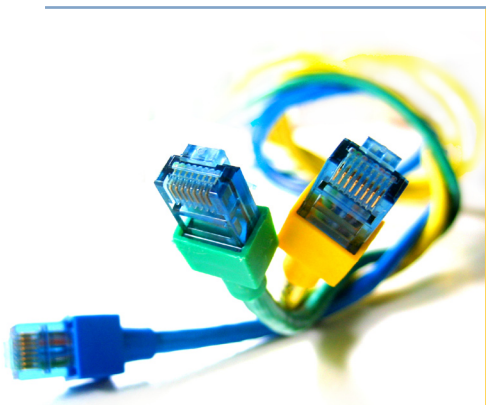


## Electrical and electronic equipment

In 1999, by request of the electronics industry, ALS Scandinavia developed an analytical method for the determination of a large number of metals and other elements in circuit boards. Since then, the method has been further developed to allow homogeneous materials such as plastics, metals, etc., to be analyzed. Today we also offer analytical methods for a large range of organic compounds in addition to the elements.



Using these developed capabilities, ALS Scandinavia often constructs material declarations or analyzes EEE (electrical and electronic equipment) with reference to company specific lists of restricted or undesirable compounds. Our laboratory is listed by IRMM as a qualified supplier for element determinations. In addition, we cooperate with another IRMM-listed laboratory to provide EEE analyses for brominated flame retardants.

### The ALS Scandinavia model for electronics analysis

Though analyses of EEE encompass a variety of sample types, substances to be determined and analytical techniques, some features of ALS Scandinavia's services should be mentioned:

- Care is taken to define, together with the customer, the parts to be analyzed and the substances to determine.
- Homogeneous materials are analyzed as received or after separation from products or product parts, while larger, inhomogeneous units can be homogenized by grinding to enable representative sub-sampling. If restricted substances are detected in the sub-sample, further investigation may be needed.
- Use of analytical techniques with very low limits of determination, often far below maximum concentration values (MCV) - this not only favors reliability at MCV levels, but enables informative calculations of "highest possible percentages of non-compatible material" in non-homogeneous units.
- Report formats and contents are, on request, customized to meet specific requirements.

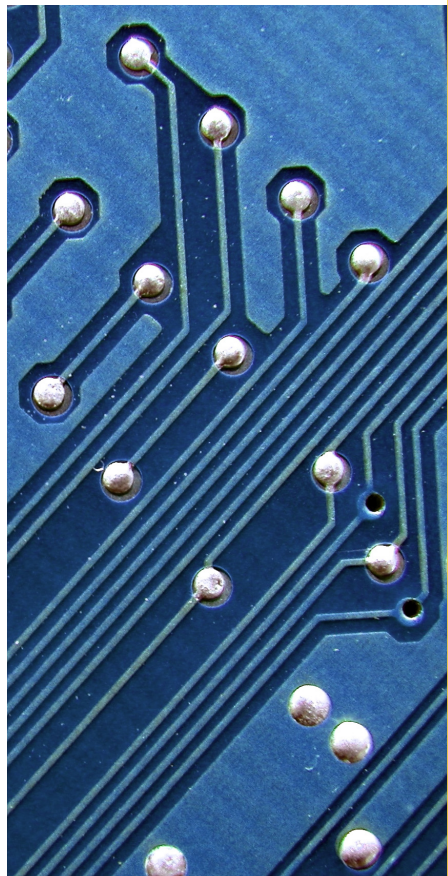
### Material declarations

Producers are required to provide information about the contents of their products and to show compliance with the RoHS directive. Products usually consist of numerous components from different sources, which means that extensive collection and evaluation of information from subcontractors may be required before the contents of a final product can be declared. A substance may also occur as an impurity in a material and thus be present in the product even if not deliberately introduced in the manufacturing process. It is thus often advantageous to submit the entire product, or selected parts or components, to chemical analysis. This is where ALS Scandinavia's expertise comes in.

### Analyses for other substances

Other hazardous substances which may be of interest are, for example, PCBs, chloroparaffins, phthalates, and organotin compounds.

Besides health, safety, and environmental considerations, materials in EEE are of interest for their economic value. In recycling, elements such as iron, copper and aluminium are recovered, as well as the precious metals gold, silver, platinum and palladium that can be recouped profitably from electronic waste. Sometimes this waste also contains small amounts of additional rare metals. By routine "screening" analyses, ALS Scandinavia provides testing for more than 70 elements in EEE. ALS can also offer screening for organic compounds. This can be a cost-effective solution for complex material declarations.



## The RoHS Directive

The European Union's RoHS directive (2002/95/EC) prescribes that new electrical and electronic equipment, introduced on the market from July 1, 2006, shall not contain lead, mercury, cadmium, hexavalent chromium, PBB (polybrominated biphenyls) or PBDE (polybrominated diphenyl ethers).

In practice it may be difficult to completely avoid these substances, i.e., to achieve zero concentrations in all products. Therefore, maximum concentration values have been proposed. These are, expressed by mass in homogeneous materials, 0.01% for cadmium and 0.1% for the rest of the substances mentioned in the directive.

## Where are the substances found?

Substance	Occurrence
cadmium	electroplating, NiCd batteries, plastics, arcing contacts and sensors
hexavalent chromium (Cr <sup>6+</sup> )	coatings on metals, primers for coated metals, hard chrome, metallizing plastics
lead	solders, termination and PCB coatings, glasses, electronic ceramics, in both passive and active devices
mercury	batteries, fluorescent lamps, switches, sensors and relays
PBB and PBDE	flame retardants in a variety of plastics



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