
# RoHS

**Overview**

RoHS, sometimes pronounced ‘rosh’, is short for the Restriction of Hazardous Substances. The full name is the Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment, which is an EU directive, and its updates, which was first implemented on 1 July 2006. The aim and definition are simple: certain dangerous or harmful substances are not permitted in electric and electronic equipment in excess of 0.1% per component (0.01% for Cadmium), unless exempted.

**The substances are:**

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chromium (Cr6+)
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ether (PBDE)
- Bis(2-ethylhexyl) phthalate DEHP
- Butyl benzyl phthalate (BPP)
- Dibutyl phthalate (DBP)
- Diisobutyl phthalate (DIBP)

The first six are from the original directive, and seven to ten were later added, becoming effective 22 July 2019.

The toxicity of the four heavy metals has been known for some time. Lead is used as an alloy to make metals softer and more malleable. Mercury is used in lights and tilt switches. Cadmium is largely found in batteries, to which different directives apply. Hexavalent chromium is used in chrome plating and corrosion-proofing. PBB and PBDE are possibly carcinogenic flame retardants found in plastics. The four phthalates (DEHP, BPP, DBP, DIBP) are plasticisers used in soft or elastic plastics that can be dissolved by saliva.

Developments in scientific testing, greater availability of medical records, and changing attitudes towards chemicals have brought this issue to the fore. Lead, commonly used in solder, is the most known for both historical lead poisoning and as the most high-profile substance in RoHS.


However, the presence of even low quantities of any heavy metals can be dangerous to health, with developmental, neurological and reproductive effects recorded. Many people are potentially exposed throughout a product's life cycle, from the factory's employees in the manufacturing process, the consumers handling the item, and then either those recycling the equipment, or to the local environment once in landfill or incinerated.

Testing is non-destructive, and can be an overall surface scan with EXDRF spectroscopy, followed by ICP-OES, UV-Vis, and GC-MS wet chemical tests depending upon which substance is being tested for.

**Exemptions**

There are approximately 39 exemptions covering 77 situations in annex 3, but the most relevant for electrical mains plugs, cables, and power cords are:

- 6(c) Copper alloy containing up to 4% lead by weight
- 7(a) Lead in high melting temperature type solders (i.e. lead-based alloys containing 85% or more lead by weight)
- 8(b) Cadmium and its compounds in electrical contacts

There are other exemptions specific to the end user, e.g. use of mercury in lighting, or lead in circuit boards. The directive does not apply to some applications, summarised generally:

- Defence/military
- Outer space
- A critical part of a larger piece of equipment which is outside the scope of the directive
- Large stationary industrial tools
- Large fixed installations
- Vehicles
- Professional non-road machinery
- Implanted medical devices
- Solar panels
- Research and development

Spare parts and materials used to repair equipment pre-dating the directive may be exempted depending upon the substance, the application, and the date used.

**Use in the EU and internationally**

Each member state must comply through national legislation, as must any goods imported into the European Union. Different member states may interpret, implement and enforce the directive differently: for example, some countries include plastic children's toys whether or not they contain electric or electronic components. Since the RoHS 2 directive (2011/65/EU), RoHS compliance is a requirement of the CE mark. Other than the CE mark implying RoHS conformance, there is no requirement for RoHS logo or marking. However, various marks have been created, usually in colour green and incorporating 'RoHS', 'lead-free' or 'Pb-free' and sometimes a tick or leaf.


The Chinese 'e' in arrowed circle may also imply conformance.

Whilst limited to the EU, other countries recognise or even require RoHS, for example Australia; Turkey has introduced very similar legislation also called RoHS. The USA does not recognise RoHS, but the state of California has applied the first four restricted substances to a limited list of electronic equipment. Mercury has long been heavily restricted, and individual states may also ban PBDE. China RoHS is very similar, and due to recycling laws Japan has limited the use of lead and requires warning labels for some harmful substances.

**Considerations for the customer**

If a product is sold both into and outside the EU, it may be easier to standardise on one RoHS compliant product rather than dual-stocking the same item with and without RoHS. RoHS may therefore be specified when not required for that country, or even specified for an application outside the scope of the directive. RoHS compliance is good practice, but is not always required; unfortunately there are popular misconceptions which cloud the issue.

For the moulded power cables and rewireable plugs and sockets supplied by Paragon Networks, RoHS largely does not apply. Generally, the only restricted substance found is lead in copper alloy, which is necessary for flexibility in cable and current-carrying contacts; this however carries an exemption, and can be used up to 4% by weight. The only other consideration is the use of lead-free solder if cable is being stripped and tinned. Lead-free solder is more brittle, less electrically conductive, and is harder to work with than its predecessor. Another major criticism of RoHS is that 90% of the world's lead is used in the manufacture of electric batteries, to which RoHS does not apply.

**RoHS declaration**

Paragon Networks designates products as RoHS compliant based on information provided by our manufacturers and suppliers. RoHS compliant means that the supplier has confirmed the compliance of the product, because:


1.They do not contain the restricted substances in Article 4(1)
2.They contain the restricted substances below the limit
3.They contain the restricted substances exempted in Annex 3

Paragon Networks has taken all reasonable steps to confirm suppliers' statements regarding the absence of the restricted substances.

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