November 2009

FACT SHEET ROHS REVIEW

Verification at the Elemental level for presence of Bromine and Chlorine in EEE

The revision of EU Directive 2002/95/EC on the Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (EEE) offers a unique opportunity to drive innovation towards the next generation of electronic devices.

Verification of bromine and chlorine at the elemental level greatly reduces costs of verifying compliance for regulatory authorities as well as for manufacturers.

CURRENT ROHS – PROBLEMS OF ENSURING COMPLIANCE

Better market surveillance has been identified as a key issue to address in the next iteration of the RoHS Directive. Experience has shown that regulators as well as industry have difficulties in ensuring conformity to the RoHS Directive´s restrictions on the brominated flame retardants (BFRs) PBBs and PBDEs. Testing for specific halogenated* (such as bromine or chlorine) compounds such as PBB and PBDEs has proven to be not only difficult but also expensive since it requires complex testing equipment, is time consuming and not cost effective to manage up the electronics supply chain. It is also challenging for regulatory authorities such as customs officials to audit products on the market for compliance since tests for PBBs and PBDEs require more material than is typically present in the EEE products tested. For many tests, 5-10g of material is required per test. However, a vast majority of components in EEE are less than 5-10g.

SMART, SIMPLIFIED VERIFICATION

A more transparent framework for compliance-verification can be introduced that achieves the same objective, but at less cost for industry as well as for regulators: *verification at the elemental** level*. This approach places restrictions on the allowed concentration of elemental bromine and chlorine, instead of on specific, individual substances containing bromine or chlorine (such as PBBs, PBDEs, TBBP-A or PVC).

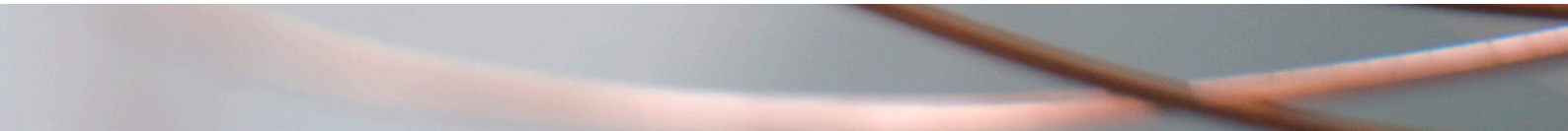
XRF-ANALYSIS: SIMPLE, COST-EFFECTIVE AND NON-DESTRUCTIVE

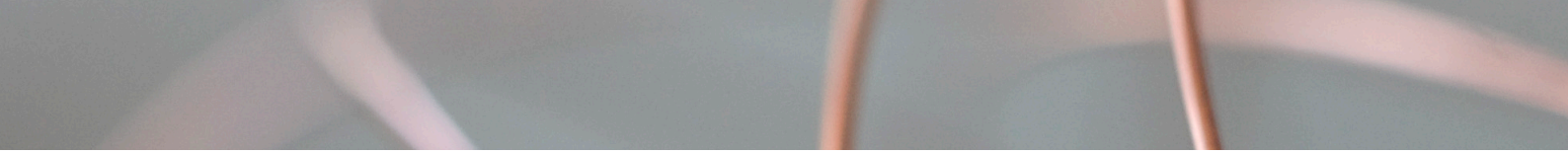
The inexpensive and non-destructive method of XRF analysis is today used to monitor conformance with heavy metal restrictions in the current RoHS Directive. This method is also widely used within the EEE industry and can readily be applied for verification of brominated and chlorinated substances in a range of materials.

Testing for specific brominated or chlorinated compounds, such as PBBs and PBDEs, requires destruction of the component under review. Verification of components containing elemental bromine or chlorine can be done with an XRF, without destroying the component analysed.

** **Halogenated compounds** are chemicals that contain a halogen element, such as bromine, chlorine, fluorine, or iodine. Industry standards developed typically definine components as "halogen-free,""low-halogen," "bromine-free," or "chlorine-free", ie compounds and products free from or low on bromine or chlorine.*

*** **Elemental approach**: Electronics companies have developed standards for homogeneous materials that establish limits based on the presence and concentration of elemental bromine and chlorine – not specific bromine or chlorine compounds (e.g. PBB, PBDE or TBBPA). This is often colloquially referred to as the "elemental approach," since restrictions are imposed on the elements themselves rather than on the compounds containing bromine and chlorine.*





IN USE TODAY

Most laboratories and major EEE suppliers already own this type of testing equipment. The advantages in terms of reduction in cost, time, and material would also apply to regulatory authorities since the same equipment used to screen for the presence of lead, cadmium, and mercury can be used to screen for bromine and chlorine in a matter of minutes. Following XRF-testing, quantitative testing should be conducted to determine the concentration and the source of bromine and chlorine if either element is detected by the XRF screening.

REDUCED COSTS

Evaluation for the presence and quantification of elemental bromine and chlorine is comparatively inexpensive, around € 100/test. This can be compared to the cost of testing, analysing and quantifying for the presence of individual substances, such as PBDE and PBB´s: € 200/substance tested. Furthermore, most labs can only test for a small subset of brominated and chlorinated compounds.

MANUFACTURERS

Establishing verification procedures for elemental bromine and chlorine simplifies verification for regulatory authorities and is cost effective, consistent, repeatable and transparent. It also simplifies and reduces costs of compliance tests and content-analysis for the manufacturing industry. It creates a more reliable compliance program for manufacturers given the fact that most suppliers do not adequately track the chemical content of their products at the compound level. Verification of elemental bromine and chlorine is easily integrated into the existing chemical management system that suppliers established to show compliance for the heavy metal restrictions in RoHS.

REGULATORS

Member states responsible for verifying RoHS-compliance of EEE-products, manufactured in the EU or imported, will reduce costs necessary for effective market surveillance while improving the reliability of ensuring conformance with RoHS restrictions.

TBBPA, AN EXAMPLE

TBBPA (Tetra bromobisphenol A) is the largest brominated flame retardant used in EEE today. TBBPA is reacted into the polymer and is therefore not detectable as a compound in the final product. Compliance with TBBPA restrictions cannot be accomplished at the compound level. However, if verification on elemental bromine is done, the bromine used in the TBBPA is detected, giving an indication of its presence.

SMART VERIFICATION OF ORGANIC HALOGEN LEVELS

For the heavy metals restricted in RoHS today the limits are set at the *elemental* level. The restrictions on lead for example apply at 0,1 % w/w, for elemental lead, not for a specific substances containing lead. The same methodology should apply for organic brominated and chlorinated substances, i.e. restriction on the elemental level, rather than on an individual compound level.

For further information and questions on how ChemSec engages with policy-makers, industry and public interest organisations on RoHS, please visit www.chemsec.org/rohs