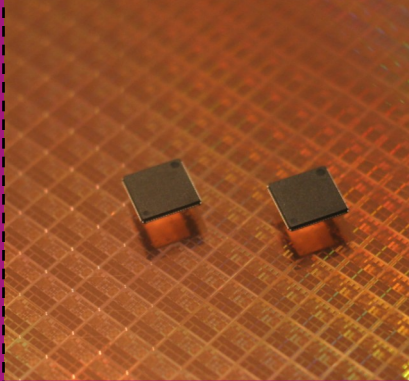


RoHS, WEEE and REACH Compliance



**One is compliant, one is not.
Balazs can tell the difference.**

The European Restrictions of Hazardous Substances (RoHS) directive bans the use of materials containing elements such as lead, mercury, cadmium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) in electronics products built anywhere in the world and sold in the EU market since 2006. Marking inks, cardboard boxes, plastic containers, and packaging foams are included in the push to eliminate toxic contaminants from consumer products. RoHS is accepted by most countries, however some countries and industries have even more restrictive standards.

Balazs™ NanoAnalysis offers compliance analysis for

- RoHS: Restriction of Hazardous Substances Directive
- WEEE: Waste Electrical and Electronic Equipment Directive
- REACH: Registration, Evaluation, Authorization and Restriction of Chemicals
- JIG: Joint Industry Group Standard
- USA, Europe and China

Table 1. Specification limits for restricted substances

Substance/Material	Threshold Level
Arsenic	1000 ppm
Cadmium	100 ppm
Mercury	100 ppm
Lead	1000 ppm
Hexavalent Chromium	1000 ppm
Phthalates of following: DINP, DEHP, DBP, DIDP,	1000 ppm
Brominated Flame Retardants (other than PBBs or	1000 ppm
Vinyl Chloride Polymer (PVC)	1000 ppm

Balazs™ provides analysis for:

- Arsenic
- Cadmium
- Mercury
- Lead
- Hexavalent Chromium
- Phthalates: DINP, DEHP, DBP, DIDP, DNOP, BBP
- Brominated Flame Retardants (other than PBBs or PBDEs)
- Total halogens (ionic and bounded)
- Vinyl Chloride Polymer (PVC)
- Chemical speciation: Tin, Fe, Ni, Cr (e.g. Cr²⁺, Cr³⁺, Cr⁰)

Balazs™ utilizes IEC 62321. Ed 1 111_116_FDIS procedure to achieve detection limits of 1 ppm for elements of interest. Elemental detection of chromium (Cr) is also performed in conjunction with the determination of hexavalent chromium (Cr(VI)) via colorimetric development as in ISO 3613 :2000(E) (Chromate Conversion Coating on Zinc, Cadmium, Aluminum-Zinc Alloys).

Sample Preparation

Mechanical

- Direct measurement
- Grinding

Chemical

- Microwave digestion
- Acid digestion
- Dry ashing
- Solvent extraction
- Accelerated solvent extraction (ASE)

Analytical Methods

Screening

- X-ray fluorescence (XRF)
- Laser ablation inductively coupled plasma mass spectrometry (LA ICP-MS)

Verification Procedures

- Gas chromatography – mass spectrometry (GC-MS)
- Alkaline digestion / colorimetric method (UV-VIS)
- Spot-test procedure / boiling water extraction procedure
- Inductively coupled plasma optical emission spectrometry (ICP-OES)
- Inductively coupled plasma mass spectrometry (ICP-MS)

Analysis of polybrominated dibiphenyl (PBB) or polybrominated diphenyl ether (PBDE) is generally performed utilizing a modification of EPA Method 1614 draft method. Analysis of various samples by these methods yields useful data for the detection limits of 100 ppm. Detection limits of 10 ppm may be achieved in cases where high boiling organic interferences occur.

Polyvinyl chloride (PVC) polymers and PVC blends are detected utilizing FTIR Spectrometry. This technique is useful for determining the presence or absence of these compounds in commercial products, as many large companies will no longer accept these polymer materials as part of assemblies.

Balazs™ has launched a series of services to help manufacturers monitor the elemental content of their packaged devices, PWBs, and polymer packaging. A certificate of analysis provides documentation for the results of each RoHS substance.

Marking and printing inks used in the labeling of shipping boxes frequently contain high levels of lead and cadmium, and as a result, our customers have submitted ink samples for elemental testing to confirm that the products contain less than the specified levels of these hazardous elements.

IC components have traditionally been soldered into place using high content lead base solders. These directives have caused many manufacturers to use alternative solders. However, if the component needs to be replaced, many repair stations still have solder pots which contain significant levels of lead from high lead content solders. Several of our customers have surveyed repair stations and found lead to be present in reworked parts that do not comply with the RoHS directives.