of Chemical Substances Prohibited or Restricted in Use by the Company". The latest version of Attachment I shall be published on the Company Environmental Bulletin Board (hereinafter referred to as the "CEB").

8-2 The Corporate Environmental Management Committee shall collect information on related laws and regulations in each country's government agencies that are now under deliberation. At the same time, to make preparations for matters relating to the Company prior to the enforcement of the laws and regulations, it shall prepare information, including a guideline, and notify it of each business facility At the same time, it shall be published on the CEB.

8-3 When it obtains any information from the latest materials for chemical substances at home and abroad, treaties, relevant laws and regulations, customers requirements, etc., it shall notify that information to each business facilities. The notification method shall be not only to display it on The Company Environment Bulletin Board (CEB) and also to send it by e-mail, internal mail, Ordinary mail,etc.

8-4 If each business facility applies for the addition or change of Chemical Substances Prohibited in Use,the Corporate Environmental Management Committee shall check such application and make an addition or change to Attachment 1, "List of Chemical Substances Prohibited or Restricted in Use by the Company".

Control Instruction for Chemical Substances Prohibited in Use, Section2-2, Designated Form 1

Please cross out either of the two in parentheses, "Prohibited or Restricted."

Application for Exemption from Chemical Substances (Prohibited/Restricted) in Use and Result Report

| Site Environmental Manager/Representative | Application | Corporate Environmental Management Committee | Reply | Site Environmental Manager/Representative |
|---|---|---|---|---|
| | | | | |

After considering the Application, it is copied and Filed by the Secretariat of the Corporate Environmental Management Committee. The original is filed by the applicant.

In accordance with the provisions set forth in Section 6-2 of "Control Instruction for Chemical Substances Prohibited in Use," our Department applies for exempting the following Chemical Substance (Prohibited/Restricted) in Use:

**The applicant is required to complete all fields of the portion framed in bold strokes of this application form.**

Date of submission:

| | | | |
|---|---|---|---|
| Applicant name | | Dept. name | |
| Name of site environmental manager/representative | (Seal) | Name of division/group manager | (Seal) |
| Name of the chemical substance applied for (Name of commodity) | | | |
| Maker name | | Name of sales agent | |
| Name of products or parts to be used | | | |
| Customer name (official name) and name of the country where they operate | | | |
| Reason for application (Please enter customer requirements, the results of surveys on related laws and regulations, etc.): If there is any document or information that you would like to attach, please attach it to this Application and Report. | | | |

Space for the Chairman of the Corporate Environmental Management Committee

| Judgment result (Put a circle mark) | Usable | Unusable: The reason is as follows. |
|---|---|---|
| Reason or comments: | | |

Section 3-3 of the Environment Management Manual Prescribed Form 2

History of Changes

Instruction No.: EM 10503
Title of this Instruction: **Control Instruction for Chemical Substances Prohibited in Use**

| Rev. code | Rev. date | Contents of change | Approval by EMC Chairman |
|---|---|---|---|
| – | July 1, 2002 | This Instruction was revised in accordance with an overall review of the rules and regulations relating to chemical substances.<br>The Chemical Substances Prohibited and Restricted in Use were set forth in this Instruction. To better control both Substances, we provided for the Chemical Substances Restricted in Use in the new separate Instruction EM10506, "Control Instruction for Chemical Substances Restricted in Use."<br>Set forth the details of "prohibited use" in the list of Attachment 1 mentioned in Section 5-1 of EM10506 Instruction.<br>Added the word "purchase" to the scope of "prohibited use" provided for in Section 4-2.<br>Added the means of checking and verifying the content, etc. of Chemical Substances by creating the new Section 7-2.<br>Added the new Item Chemical Substances Prohibited in Use to the "List of Chemical Substances Prohibited in Use." | |
| B | Oct 30, 2002 | Transfer Company Banned Substances chlorinated hydrocarbons and benzenebto Company Restricted Substances List. Amend detailed list "Asbesto".Add postscript To 7-3(1),8-1,8-4. | |
| C | Apr. 25, 2003 | Added changes in order to consolidate the lists of chemical substances prohibited and restricted in use and to adjust the wording in Control Instructions for Chemical Substances.<br>Added chemical substances contained in our products in order to comply with customers' requirements and EU's RoHS regulations.<br>(EXP: Mirex, TBBP-A-bis,etc added total 21chemical substances) | |

Chemical substances prohibited & restricted Ver.1-2

# List of Chemical Substances Prohibited and Restricted

Chemical Substances Prohibited and Restricted of Minebea Group
Attachment list of Prohibited and Restricted

List of Prohibited and Restricted

Analysis method _ Terms

Details list

MINEBEA Co., Ltd.

The Corporate Environmental Management Committee

| No. | | Substances Name | CAS_No_ | Details List | Banned OR Restricted | | The time to ban on receiving the parts and materials | | Restriction_Application | | Application | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | —— – —— | | | | | | | | | | | | |
| 2 | eavy meta | Cadmium & its compounds | 7440-43-9etc | _ | | _ | | | | | | | Ouch-ouch disease, emphysema, liver damage |
| | | Lead & its compounds | 1317-36-8etc | _ | | _ | | Exemption | | | | | Poverty of blood, center nerve disorder |
| | | Mercury & its compounds | 7439-97-6etc | _ | | _ | _ | ption | | >10(mg/lamp) | | | Nerve disorder |
| | | | | | | | | Exemption | Straight-tube fluorescent lamps ( <10 mg/lamp : Exemption) | <10(mg/lamp) | | Exemption | |
| | | | | | | | | | Small-sized fluorescent lamps ( < 5 mg/lamp : Exemption) | < 5(mg/lamp) | | Exemption | |
| | | | | | | | _ | | Banned Contain in a Packing material | | Note_ | | Chromium ulcer, |
| | | | | | | | _ | | Batteries, catalysts | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Hexavalent Chromium___¯_ & its compounds | 7789-00-6etc | _ | | _ | | _ | Banned use at surface treatment(e.g.plating), coating and Chromate. | <5 | Note_ | | lung cancer, sensitizing property |
| | | | | | | | | _ | Banned use at a Paints,pigments,dyes and inks | <5 | Note_ | | |
| | | Arsenic & its compounds | 7440-38-2etc | _ | | _ | | _ | Banned use at a Paints,pigments,dyes and inks | <5 | | | Lung cancer, skin cancer |
| | | | | | | | | _ | Banned used for woods an antiseptic | <5 | | | |
| | | | | | | | | _ | Banned use for around water | | Note_ | | |
| | | | | | | | | _ | Banned use for Water treatment | | Note_ | | |
| | | | | | | | | _ | No use or residue allowed in products. | <5 | Note_ | | |
| | | Nickel & its compounds | 7440-02-0etc | _ | | _ | | _ | Prohibited in the parts touching skin. | | Note 7 | | Dermatitis venenata, malignant edema |
| | | Beryllium and its compounds | | _ | | _ | | _ | No use or residue allowed in products. | | | | |
| | | Yellowphosporous | 7723-14-0 | | _ | | _ | | | | | | |
| | | Aluminiumphoshide | 20859-73-8 | | _ | | _ | | | | | | |
| | | Tetra alkyl lead | | | _ | | _ | | | | | | Poverty of blood, center nerve disorder |
| 3 | chlorinated organic compounds | Polychlorinated biphenyls (PCB) | 1336-36-3 | _ | _ | | _ | | | | | | Skin trouble,liver damage |
| | | Polynaphthalene chloride (PCN) (Chlorides are n | | _ | _ | | _ | | | | | | Skin trouble, liver damage |
| | | Polychlorinated terphenyls_PCT_ | 61788-3-8 | | _ | | _ | | | | | | Skin trouble, liver damage |
| | | Chlorinated paraffin (short-chained chlorinated paraffin) Carbon number 10-13, chloine 50wt% | 61788-76-9,etc | _ | | _ | _ | | The cabinets and the flame retardants used for PWSs | | Note 8 | | Cancer-causing |
| | | Mirex (Perchlordecone) | 2385-85-5 | _ | _ | | _ | | | | | | |
| | | Other chlorinated organic compounds (Except for PCB,PCN,CP,Mirex) | | | | _ | | _ | The plasticizers or flame retardants contained in plastics, | | | | |
| 4 | Chlorinated hydrocarbons | 1,1,1,2-tetrachloroethan | 630-20-6 | | | _ | | _ | | <1000 | | | Cancer-causing |
| | | 1,1,1-trichloroethan | 71-55-6 | | _ | | _ | | | <1000 | | | Ozone depleting |
| | | 1,1,2,2-tetrachloroethan | 79-34-5 | | | _ | | _ | | <1000 | | | Cancer-causing |
| | | 1,1,2-trichloroethan | 79-00-5 | | | _ | | _ | | <1000 | | | Ozone depleting |
| | | 1,1-dichloroethylene | 75-35-4 | | | _ | | _ | | <1000 | | | Ozone depleting |
| | | Bis(chloromethhyl) ether | 542-88-1 | | _ | | _ | | | | | | |
| | | Hexachlorobenzene | 118-74-1 | | _ | | _ | | | | | | |
| | | Chloroform (Trichloromethan) | 67-66-3 | | | _ | _ | | Prohibited in the parts touching skin. | <1000 | Note 7 | | |
| | | Carbon tetrachloride (Tetrachloromethan) | 56-23-5 | | _ | | _ | | | <1000 | | | Ozone depleting |
| | | Pentachloroethane | 76-01-7 | | | _ | | _ | No use or residue allowed in products. | <1000 | | | |
| | | Pentachlorophenol (PCP) | 87-86-5 | | | _ | | _ | No use or residue allowed in products. | <5 | | | |
| | | Monomethyl dichloro diphenyl methan | | | _ | | _ | | | | | | |
| | | Dichloro((dichloroPhenyl)methyl)methyl | 76253-60-6 | | _ | | _ | | | | | | |
| | | Chloroethylene (Vinyl chloride monomer) | 75-01-4 | | | _ | _ | | Banned use for airzol | | | | Cancer-causing, finger tip bone dissolution, liver angiosarcoma |
| | | Chloromethyl methylether | 107-30-2 | | _ | | _ | _ | | | | | |
| | | 1,3-Dichloropropene | 542-81-7 | | _ | | _ | _ | | | | | |
| | | Benzylidyne = trichloride | 98-07-7 | | _ | | _ | _ | | | | | |
| | | Chlorinated hydrocarbons(CHCs) | | _ | | _ | | _ | No use or residue allowed in products. | | Note 3 | | |
| 5 | brominated organic compounds | Polybromobiphenyls _PBBs) | 67774-32-7etc | _ | _ | | _ | | | | | | Development of dioxin |
| | | Polybromodiphenylethers (PBDEs=PBDOs,PBBEs | 1163-19-5etc | _ | _ | | _ | | | | | | |
| | | Tetrabromobisphenol-A-bis-(2,3-dibromopropylether) (TBBP-A-bis) | 21850-44-2 | _ | | _ | | _ | No use or residue allowed in products. | | | | |
| | | Other brominated organic compounds (ExceptforPBB,PBDE,TBBP-A-bis) | | | | _ | | _ | The flame retardants contained in plastics, or used for PWSs. | | | | |
| 6 | Organic phosphorous compounds | Diethyl paranitrophenyl thiophosphate (Parathion) (Organic phosphorous compounds) | 56-38-2 | | _ | | _ | | | | | | |
| | | Dimethyl-(diethylamide-1-chlorchlotonyl)phosphate (Organic phosphorous compounds) | 13172-21-6 | | _ | | _ | | | | | | |
| | | Dimethyl ethylmercapt ethylthiophosphate (Methyl mercaptan) (Organic phosphorous compounds) | 8022-00-2 | | _ | | _ | | | | | | |
| | | Dimethyl paranitrophenyl thiophosphate (Methyl parathion) (Organic phosphorous compounds) | 298-00-0 | | _ | | _ | | | | | | |
| | | Tetraethyl pyrophosphate (TEPP) (Organic phosphorous compounds) | 107-49-3 | | _ | | _ | | Prohibited in the parts touching skin. | | Note 7 | | |
| 7 | | Chlorinated dioxins and Brominated dioxins _Include of Furanes_ | 01746-01-6etc | _ | _ | | _ | | | | | | Allergic reaction, liver damage, thyroid gland damage |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | Organic tin compounds (Limited to Tributyltins category | 1066-440etc | _ | | _ | _ | | No use or residue allowed in products. | | | | Impaired liver function, brain disorder |
| 9 | | Asbestos (Ascarite) | 1332-2I-4 | | _ | | _ | | | | | | Asbestos pneumonopathy, lung cancer |
| 10 | | Azo compounds (Substances which release Amine during resolution) | 92-67-1etc | _ | | _ | _ | | Prohibited in the parts touching skin. | | Note 7 | | Cancer-causing |
| 11 | | Chlordenes | | _ | _ | | _ | | | | | | Cancer-causing |
| 12 | | Fluoroacetic acid | 144-49-0 etc | _ | _ | | _ | | | | | | |
| 13 | | Creosotes | 8001-58-9etc | _ | | _ | _ | | No use or residue allowed in products. | | | | Bone marrow failure |
| 14 | | Polyvinyl chloride (PVC)and PVC blends | 9002-86-2 | _ | | _ | _<br>_ | <br>_ | Banned use for Packaging material<br>Banned use for Power-supply cords,sheets, insulation plates, connection cords,vinyl wires for intermal eiring and other units cords. | | | | Development of dioxin |
| 15 | | Radioactive | | _ | _ | | _ | | | | | | |
| 16 | | Dichlorodiphenyltrichloroethane | | | _ | | _ | | | | | | |
| 17 | | Benzidine & its chlorides | 92-87-5etc | | _ | | _ | | | | | | Cacer-causing |
| 18 | | 2-naphthylamine(_-naphthyl amine)& its salt | 91-59-8etc | | | _ | _ | | | <1000 | | | Cancer-causing |
| 19 | | 2,4,6-tri-tert-butylphenyl | 732-26-3 | | _ | | _ | | | | | | |
| 20 | | 4-aminodiphenyl & its salt | 92-67-1etc | | _ | | _ | | | | | | Cancer-causing |
| 21 | | 4-nitrobiphenyl & its salt | 92-93-3etc | | _ | | _ | | | | | | Cancer-causing |
| 22 | | 9-Methoxy-7H-flo[3,2-g][1]benzopyran-7-one (Methoxypsoraien) | 298-81-7 | | _ | | _ | | | <1000 | | | |
| 23 | | Di-_-oxo-di-n-butylstanniohyderoxyborane (DBE | 75113-37-0 | | | _ | _ | | | | | | |
| 24 | | Aldrin | 309-00-2 | | _ | | _ | | | | | | Cancer-causing |
| 25 | | Ethlene oxide | 75-21-8 | | _ | | _ | | Banned used for woods an antiseptic | | | | Cancer-causing |
| 26 | | Endrin | 72-20-8 | | _ | | _ | | | | | | |
| 27 | | Octamethylpyrophosphoramide | 152-16-9 | | _ | | _ | | | | | | |
| 28 | | Dieldrin | 60-57-1 | | _ | | _ | | | | | | |
| 29 | | Tris(1-aziridinyl)phosphine ox.ide (APO) | 545-55-1 | | | _ | _ | | Prohibited in the parts touching skin. | | Note 7 | | Development of dioxin, cancer-causing |
| 30 | | Tris(2,3-dibromopropyl) phosphate (TDBPP) | 126-72-7 | _ | | _ | _ | | | | | | |
| 31 | | Benzene | 71-43-2 | | _ | | _ | | | | | | |
| 32 | | Formaldehyde (Formaiin) | 50-00-0 | | | _ | | _ | No use or residue in Wooden Products | Note 9 | | | Breathing prpblems, disturbance of sensation, systemic problems |
| 33 | | Bromobenzylbromotoluene (DBBT) | 99688-47-8 | | _ | | _ | | | | | | |
| 34 | | Methyl bromide | 74-83-9 | | _ | | _ | | | | | | Center nerve disorder |

Note__Restrictions regarding heavy metal included in packaging material :
Regardless of applications of the packaging material, lead, mercury, cadmium and hexavalent chromium or its chemical compound or its mixture is prohibitted from use.
If there are impurities remaining, the total density for lead, mercury, cadmium and hexavalent chromium should be below 100ppm(mg/kg).

Note__Use or residue in products or components that are directly related to human life and safety, such as airplanes, automobiles, medical care equipment can be excluded by application._EM10503 6-1 clause_
The Site Environment Committee and the Site Environment Manager shall carefully review the contents and decide the or whether to use or not.

Note__If the product's (such as electronic components) characteristics cannot be achieved without the chemical substance and an alternative is not available under current technology, can be excluded by application._EM10503 6-2clause_
The Site Environment Committee and the Site Environment Manager shall carefully review the contents and decide the or whether to use or not.

Note__Includes the hull of a boat, float, net, and wood, stakes, tools, equipment that are partialy underwater.

Note__Cannot be used for processing water for industrial use or industrial waste water regardless of applications.

Note__Use in accessories such as necklaces, earrings, pierced rings, watches, etc. that always touch the skin is prohibited.

Note8:Outer frames of merchandise(cabinets) and printed circuit boards(fire retardant and elasticizers).

Note9:Concentration in the air-Equal to of less than 0.1ppm in an air-tight test chamber whose volume is $10m^3$ or more(Chanber method)
Equal to or less than 6.5mg in 100g of the chipboard without surface treatments(Perforair method)
Equal to or less than 7.0mg in 100g of the plywood without surface treatments(Perforair method)

For inquiries, please contact the following.
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# Chemical substances prohibited and restricted Ver.1-2

Definitions of terms

1-1.Contained

"Contained" is a situation in which a substance is added to,fills up, mingies with,or adheres to (1)the parts or devices employed in products, or (2) the materials used for the parts or divices,regardless if the situation is intentionally created or not.
(when a substance is unintentinally contained in, or added to a product in a processing process, this is also regarded as "Contained.")

1-2.Use

This term refers to your intentional adding, filling, mixing or attaching of any chemical substances to component parts, devices or materials comprising your products, with the aim of changing the characteristics of the materials of the products.
(The term does not refer to the unintentional and unforeseeable mixing or adhering of any chemical substances to products in your manufacturing processes.)

1-3.Impurity

An"Impurity"is a substance that satisfies either or both of the following conditions: 1) A substance contained in a natural material,which cannot technically be removed in a refining process totally(I.e.natural impuritles); and 2) A substance generated in a synthesis process,the total removal of which is technically impossible.

The time to ban on receiving the parts and materials

2-1.Banned immediately

"Immediately banned" means an immediate ban, which is commonly applied to the Minebea Group.

2-2.The banned dates of delivery

The banned dates of delivery are classified into "immediately banned" and "separately fixed."
"Immediately banned" means an immediate ban, which is commonly applied to the Minebea Group. "Separately fixed"means fixing a banned date of delivery in accordance with laws and customers' request at our plants.
("Separately fixed" includes "dates not yet fixed.")

Analysis method

3-1. Analysis method for cadmium and lead content

(1) Pre-treatment method

One of the following three methods shall be used.

1) a wet decomposition method under the existence of sulfuric acid, nitric acid and hydrogen peroxide (for example: the decomposition method, etc. specified in BS EN 1122:2001, "Plastics–determination of cadmium–Wet decomposition method");

2)an incineration method under the existence of sulfuric acid; or 3) a pressurized acid decomposition method (a microwave decomposition method) within a sealed container.

If sediments are produced, they should be dissolved in one way or another.

(2) Measuring equipment

The standard equipment shall be: inductively coupled plasma-atomic (optical) emission spectroscopes

(ICP-AES, ICP-OES),
atomic absorption spectroscopes (AAS) or inductively coupled plasma mass spectroscopes (ICP-MS).

(3) Analysis of lead content
Both cadmium and lead contents can be analyzed in a method other than AAS.

(4) Others
It would be best if the combination of pre-treatment and measuring equipment could keep the determination limit of cadmium at less than 5mg/kg (ppm) and that of lead at less than 3.0mg/kg (ppm), respectively.

3-2 Analysis method for mercury, cadmium, hexavalent chromium and lead in packaging materials

(1) Pre-treatment method
One of the following three methods shall be used.
1) a wet decomposition method under the existence of sulfuric acid, nitric acid and hydrogen peroxide (for example: the decomposition method, etc. specified in BS EN 1122:2001, "Plastics–determination of cadmium–Wet decomposition method");
2) an incineration method under the existence of sulfuric acid; or 3) a pressurized acid decomposition method (a microwave decomposition method) within a sealed container.
Using a) a microwave decomposition method or b) a decomposition flask with a reflux condenser, mercury shall be hydrolyzed with sulfuric acid or nitric acid.
If sediments are produced, they should be dissolved in one way or another.
Chromium shall be analyzed as total chromium, and the total concentration for mercury, cadmium, hexavalent chromium and lead shall be less than 100mg/kg (ppm). But if it is 100mg/kg (ppm) or more, hexavalent chromium in total chromium shall be analyzed. A check shall be made on whether the total concentration is less than 100mg/kg (ppm).

(2) Measuring equipment
The standard equipment for examining cadmium, total chromium and lead content shall be:
inductively coupled plasma–atomic (optical) emission spectroscopes (ICP-AES, JCP-OES), atomic absorption spectroscopes (AAS) or inductively coupled plasma mass spectroscopes (ICP-MS).
The standard equipment for examining mercury content shall be:
vapor hydride generation system AAS or vapor hydride generation system ICP-AES, ICP-OES.

(3) Others
It would be best if the combination of pre-treatment and measurement equipment could keep:
1) the determination limit of mercury at less than 5mg/kg (ppm);
2) that of cadmium at less than 5mg/kg (ppm);
3) that of total chromium at 2mg/kg (ppm); and
4) that of lead at 3mg/kg (ppm).
Cadmium. lead and total chromium contents can be analyzed in a method other than AAS.

3-3. Analysis method for formaldehyde

(1) Chamber method: EN 717-1_Wood based panels; determination of formaldehyde release; formaldehyde emission by the chamber method

(2) Perforator method: EN120: Wood based panels; determination of formaldehyde content; extraction method called perforator method; German version EN120; 1992

3-4.Azo compounds
Test method_for reference__The following are methods to decompose azo compounds and then to extract amines_LMBG_German Law for Foods and Consumer Products_
LMBG 82-02-2_Analysis of commodities-Detection of particular azo dyes used in textile commodities
LMBG 82-02-3_Analysis of commodities-Detection of particular azo dyes used in leather
LMBG 82-02-4_Analysis of commodities-Detection of particular azo dyes used in polyester fibres

MINEBEA CO.,LTD

**CFC**__Specified Chlorofluorocarbons: Appendix A, Group I and Appendix B, Group I of the Montreal Protocol_

All CFC-containing chemical substances fall under the category of these Groups.
The following list only shows several examples of the substances.
The CFC-containing substances other than those listed below are also included in this category.

| Substances Name | CAS No. |
|---|---|
| 1,1,1-Trichlorotrifluoroethane CFC-113a | 354-58-5 |
| 1,1,2-trichloro-1,2,2-trifluoroethane CFC-113 | 76-13-1 |
| 1,1-Dichlorotetrafluoroethane CFC-114a | 374-07-2 |
| 1,2-Dichlorotetrafluoroethane CFC-114 | 76-14-2 |
| Chlorotrifluoromethane CFC-13 | 75-72-9 |
| 2-Chloroheptafluoropropane CFC-217 | 76-18-6 |
| Monochloropentafluoroethane CFC-115 | 76-15-3 |
| Dichlorodifluoromethane CFC-12 | 75-71-8 |
| 1,2-Dichloro-1,1,2,3,3,3-hexafluoropropane CFC-216 | 661-97-2 |
| 2,2-Difluorotetrachloroethane CFC-112a | 76-11-9 |
| 1,2-Difluorotetrachloroethane CFC-112 | 76-12-0 |
| 1,1,1,3-Tetrachlorotetrafluoropropane CFC-214 | 2268-46-4 |
| Trichlorofluoromethane CFC-11 | 75-69-4 |
| 1,2,3-Trichloropentafluoropropane CFC-215 | 76-17-5 |
| Hexachlorodifluoropropane CFC-212 | 3182-26-1 |
| Heptachlorofluoropropane CFC-211 | 422-78-6 |
| Pentachlorotrifluoropropane CFC-213 | 2354-06-5 |
| Pentachlorofluoroethane CFC-11 | 354-56-3 |

**HCFCs** (Transitional substances: Appendix C, Group I of the Montreal Protocol)
All HCFC-containing chemical substances fall under the category of this Group.
The following list only shows several examples of the substances.
The HCFC-containing substances other than those listed below are also included in this category.

| Substances Name | CAS No. |
|---|---|
| 1,1-dichloro-1-fluoroethane HCFC-141a | 1717-00-6 |
| 2,2-dichloro-1,1,1-trifluoroethane HCFC-123 | 306-83-2 |
| 2-chloro-1,1,1,2-tetrafluoroethane HCFC-124 | 2837-89-0 |
| 2-Chloro-1,1,1-trifluoroethane HCFC-133a | 75-88-7 |
| Trifluorochloroethane | 1330-45-6 |
| 1-Chloro-1,1-difluoroethane HCFC-142b | 75-68-3 |
| Chlorodifluoropropane HCFC-262 | 134190-53-7 |
| Chlorodifluoromethane HCFC-22 | 75-45-6 |
| Chlorotetrafluoropropane HCFC-244 | 134190-50-4 |
| Chlorotrifluoropropane HCFC-253 | 134237-44-8 |
| 1-Chloro-1-fluoroethane HCFC-143 | 1615-75-4 |
| Chlorofluoropropane HCFC-271 | 134190-54-8 |
| Chlorofluoromethane HCFC-31 | 593-70-4 |
| Chlorohexafluoropropane HCFC-226 | 134308-72-8 |
| Chloropentafluoropropane HCFC-235 | 134237-41-5 |

| | |
|---|---|
| Dichlorodifluoroethane HCFC-132 | 25915-78-0 |
| Dichlorodifluoropropane HCFC-252 | 134190-52-6 |
| Dichlorotetrafluoropropane HCFC-234 | 127564-83-4 |
| Dichlorotrifluoropropane HCFC-243 | 134237-43-7 |
| Dichlorofluoropropane HCFC-261 | 134237-45-9 |
| Dichloromonofluoromethane HCFC-21 | 75-43-4 |
| 3,3-Dichloro-1,1,1,2,2-pentafluoropropane HCFC-225ca | 422-56-0 |
| 1,3-Dichloro-1,1,2,2,3-pentafluoropropane HCFC-225cb | 507-55-1 |
| Tetrachlorodifluoropropane HCFC-232 | 134237-39-1 |
| Tetrachlorotrifluoropropane HCFC-223 | 134237-37-9 |
| Tetrachlorodifluoroethane HCFC-121 | 134237-32-4 |
| Tetrachlorofluoropropane HCFC-241 | 134190-49-1 |
| Trichlorodifluoroethane HCFC-122 | 41834-16-6 |
| Trichlorodifluoropropane HCFC-242 | 134237-42-6 |
| Trichlorotetrafluoropropane HCFC-224 | 134237-38-0 |
| Trichlorotrifluoropropane HCFC-233 | 134237-40-4 |
| Trichlorofluoroethane HCFC-131 | 134237-34-6 |
| Trichlorofluoropropane HCFC-251 | 134190-51-5 |
| Hexachlorofluoropropane HCFC-221 | 134237-35-7 |
| Pentachlorodifluoropropane HCFC-222 | 134237-36-8 |
| Pentachlorofluoropropane HCFC-231 | 134190-48-0 |

**Asbesto**

All asbesto-containing chemical substances fall under the category of this group.

The following list only shows several examples of the substances.

The asbesto-containing substances other than those listed below also fall under this category.

| Substances Name | CAS No. | Chemical Formula |
|---|---|---|
| Asbestos | 1332-21-4<br>132207-32-0<br>132207-33-1 | |
| Crocidolite | 12001-28-4 | Na2Fe5(Si8O22)(OH)2 |
| chrysotile | 12001-29-5 | Mg3Si2O5(OH)4 |
| amosite | 12172-73-5 | (Mg,Fe)7Si8O22(OH)2 |
| anthophyllite | 17068-78-9 | (Mg,Fe)7Si8O22(OH)2 |
| tremolite | 14567-73-8 | Ca2Mg5Si6O22(OH) |
| actinolite | 13768-60-8 | Ca2(Mg,Fe)5Si8O22(OH)2 |

**Halon**_Appendix A, Group _of the Montreal Protocol_

All halon-containing chemical substances fall under the category of this Group.

The following list only shows several examples of the substances.

The halon-containing substances other than those listed below are also included in this category.

| Substances Name | CAS No. | Chemical Formula |
|---|---|---|
| Bromochlorodifluoromethane ; Halon-1211 | 353-59-3 | CBrClF2 |
| Bromotrifluoromethane ; Halon-1301 | 75-63-8 | CBrF_ |
| 1,2-Dibromotetrafluoroethane ; Halon-2402 | 124-73-2 | C2Br2F4 |

**Polychlorinated naphthalene (PCN) (Cl>=3)**

All chemical substances with polychlorinated naphthalene fall under the category of this group.

The following list only shows several examples of the substances.

The substances with the naphthalene other than those listed below also fall under this category.

| Substances Name | CAS No. | Chemical Formula |
|---|---|---|
| Polychlorinated naphthalene | | C10H8-xClx (x>=3) |
| Trichloronaphthalene | 1321-65-9 | C10H5Cl3 |
| Tetrachloronaphthalene | 1335-88-2 | C10H5Cl4 |
| Pentachloronaphthalene | 1321-64-8 | C10H5Cl5 |
| Octachloronaphthalene | 2234-13-1 | C10H5Cl8 |

**Poiybromobiphenyls and Polybromodiphenylethers**

_PBBs _PBDEs=PBDOs,PBBEs,PBDEs_

All chemical substances containing PBBs and PBDEs fall under the category of this group.

The following list only shows several examples of the substances.

The substances with PBBs and PBDEs other than those listed below also fall under this category.

| Substances Name | CAS No. | Chemical Formula |
|---|---|---|
| Polybromobiphenyl_PBB | e.g.67774-32-7 | C12H10-xBrx(x=1-10) |
| Polybromodiphenyl ether_Polybromodiphenyl oxide_ Polybromobiphenyl ether_DBDE_DBDO;PBBE | | C12H10-xBrxO(x=1-10) |
| Decabromodiphenyl ether;Decabromodiphenyloxide | 1163-19-5 | C12HBr10O |
| Octabromodiphenyl ether:Octabromodiphenyloxide | 32536-52-0 | C12H2Br8O |
| Hexabromodiphenyl ether;Hexabromodiphenyloxide | 36483-60-0 | C12H4Br6O |
| Pentabromodiphenyl ether; Pentabromodiphenyloxide | 32534-81-9 | C12H5Br5O |

**Polychlorinated biphenyls (PCB)**

| Substances Name | CAS No. | Chemical Formula |
|---|---|---|
| Polychlorinated biphenyls :PCB | 1336-36-3 | C12H10-xClx (x=1-3) |

**Chlordenes**

| Substances Name | CAS No. |
|---|---|
| Chlordan | 12789-03-6 |
| Oxychlordan | 27364-13-8 |
| trans-Nonachlor | 39765-80-5 |

**Chlorinated dioxins and Brominated dioxins**_Include of Furanes_

All chemical substances with dioxins and furanes fall under the category of this group. The following list only shows several examples of the substances. The substances with dioxins and furanes other than those listed below also fall under this category.

| Substances Name | CAS No. |
|---|---|
| 1,2,3,4,6,7,8,9-Octachlorodibenzodioxin | 3268-87-9 |
| Octachlorodibenzofuran | 39001-02-0 |
| 1,2,3,4,6,7,8-Heptachlorodibenzofuran | 67562-39-4 |
| 1,2,3,4,6,7,9-Heptachlorodibenzofuran | 70648-25-8 |
| 1,2,3,4,7,8-hexachlorodibenzo[b,e][1,4]dioxin | 39227-28-6 |
| 1,2,3,4,7,8-hexachlorodibenzofuran | 70648-26-9 |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 57653-85-7 |
| 1,2,3,6,7,8-Hexachlorodibenzofuran | 57117-44-9 |
| 1,2,3,6,7,8-Hexabromodibenzo-dioxin | 110999-45-6 |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 19408-74-3 |
| 1,2,3,7,8,9-Hexachlorodibenzofuran | 72918-21-9 |
| 1,2,3,7,8,9-Hexabromodibenzo-dioxin | 110999-46-7 |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 |
| 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 |
| 1,2,3,7,8-Pentabromodibenzo-dioxin | 109333-34-8 |
| 1,2,3,7,8-Pentabromodibenzofuran | 107555-93-1 |
| 2,3,4,6,7,8-Hexachlorodibenzofuran | 60851-34-5 |
| 2,3,4,7,8-Pentachlorodibenzofuran | 57117-31-4 |
| 2,3,4,7,8-Pentabromodibenzofuran | 131166-92-2 |
| 2,3,7,8-Tetrachlorodibenzo-p-Dioxin | 1746-01-6 |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 |
| 2,3,7,8-Tetrabromodibenzo-dioxin | 50585-41-6 |
| 2,3,7,8-Tetrabromodibenzofuran | 67733-57-7 |

**Radioactive**

All Radioactive-containing chemical fall under the category of this group. The following list only shows several examples of the substances. below are also included in this category.

| Substances Name | CAS No. | Chemical Formula |
|---|---|---|
| Uranium | | |
| Plutonium | | |
| Radon | | |
| Americium | | |
| Thorium | | |
| Other Radioactive substances | | |

**Organic phosphorous compounds**

| Substances Name | CAS No. |
|---|---|
| Diethyl-paranitrophenyl-triophosphate | 56-38-2 |
| Dimthyl-(diethylamido-1-chlorocrotonyl)-phosphate | 13171-21-6 |
| Dimethylethylmercaptoethylthiophosphate | 8022-00-2 |
| Dimethylparanitrophenylthiophosphate | 298-00-0 |
| Tetraethylpyrophosphate_TEPP | 107-49-3 |

**Fluoroacetic acid**

| Substances Name | CAS No. |
|---|---|
| Monofluoroacetate | 144-49-0 |
| Fluoroacetamide | 640-19-7 |
| Sodium fluoroacetate | 62-74-8 |

**Mirex**

| Substances Name | CAS No. | Chemical Formula |
|---|---|---|
| Mirex (Perchlordecone) Dodecachlorooctahydro-1,3,4-metheno-2H-cycrobuta(c,d)pentalene | 1336-36-3 | $C_{10}Cl_{12}$ |

**Hydrobromo flurocarbons**(HBFCs)

All HBFC-containing chemical substances fall under the category of this group. The following list only shows several examples of the substances. below are also included in this category.

| Substances Name | CAS No. |
|---|---|
| Halothane | 151-67-7 |
| 1,2-Dibromo-1,1-difluoroethane | 75-82-1 |
| 1,3-Dibromo-1,1-difluoropropane | 460-25-3 |
| Difluorodibromomethane | 75-61-6 |
| Dibromotetrafluoropropane | |
| 1,2-Dibromo-1,1,2-trifluoroethane | 354-04-1 |
| 2,3-Dibromo-1,1,1-trifluoropropane | 431-21-0 |
| 1,2-Dibromo-1-fluoroethane | 358-97-4 |
| Dibromofluoromethane | 1868-53-7 |
| Dibromofluoropropane | |
| Dibromopentafluoropropane | |
| Tetrabromofluoropropane | |
| Tetrabromodifluoropropane | |
| Tetrabromotrifluoropropane | |
| Tetrabromofluoroethane | |
| Tribromodifluoroethane | |
| Tribromodifluoropropane | |
| Tribromotetrafluoropropane | |
| Tribromotrifluoropropane | |
| Tribromofluoroethane | |
| Tribromofluoropropane | |
| 1-Bromo-1,1-difluoroethane | 420-47-3 |
| 2-Bromo-1,1-difluoroethane | 359-07-9 |
| Bromodifluoromethane | 1511-62-2 |
| Bromodifluoropropane | |
| Bromotetrafluoropropane | |
| Bromotetrafluoroethane | |
| 1,1,1-Trifluoro-2-bromoethane | 421-06-7 |
| Bromotrifluoropropane | |
| 1-Bromo-2-fluoroethane | 762-49-2 |
| Propane, 1-bromo-2-fluoro- | 1871-72-3 |
| 1-Bromo-3-fluoropropane | 352-91-0 |
| Bromofluoromethane | 373-52-4 |
| 1-Bromo-1,1,2,3,3,3-hexafluoropropane | 2252-78-0 |
| Bromopentafluoropropane | |
| Hexabromofluoropropane | |
| Pentabromodifluoropropane | |
| Pentabromofluoropropane | |

**Azoic dyes (Substances which release Amine during resolution)**

Azo dyes which produce one or more aromatic amines during resolution of one or more azo groups
Azoic dyes are derived from amino compounds. They have a widevariety of applications as industrial dyes,acid dyes, basic dyes, direct dyes and mordant dyes.Type of the amine that must not be generated sfter the resolution of the banned azo compounds.

Test method_for reference__The following are methods to decompose azo compounds and then to extract amines. LMBG 82-02-2,LMBG 82-02-3,LMBG 82-02-4 _LMBG_German Law for Foods and Consumer Products_

| Names | CAS No. |
|---|---|
| 4-Aminodiphenyl | 92-67-1 |
| Benzidin | 92-87-5 |
| 4-chlor-o-toluidin | 95-69-2 |
| 2-Naphthylamin | 91-59-8 |
| o-Aminoazotoluol | 97-56-3 |
| 2-Amino-4-nitorotoluol | 99-55-8 |
| p-Chloramilin | 106-47-8 |
| 2,4-Diaminoanisol | 615-05-4 |
| 4,4-Diaminodiphenylmethan | 101-77-9 |
| 3,3-Dichlorbenzidin | 91-94-1 |
| 3,3-Dimethoxybenzidin | 119-90-4 |
| 3,3-Dimethylbenzidin | 119-93-7 |
| 3,3-Dimethyl-4,4-dianodiphenylmethan | 838-88-0 |
| p-Kresidin | 120-71-8 |
| 4,4-Methylen-bis-_2-chloranilin_ | 101-14-4 |
| 4,4-Oxydianilin | 101-80-4 |
| 4,4-Thiodianilin | 139-65-1 |
| o-Toluidin | 95-53-4 |
| 2,4-Toluylendiamin | 95-80-7 |
| 2,4,5-Trimethylanilin | 137-17-7 |
| o-Anisidine | 90-04-0 |
| 4-amino azobenzene | 60-09-3 |

**Cadmium(Cd) & its compounds**

All cadmium-containing chemical substances fall under the category of this group.The following list only shows several examples of the substances. The cadmium-containing substances other than those listed below also fall under this category.

| Names | CAS No. | Chemical formula |
|---|---|---|
| Cadmium | 7440-43-9 | Cd |
| Cadmium alloys | | |
| Cadmium oxide | 1306-19-0 | CdO |
| Cadmium chloride | 10108-64-2 | CdCl2 |
| Cadmium sulfide | 1306-23-6_ 8048-07-5 | CdS |
| Cadmium nitrate | 10325-94-7 | Cd_NO3_2_ |
| | 10022-68-1 | Cd(NO3)2 4H20 |
| Cadmium sulfate | 10124-36-4 | CdSO4 |
| Cadmium stearate | 2223-93-0 | Cd_C18H3502_2 |
| Other cadmium compounds | | |

**Creosote**

Liquid made from dry distillation of wood_Category of the phenol series and its ether mixture.

| Names | CAS No. |
|---|---|
| Creosote | 8001-59-9 |
| Creosote oil | 61789-28-4 |
| Distillates(coal tar)Naphtalene oils | 283-484-8 |
| Creosote oil,Acenaphthalene fraction | 90604-84-9 |
| Distillates(coal tar)upper | 65996-91-0 |
| Anthracene oil | 90640-80-5 |
| Tar acid,Coal,Crude | 65996-85-2 |
| Creosote,Wood | 8021-39-4 |
| Low temperature tar oil,alkaline | 122384-78-5 |

**Tris(2,3,-dibromopropyl)phosphate(TDBPP)**

| Names | CAS No. | Chemical formula |
|---|---|---|
| Tris(2,3,-dibromopropyl)phosphate(TDBPP) | 126_72_7 | C9H15O4Br6P |

Key hazardous properties: This chemical substance has the potential to produce cancer-causing dioxin or other poisonous gases during the course of the burning.

**Nickel (Ni) & its compounds**

All nickel-containing chemical substances fall under the category of this group.

The following list only shows several examples of the substances.

The nickel-containing substances other than those listed below also fall under this category.

| Names | CAS No. | Chemical formula |
|---|---|---|
| Nickel | 7440-02-0 | Ni |
| Nickel alloys | | |
| Nickel___oxide | 1313-99-1 | NiO |
| Nickel___oxide | 1314-06-3 | Ni2O3 |
| Nickel fluoride | 10028-18-9 | NiF2 |
| Nickel chliride | 7791-20-0 | NiCl2 |
| Nickel monosulfide; Nickel(_)sulfide | 16812-54-7 | Ni2S |
| Dinickel monosulfide; Nickel subsulfide | 12035-72-2 | NiS |
| Nickel nitrate | 13478-00-7 | Ni(NO3)2 |
| Nickel___carbonate | 39430-27-8 | NiCO3 |
| Nickel chloride | 13931-83-4 | Ni(ClO3)2 |
| Nickel perchlorate | | Ni(ClO4)2 |
| Nickel sulfate | 7786-81-4 | NiSO4 |
| Nickel formate | 3349-06-2 | Ni(HCOO)2 |
| Nickel carbonyl | 13463-39-3 | Ni(CO)4 |

Key hazardous properties: These chemical substances have the potential to cause sensitizing skin irritation, edema diseases of a malignant nature or other similar diseases.

**Lead(Pb) & its compounds**

All lead-containing chemical substances fall under the category of this group.
The following list only shows several examples of the substances. The lead-containing substances other than those listed below are also included in this category.

| Names | CAS No. | Chemical formula |
|---|---|---|
| Lead | 7439-92-1 | Pb |
| Lead/Tin alloy | 39412-44-7 | Pb-Sn |
| Lead___oxide | 1317-36-8 | PbO |
| Lead___oxide | 1309-60-0 | PbO2 |
| Dilead trioxide | | Pb2O3 |
| Trilead tetraoxide | 1314-41-6 | Pb3O4 |
| Lead azide | 13424-46-2 | PbN6 |
| Lead(_)fluoride | 7783-46-2 | PbF2 |
| Lead(_)chloride | 7758-95-4 | PbCl2 |
| Lead(_)chloride | 13463-30-4 | PbCl4 |
| Lead(_)iodide | 10101-63-0 | PbI2 |
| Lead(_)sulfide | 1314-87-0 | PbS |
| Lead(_)cyanide | 592-05-2 | Pb(CN)2 |
| Lead fluoroborate | 13184-96-5 | Pb(BF4)2 |
| Lead fluosilicate | 25808-74-6 | PbSiF62H2O |
| Lead nitrate | 10099-74-8 | Pb(NO3)2 |
| Lead carbonate | 598-63-0 | PbCO3 |
| Lead hydroxycarbonate | 1344-36-1 | (PbCO3)2Pb(OH)2 |
| Lead perchorate | 13637-76-8 | Pb(ClO4)2 |
| Lead(_)sulfste | 7446-14-2<br>15739-80-7 | PbSO4 |
| Lead oxide sulfste | 12202-17-4 | PbSO7 |
| Lead(_)phosphate | 7446-27-2 | Pb3(PO4)2 |
| Lead thiocyanate | 592-87-0 | Pb(SCN)2 |
| Lead(_)acetate,trihydrate | 6080-56-4 | Pb(CH3COO)2_3H2O |
| Lead(_)acetate | 301-04-2 | Pb(CH3COO)2 |
| Lead(_)acetate | 546-67-8 | Pb(CH3COO)_ |
| Lead oleate | 1120-46-3 | Pb[CH3(CH2)7CH=CH(CH2)7COO]2 |
| Lead stearate | 7428-48-0 | Pb(C17H35COO)2 |
| Lead(_)metaborate | 10214-39-8 | Pb(BO2)2_H20 |
| Lead metasillicate | 11120-22-2<br>;22569-74-0 | PbSiO3 |
| Lead antimonite | 122666-38-5<br>;13150-89-9 | Pb3(SbO4)2 |
| Lead arsenate(1:1) | 7784-40-9 | PbHAsO4 |
| Lead(_)arsenite | 10031-13-7 | Pb(AsO2)2 |
| Lead chromate_chrome yellow | 1344-37-2 | PbCrO4 |
| Lead molybdate | 10190-55-3 | PbMoO4 |
| Lead plumbate | 12013-69-3 | Ca2PbO4 |
| Tetramethyl lead | 75-74-1 | Pb(CH3)4 |
| Tetraethyl lead | 78-00-2 | Pb(C2H5)4 |
| Other lead compounds and alloys | | |

**Chlorinated paraffins (CP)**

Outer frames of merchandise(cabinets) and printed circuit boards(fire retardant and elasticizers).

| Names | CAS No. | Chemical formula |
|---|---|---|
| Short-chain Chlorinated paraffins<br>C 10-13_Cl_50wt% | e.g.<br>10871-26-2 | |

**Mercury_Hg_its compounds**

All mercury-containing chemical substances fall under the category of this group.
The following list only shows several examples of the substances. The mercury-containing substances other than those listed below also fall under this category.

| Names | CAS No. | Chemical formula |
|---|---|---|
| Mercury | 7439-97-6 | Hg |
| Mercury alloys,Amalgam | | |
| Mercurous oxide(_) | 15829-53-5 | Hg20 |
| Mercurous oxide:Mercury(_)oxide | 21908-53-2 | HgO |
| Mercurous chloride(_)_ | 10112-91-1 | Hg2Cl2 |
| Mercurous chloride(_) | 7487-94-7 | HgCl2 |
| Mercuric nitrate(_) | 10045-94-0 | Hg(NO3)2 |
| Mercurous sulfatr(_) | | Hg2SO4 |
| Mercuric fulminate(_) | 7783-35-9 | Hg(ONC)2 |
| Mercuric acetate(_) | 1600-27-6 | Hg(CH3COO)2 |
| Methylmercury salts | e.g.22967-92-6 | CH3HgX, X=Cl,Br,I,OH or_etc. |
| Ethylmercury salts | | C2H5HgX, X=Cl,Br,I,OH or_etc. |
| Propylmercury salts | | C3H7HgX, X=Cl,Br,_,OH or_etc. |
| Phenylmercury salts | | C6H5HgX, X=Cl,Br,I,OH or_etc. |
| Methoxyethylmercury salts | | CH3OC2H4HgX, X=Cl,Br,_,OH or_etc. |
| Dialkylmercury | | R2Hg,R=alkyl group |
| Diphenylmercury | 587-85-9 | (C6H5)2Hg |
| Other mercury compounds | | |

Key hazardous properties: These chemical substances and compounds have the potential to cause nervous disturbance or other similar nervous diseases.

**Tin-containing organic compounds**

Of tin-containing organic compounds, tre-n-butyl tin and triphenyl tin fall under the category of this group.

The other organic tin compounds, metal tin, tin alloy, tinning and inorganic tin compounds are not included in this category.The following list only shows several examples of the substances. The tre-n-butyl tin and triphenyl tin other than those listed below are also included in this category.

| Names | CAS No. | Chemical formula |
|---|---|---|
| Tre-n-butyltin bromide | 1461-23-0 | (C4H9)3SnBr |
| Bis(tributyltin)oxide | 56-35-9 | C24H54OSn2 |
| Triphenyltin | 668-34-8 | (C6H5)3Sn |
| Triphenyltin bromide | | (C6H5)3SnBr |
| Triphenyltin chloride | 639-58-7 | (C6H5)3SnCl |
| Triphenyltin hydroxide | 76-87-9 | (C6H5)3SnOH |
| Triphenyl tin N,N'-dimethyldithincarbamat | 1803-12-9 | (C6H5)3Sn(CH3)2NCS2 |
| Triphenyl tin fluoride(fentinfluoride) | 379-52-2 | (C6H5)3SnF |
| Triphenyl tin fatty acetate(fentin acetate | 900-95-8 | (C6H5)3SnOCOCH3 |
| Triphenyl tin fatty acid salts | 18380-71-7 | |
| Triphenyl tin chloroacetate | 7094-94-2 | (C6H5)3SnOCOCH2Cl |
| Tributyl tin methacrylate | 2155-706 | (C4H9)SnC4H5O2 |
| Bis(Tributyl tin)fumarate | 6454-35-9 | C2H2(COO)2([C4H9]3Sn)2 |
| Tributyl tin fluoride | 1983-10-4 | (C4H9)3SnF |
| Bis (tributyl tin)2,3-dibromosuccinate | 31732-71-5 | ([C4H9]3Sn)2C2H4(BR)2(COO)2 |
| Tributyl tin acetate | 56-36-0 | (C4H9)3SnOCOCH3 |
| Tributyl tin laurate | 3090-36-6 | (C4H9)3SnC12H23O2 |
| Bis(tributyl tin) phthalate | 4782-29-0 | (C6H4)(C00)2([C4H9]3Sn)2 |
| Tributyl tin sulfamate | 6517-25-5 | (C4H9)3SnSO3NH2 |
| Bis(tributyl tin) maleate | 14275-57-1 | C28H5604Sn2 |
| Tributyl tin chloride | 1461-22-9 | (C4H9)3SnCl |
| Mixture of Tributyl tin cyclopentanecarboxylate and its alaoga (Tributyl tin naphthenate) | 85409-17-2 | |
| Mixture of Tributyl tin 1,2,3,4,4a,4b,5,6,10,10a-decahydro-7-isopropyl-1,4a-dimethyl-1-phenanthrenecarboxylate and its anaiogs(Tributyl tin rosin salts) | 26239-64-5 | C32H56O2Sn |
| Methacrylate and Tributyl tin methacrylate (alkyl;c=8) | | |

Key hazardous properties: These substances have the potential to cause liver damage and brain lesion.

**Potassium chromate_$Cr^{6+}$_its compounds**

Only chemical substances with sexivalent chrome fall under the category of this group.
Chrome-plated substances and chromate are also included in this category.
Metal chrome, chrome alloy and tervalent chrome compounds do not fall under the category.
The following list only shows several examples of the substances.
The substances with sexivalent chrome other than those listed below also fall under the category.
Only chemical substances with sexivalent chrome fall under the category of this group.

| Names | CAS No. | Chemical formula |
|---|---|---|
| Chromium(_)oxide | 1333-82-0 | CrO3 |
| Lithium chromate | 14307-35-8 | Li2CrO4 |
| Sodium chromate | 7777-11-3 | Na2CrO4 |
| Potassium chromate | 7789-00-6 | K2CrO4 |
| Potassium chlorochromate | 16037-50-6 | K[CrO3Cl] |
| Ammonium chromate | 7788-98-9 | (NH42CrO4) |
| Copper chromate | 7788-98-9 | CuCrO4 |
| Magnesium chromate | 13423-61-5 | MgCrO4 |
| Calcium chromate | 13765-19-0 | CaCrO4 |
| Strontium chromate | 7789-06-2 | SrCrO4 |
| Barium chromate | 10294-40-3 | BaCrO4 |
| Lead chromate;Chromate yellow | 1344-37-2 | PbCrO4 |
| Zinc chromate | 12018-19-8, 13530-65-9 | ZnCrO4 |
| Sodium dichromate; Sodium bichromate | 10588-01-9 | Na2Cr2O7 |
| Potassium dichromate;Potassium bichromate | 7778-50-9 | K2Cr2O7 |
| Ammonium dichromate; Ammonium bichromate | 7789-09-5 | (NH4)2Cr2O7 |
| Calcium dichromate; Calcium bichromate | 14307-33-6 | CaCr2O7 |
| Zinc dichromate; Zinc bichromate | 14018-95-2 | ZnCr2O7 |
| Other hexavalent chromium compounds | | |

Key hazardous properties: These substances and compounds have the potential to cause chromium ulcer-carcinoma,sensitizing lung cancer or other similar diseases.

**Arsenic_As_its compounds**

All arsenic-containing chemical substances fall under the category of this group.
The following list only shows several examples of the substances.
The arsenic-containing substances other than those listed below are also included in this category.

| Names | CAS No. | Chemical formula |
|---|---|---|
| Arsenic | 7440-38-2 | As |
| Arsenic alloys | | |
| Arsenic selenide | 1303-36-2 | As2Se3 |
| Arsenic trioxide | 1327-53-3 | As2O3 |
| Arsenic pentoxide | 12044-50-7 | As2O5 |
| Arsenic trichloride | 7784-34-1 | AsCl3 |
| Hydrogen arsenide; Arsine | 7784-42-1 | AsH3 |
| Arsenic acid | 7778-39-4 | H3AsO4 1/2H2O |
| Calcium arsenate | | Ca3(AsO4)1 |
| Lead arsenate | 3687-31-8 | PbHAsO3 |
| Sodium arsenate | 7784-46-5 | NaAsO2 |
| Potassium arsenate | 7784-41-0 | KAsO2HAsO2 |
| Lead arsenic | 10031-13-7 | Pb(AsO2)2 |
| Copper(_)hydrogen arsenate;Scheel's green | 10290-12-7 | CuHAsO3 |
| Copper asetate arsenate; Emerald green | 12002-03-8 | Cu(C2H3O2)23 Cu(AsO2)2 |

**Key hazardous properties:** These chemical substances and compounds have the potential to cause lung cancer,
skin cancer or any other similar type of cancer.

**Chlorinated hydrocarbons**(CHCs)

All CHC-containing chemical substances fall under the category of this group.The following list only shows several examples of the substances. The CHC-containing substances other than those listed below are also included in this category.

| Substances Name | CAS No. |
|---|---|
| 1,1-dichloroethane | 75-34-3 |
| 1,2,3-Trichloropropane | 96-18-4 |
| 1,2-Dichloroethane | 107-06-2 |
| Propylene Dichloride | 78-87-5 |
| 1,4-dichloro-2-Butene | 764-41-0 |
| cis-1,2-Dichloroethene | 156-59-2 |
| trans-1,2-Dichloroethene | 156-60-5 |
| alpha-BHC | 319-84-6 |
| Lindane | 58-89-9 |
| Ethyl Chloride | 75-00-3 |
| Chloroprene | 126-99-8 |
| Methyl Chloride | 74-87-3 |
| Dichloroacetylene | 7572-29-4 |
| Dichloromethane | 75-09-2 |
| Tetrachloroethylene | 127-18-4 |
| Chlorinated Camphene | 8001-35-2 |
| Trichloroethylene | 79-01-6 |
| hexachloroethane | 67-72-1 |
| Hexachlorocyclohexane | 608-73-1 |
| Hexachlorocyclopentadiene | 77-47-4 |
| hexachlorobutadiene | 87-68-3 |
| Isobutenyl chloride | 563-47-3 |
| Allyl Chloride | 107-05-1 |

## Beryllium and its compounds

| | |
|---|---|
| Beryllium | 7440-41-7 |
| Beryllium alloys | |
| Beryllium chloride | 7787-47-5 |
| Beryllium sillcate | 15191-85-2 |
| Beryllium oxide | 1304-56-9 |
| Beryllium nitrate | 13597-99-4 |
| Beryllium fluoride | 7787-49-7 |
| Beryllium sulfate tetrahydrate | 7787-56-6 |
| Beryllium sulfate | 13510-49-1 |
| Beryllium aluminum sillicate | 1302-52-9 |
| Beryllium carbonate ,basic | 13106-47-3 |
| Beryllium hydrooxide | 13327-32-7 |
| Beryllium hydrogenphosphate | 13598-15-7 |
| Beryllium oxyfluoride | 63990-88-5 |

Product Safety - Negotiating the Maze of
European Union Requirements
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INTRODUCTION

- CNH Global N.V.
  - $10.0 Billion per year in Revenue
  - Public Corporation on NYSE [CNH]
  - Majority of stocks owned by Fiat SpA
  - Agricultural and Construction Equipment, Engines and Financial Services
  - Multiple Brands: Case IH, New Holland, Fiat-Kobelco, Kobelco, Steyer, Case, Fiat-Allis, and O&K
  - World-wide manufacturing: 12-N.A. Plants, 17 European plants, 5 in LAR, 3 in APAC (excluding J-Vs)
  - World-wide Distribution: 12,400 Dealer and Distributors in 160 countries

- Global Heavy Equipment Industry
  - Capital Intensive
  - Low Volumes
  - Global Product Platforms
  - Product Differentiation to meet local market requirements
  - Global component sourcing
  - Highly Competitive
  - Complicated international flow of products and components

Product Liability Framework in Europe --
It's Very Different

- EC Directives
- Implementation through Member States
- Underlying Legal Framework of Member States
  - Predominately Civil Law v. Common Law (except UK)
  - Code-based Law:
    - > Broad Legal Principles
    - > Prescriptive Regulatory/Technical/Engineering Standards

Product Liability Framework in Europe (Continued)

- Public Inquiry/Prosecution v. Private Tort Suit for Damages
  - White Belts and Holsters - Product related accidents and injuries are treated as police matters
  - Plant Managers and responsible company officials can be criminally prosecuted and fined
  - Judges' and Magistrates' Roles are Different
    > Inquisitorial Model v. Adversarial Model
    > Investigating Judge can hire experts and request that the parties develop evidence
  - Public prosecutions can by very political

Product Liability Framework in Europe (Continued)

- Civil Law Private Litigation is very different
  - Plaintiffs must post cash or a bond for estimated court and defendant fees and costs at the time of filing suit
  - Loser pays court's and prevailing party's costs and fees
  - Lawyers are paid a code-based fee based on the size of the claim and the number of litigation stages. They cannot be paid more or less than the statutory fee.
  - There are no contingent fees
  - There are no "show-up" trials
  - There are no juries

 

Product Liability Framework in Europe (Continued)

- Private Suits by injured persons are usually 'Tag-along' proceedings to the Public Prosecution
  - Public Prosecution determines whether a standard has been violated
  - Criminal Liability is strict without a mens rea
- Private damages are more limited due to the comprehensive social welfare systems in the EU
  - National Medical Schemes
  - Disability/Pension Systems
  - Public prosecutions address "punitive" issue

European Product Regulation for Heavy Equipment & Machinery - A Dual System

- Homologation - The "Old" Approach
  - Applies to Agricultural and Forestry Tractors (74/150/EEC) as amended
- Self Declaration/CE Marque - The "New" Approach
  - Applies to all other Heavy Machinery (98/37/EC)
- Process & Substantive Standards
  - Each of the processes will result in identification of and conformance with the substantive or technical standards (e.g. mechanical, electrical, thermal, noise, vibration, radiation, materials and substances, ergonomic principles)

 

HOMOLIGATION

- EC Directive/Implemented by Member State Homologation Authorities/Ministries
  - 'Forum' shopping
  - Market considerations
- Ag/Forestry Tractors
- Two Homologation Paths:
  > Type Approval - Categories of product or models
  > Individual Approval - single product or "one-off" situations
- Requires a recognized Third-Party Agency
- Certified Compliance
- Safety Obligation are met
- Documentation - 10 year minimum
- Limitation to Future Engineering Changes

New Self Declaration Approach

- Manufacturer Self-Declares Product is Safe
  > Declaration of Conformity
  > Declaration of Incorporation (components)
- Place on Market/Put into Service
- Presumption of Compliance (v. Certification of Compliance)
- Technical File
  - Content
  - Production
  - Physical Location
- CE Marque
- **Recordkeeping - 10 years**

 

New Self Declaration Approach (Continued)

- STANDARDS
  - 'A' Standards: "OSHA"
  - 'B' Standards: Safety Components
  - 'C' Standards: Specific to machinery
- Where there are no standards must do a Risk Assessment
- Risk Assessment
  - Frequency
  - Vulnerability
  - Severity

New Self Declaration Approach (Continued)

- EN 1050 Iterative Risk Assessment Process
  - Determination of the limits of the machinery
  - Hazard Identification
  - Risk Estimation
  - Is the machinery safe? Y/N
  - If no - engage in Risk Reduction (back to the beginning of the Risk I.D./Risk Assessment process)