UL Solutions

Insights into EU chemical recalls for electrical and electronic products

LET'S GO

Understanding hazards may help you mitigate risks

Electrical and electronic products manufacturers are required to make sure the products they develop meet chemical safety requirements for users.

While most of these articles on the market conform to regulations, others are recalled each year due to specific chemical safety concerns. In this e-book, UL Solutions experts provide insights on key hazardous substances identified in products recalled in 2023 on the European market.

To mitigate risks, UL Solutions offers testing services for high-risk materials in accessible and inaccessible parts of the products that may contains these substances. Manage your chemical compliance with our testing, advisory services and chemical data management software.

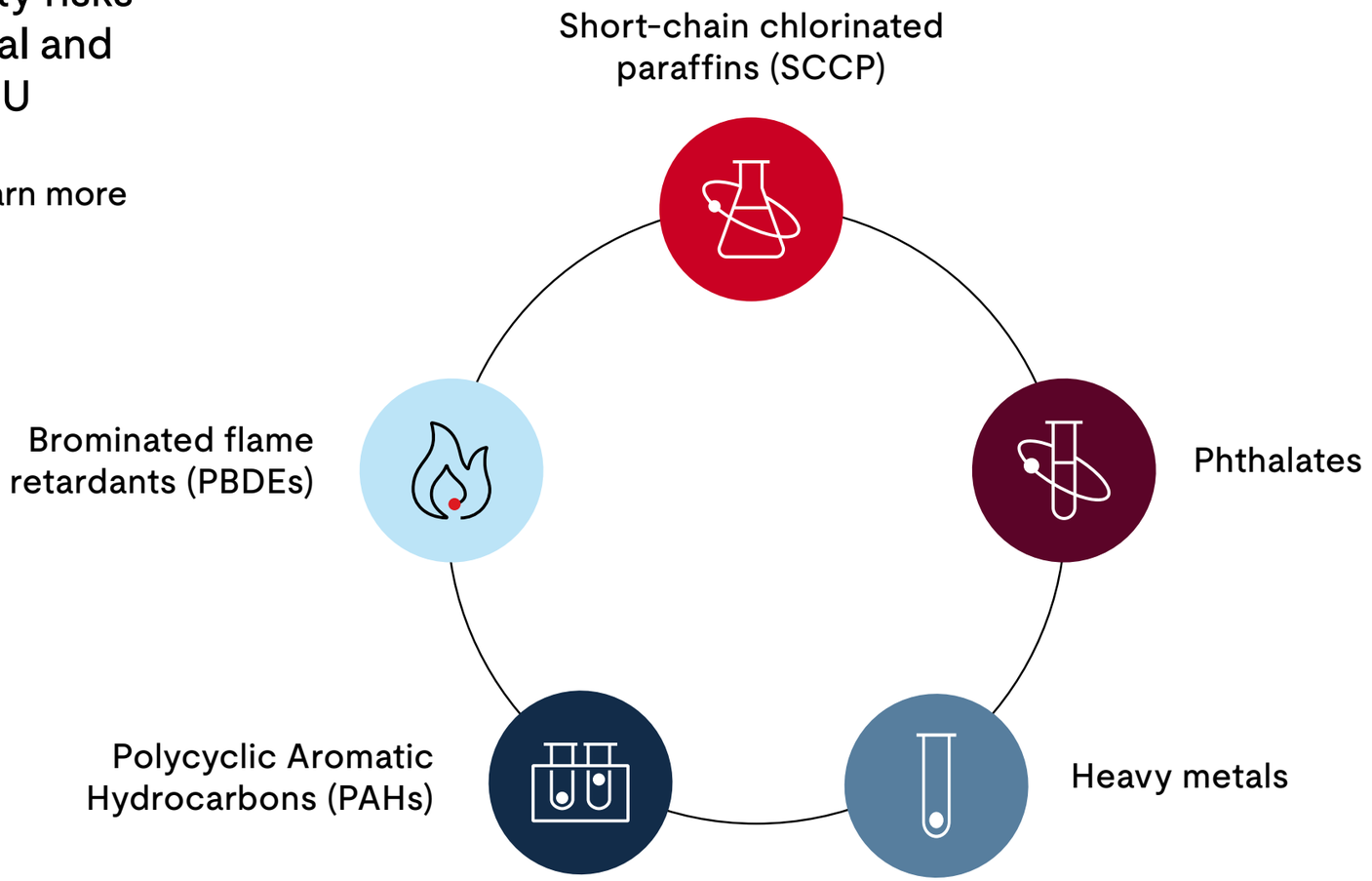
Contact us anytime at RCP@ul.com or visit our Chemical management for electrical and electronic webpage for more information.

*Source: https://ec.europa.eu/safety-gate/#/screen/pages/reports

Please note that the information in this document is correct as of the date of publication: August 2024.
For more detailed information on specific products and suggested testing, please contact us.

Common chemical safety risks associated with electrical and electronic products in EU

Click on the substances to learn more



Short-chain chlorinated paraffins (SCCPs)

Where you can find SCCPs in electrical and electronic products?

SCCPs are primarily used in metalworking applications and in polyvinyl chloride (PVC) processing. SCCPs are also used as plasticizers and flame retardants in a variety of applications, including in paints, adhesives and sealants, leather fat liquors, plastics, rubber, textiles and polymeric materials.

Historically, SCCPs have been used as lubricants and coolants in metalworking fluids (MWF). In general, lubricants that are chlorinated paraffins or contain chlorinated paraffin additives are designed to lubricate parts that experience extreme pressures, and are used in deep drawing, tube bending and cold heading. The transition away from using SCCPs, and chlorinated paraffins in general, in metalworking applications has included the development of alternatives as well as alternative processes.

Why SCCPs are considered hazardous?

SCCPs are classified as a persistent organic pollutant and a very persistent and very bio accumulative substance[1]. SCCPs are toxic to aquatic organisms at low concentrations[2].

What is the specific risk?

Repeated exposure to SCCPs may cause skin dryness or cracking and eye irritation but overall are considered to have low toxicity to humans. SCCPs may cause long-term adverse effects in aquatic organisms[3].

Specific European regulations or requirements

SCCPs are restricted under Persistent Organic Pollutants (POPs) Regulation (EU) No 2019/1021, Annex I, part A. They are also listed on the Candidate List of substances of very high concern (SVHC) whose presence requires specific communication and notification obligations.

Phthalates

Where you can find phthalates in electrical and electronic products?

Phthalates are common plasticizers generally incorporated into materials to enhance their flexibility and durability. Examples of products they can also be found in include adhesives, sealants, paints, rubber materials, wires and cables, medical devices, and sports equipment. The most known phthalates are ortho-phthalates, such as bis(2-ethylhexyl) phthalate (DEHP) and di-''isononyl'' phthalate (DINP).

Some of the most common phthalates found in PVC applications include DEHP, DBP, DEP, and DiNP. DEHP was historically the most used phthalate for plasticizing PVC, but in 2015 it was banned in most product applications in Europe due to concerns over its endocrine-disrupting potential.

In the electronics industry, plasticized PVC forms the coatings on wires and various plastic parts in electronic devices.

Why phthalates are considered hazardous?

Several ortho-phthalates, for example DEHP[4], dibutyl phthalate (DBP)[5], diisobutyl phthalate (DIBP) and benzyl butyl phthalate (BBP)[7] may damage fertility or the unborn baby and interfere with the hormonal system. They affect the sexual development of boys which can lead to infertility in adults.

Some ortho-phthalates, such as DBP, BBP, and DEHP, are also harmful to the environment.

What is the specific risk?

Phthalate size and shape affect hormone receptor proteins and enzymes involved in the synthesis or activation of hormones, so some of them are endocrine disruptors. Boys, pregnant women and young children in general have been found to be the most vulnerable groups to the effects of phthalates[8].

Specific European regulations or requirements

Phthalates are restricted in electrical and electronic products under the Restriction of Hazardous Substances (RoHS) Directive 2011/65/EU. They are also listed under the Candidate List of SVHC, whose presence requires specific communication and notification obligations.

Heavy metals

Where you can find heavy metals in electrical and electronic products

Heavy metals are currently essential in most electronic devices, although innovative companies are always looking for safer alternatives. Here are some typical examples:

- Cadmium –Used in rechargeable computer batteries, contacts and switches
- Mercury – Used in the liquid crystal displays (LCDs) of mobile phones and flat-screen computer monitors as well as in switches, batteries and fluorescent lamps
- Lead – Used in the cathode ray tubes (CRTs) found in computer and TV screens
- Hexavalent chromium – Used in the production of various metal housings
- Nickel – Used in some mobile phones' circuit boards and soldering

Lead and cadmium – Used in the rechargeable batteries in game consoles and electric toys. Companies may get exemptions and authorizations to use certain dangerous chemicals in electronics, usually for a limited time.

Some of the products recalled from the European market contains Lead and Cadmium in solder points.

Why heavy metals are considered hazardous

With reference to heavy metals commonly found in electrical and electronic products, Cadmium is classified in Europe as fatal if inhaled. Additionally, it is very toxic to aquatic life with long-lasting effects, may cause cancer, causes damage to organs through prolonged or repeated exposure, is suspected of causing genetic defects, is suspected of damaging fertility or the unborn child and catches fire spontaneously if exposed to air . Lead may damage fertility or the unborn child, it may cause cancer, harm to beast-fed children or damages to organs through prolonged or repeated exposure, it can have long-lasting effects on the aquatic life[10].

What is the specific risk?

Due to the presence of these substances, e-waste is generally considered hazardous waste, which, if improperly managed, may pose significant human and environmental health risks[11] . This is why the European RoHS Directive has the scope to prevent the risks posed to human health and the environment related to the management of electronic and electrical waste limiting these substances.

Specific European regulations or requirements

Heavy metals are restricted in electrical and electronic products under the Restriction of Hazardous Substances (RoHS) Directive 2011/65/EU. They are also listed under Candidate List of SVHC, whose presence require specific communication and notification obligations.

Polycyclic aromatic hydrocarbons (PAHs)

Where you can find PAHs in electrical and electronic products?

PAHs in consumer products may originate from the following sources:

- Use of mineral oil- or coal-based extender/plasticizer oils in the production of rubber and plastics; oils may (unintentionally) contain different concentrations of PAHs and are added to materials to achieve the desired material properties
- Carbon black (CAS 1333-86-4 and EC number 215-609-9), which is intentionally added to elastomers to achieve the required properties of the material (e.g., color, flexibility, damping, solubility in the polymer matrix).

PAHs may be present in articles produced from materials containing either of these. PAHs in articles supplied to the public may also originate from recycled rubber (e.g., recycled tires) or plastic containing any of the above materials.

PAHs are typically found in certain elastomer/rubber materials, but also in plastic materials, lacquers/varnishes, or coatings (e.g., plastic coating made of synthetic organic polymers) that may be encountered in or as part of consumer products.

The materials in articles or components of articles most likely affected by this restriction are rubber surfaces and soft or dark plastic surfaces.

Why PAHs are considered hazardous

PAHs are hazardous for both human health and the environment. Many PAHs have been found to be toxic, mutagenic and/or carcinogenic. PAHs are found naturally in the environment and are typically created as environmental pollutants from the incomplete combustion of organic materials[12].

PAHs are not easily dissolved in water, and they are lipophilic which means they are readily absorbed and distributed in an organism's fatty tissues. In general, the more aromatic rings in the PAH molecule, then the better it accumulates in the body, and PAH can bind to cellular proteins and DNA.

In response to these concerns, the European Union has classified many PAHs as carcinogenic, mutagenic, and reprotoxic (CMR).[13]

What is the specific risk?

For all products that have long-term or repeated skin contact made of plastic and polymeric materials, it can be the risk of the presence of these substances. Examples are holding devices on domestic appliances (such as blenders or coffee machines)[14].

Specific European regulations or requirements

There are eight PAHs that are included in the REACH Annex XVII restricted substances list, which is classified as carcinogenic category 1B. These PAHs are restricted from use in rubber extender oils and articles supplied to the public.

Brominated flame retardants (BFRs – PBDEs and PBBs)

Where you can find brominated flame retardants in electrical and electronic products?

Polybrominated diphenyl ethers (PBDEs) and polybrominated biphenyls (PBBs) are two groups of substances that are or have been used as flame retardants in plastic and textiles.

Why brominated flame retardants are considered hazardous?

Because these compounds are additive rather than chemically bound to the products, they can be released into the environment. They are persistent organic chemicals and can bioaccumulate; therefore, they have become contaminants detectable in the environment, in animals, and in humans[15].

What is the specific risk?

The properties of some BFRs are typical for persistent organic pollutants, and certain BFRs, in particular some polybrominated diphenyl ether (PBDE) congeners and hexabromocyclododecane (HBCD), are suspected of causing adverse health effects. Global consumption of the most demanded BFRs, i.e., penta-, octa-, and decaBDE, tetrabromobisphenol A (TBBPA), and HBCD, has doubled in the 1990s[16]. Only limited and rather uncertain data are available regarding the occurrence of BFRs in consumer goods and waste fractions, as well as regarding emissions during use and disposal.

Specific European regulations or requirements

In Europe, BFRs are restricted in electrical and electronic products under the Restriction of Hazardous Substances (RoHS) Directive 2011/65/EU and POP Regulations (EU) No 2019/1021.

Sources

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