

What are PCBs?

Polychlorinated Biphenyls (PCBs) are chlorinated, colourless liquids.

Depending on the number of chlorine atoms in their molecules, their physical, chemical, and toxicological properties vary considerably.

In the 1960s and 1970s maximum PCBs production limits were reached. Between 1983 and 1993 production of PCBs was stopped in most countries.

PCB is one of the 21 POPs (Persistent Organic Pollutants) under the Stockholm Convention, which require immediate international action and shall be eliminated by 2028.

Applications of PCBs

Due to their characteristics PCBs mixtures have been used in open, partially open and closed systems. It is important to know that PCBs applications can be found throughout all industries and to not only focus on the electricity utilities.

Typical applications of PCBs in **closed systems**:

- Insulation and/or cooling fluid in transformers
- Dielectric fluid in capacitors
- Hydraulic fluid in lifting equipment, trucks and high pressure pumps



Closed systems: transformers and capacitors

Typical applications of PCBs in **open systems**:

- Additive in glues, sealants (caulks) and corrosion protection paints
- Lubrication fluid in oils and grease
- Laminating agent in paper production
- Various other applications



Open systems: corrosive protection coating

PCBs Health Risks

PCBs are persistent and transported through air – by evaporating and re-condensing – the so-called “global distillation”. PCBs can be found in any part of the world, and in numerous matrixes (air, water, soil, etc.).

Due to its chemical and bio-chemical stability and its high solubility in fatty tissue, the substance has entered the food chain as a bio-accumulator.

PCBs are mainly taken in via stomach and intestine, the skin and respiration. Because of their demonstrated toxicity even in low concentrations, the equipment containing in excess of 0.005% PCBs is considered toxic waste and needs to be disposed of in an environmentally-sound way at the end of its lifecycle or before 2025, whichever occurs first.

Impact on Human Health

Some of the potential damages related to long-term exposure of small doses of PCBs are:

- Damage to liver, and kidneys
- Influences on the thyroid hormones and possible effects on the development of the brain
- Influences on the reproductive system and especially unborn children
- Possible carcinogenic effects

PCBs are highly toxic in case of an acute exposition. The symptoms of an acute poisoning include:

- Chloroacne
- Hair loss
- Headaches



Hair loss



Chloroacne

PCBs in Fires

The highly toxic substances **Dioxin** and **Furan** are unintentionally formed and released from thermal processes (fires) involving PCBs as a result of incomplete combustion. The health effects of such expositions are:

- Influences on the immune system
- Deformations of unborn children
- Chloroacne

PCBs Elimination Network (PEN)

The **PEN** is designed as an equal partnership for stakeholders from different sectors with an interest in the environmentally sound management of PCBs interacting within a voluntary framework. It offers substantial information exchange and support for countries to achieve the goals of the Stockholm Convention related to PCBs.

www.pops.int/pen

Identification of PCBs

Trade Names of PCBs

In many cases, the manufacturer provided information about the type of dielectric liquid used in the transformer or capacitor by identification on the nameplate.

There are dozens of PCBs trade names like Askarel, Sovol, Sovtol, Aroclor, Pyralen, Kanechlor, etc.

Attention: Transformers which had originally been PCBs free (according to nameplate) could have been contaminated with PCBs during e.g. maintenance work. Cross contamination can result from using contaminated tanks, containers, hoses, pumps, etc.

Sampling and Screening of PCBs

In case of transformers, it is necessary to take an oil sample and to check it for PCBs. Appropriate test kits for quick and simple on-site analysis are available.



Transformer sampling



L2000DX Analyzer

As capacitors are a hermetically sealed entity, contamination after manufacture can be excluded. In some cases, lists providing information about the PCBs content of capacitors exist.

In order to quantify the exact content of PCBs present in the oil, laboratory analysis by gas chromatography will be necessary.

Precaution

Each holder of potentially contaminated equipment has to consider identification of the type of insulation fluid in transformers, capacitors, switchers, regulators as well as the spare or waste oil stored on site. Furthermore prevention actions should be taken in case of incidents.

Precaution for Holders of PCBs

- Label electrical devices for easy recognition
- Install a drip tray under the PCBs containing device
- Frequently check the condition of the PCBs devices (leakage, swelling or deformation, corrosion, etc.)
- Do not store inflammable materials close to PCBs
- Always wear personal protective equipment (PPE) when handling PCBs devices (gloves, overall, respiration mask, etc.) and ventilate workplace well
- PCBs and devices containing PCBs must only be disposed of by specialised companies
- Never release PCBs into the environment
- Never abandon PCBs devices (e.g. Mining Industry)
- Never burn PCBs!



Transformer labelling and prevention of cross-contamination

First Aid

- **Liquid PCBs on the skin:**
Use water and soap to wash thoroughly
- **Liquid PCBs in the eyes:**
Rinse eyes with lukewarm jets of water for 15 minutes, always keeping eyes wide open
- **Liquid PCBs in the mouth and in the stomach:**
Rinse mouth with water, do not drink anything else, consult doctor immediately
- **Highly concentrated vapours of PCBs:**
Take affected people outside in the open area

Emergency Measures

Emergency Actions for Cold Incidents

- Call Safety Officer immediately
- Call fire/chemical brigade immediately
- Inform the doctor in charge and equip the chemical response team with personal protective equipment
- Switch off the power supply to the concerned device and check grounding
- Limit the spreading of the seeping oil by sealing the leak and using absorbing materials (sand, sawdust or cement) or by pumping in appropriate containers. If possible, a drip tray can be placed under the leak
- Prevent the contamination of watercourses

Emergency Actions for Hot Incidents

- Call Safety Officer immediately
- Call fire/chemical brigade immediately
- Inform the doctor in charge
- Switch off the power supply
- Hermetically seal the rooms or the entire building, switch off ventilation systems
- Evacuate people from all concerned buildings, and on a larger scale in the direction of the wind

Disposal of PCBs

In general, waste streams involve equipment and oil contaminated with PCBs. The various existing disposal technologies can be grouped into combustion (i.e. incineration) and non-combustion methods (e.g. alkali metal reduction, base-catalysed decomposition and gas-phase chemical reduction).

All types of PCBs recycling and disposal technologies involve important treatment costs.

Further Information

For further information, please contact:

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INFORMATION ON PCBs

