INTRODUCTION

In June 2011 the European Union issued a revision to the Restriction on Hazardous Substances (RoHS) in Electrical and Electronic Equipment Directive (2011/65/EU). This revision mandates stricter due diligence regimens supporting claims of compliance. Companies have responded with greater emphasis on obtaining third party laboratory analytical results related to the constituents of their products. Providing test results for the RoHS substances - mercury, cadmium, lead, hexavalent chromium, polybrominated biphenyls, and polybrominated diphenyl ether - has now become routine, while inclusion of additional analytes, such as chlorine and phthalates, has become increasingly commonplace. With this increase in emphasis on test results, a company's ability to electronically read lab report results, upload them into electronic records, assess compliance with software, and exchange those results up and down the supply chain becomes paramount.

This standard will therefore focus on establishing a structure for communicating essential lab report data electronically in XML format for their accurate transmission and efficient evaluation. Nevertheless, it is recognized that some definition of the elements of a robust human-readable report is warranted, because not all human-readable elements will be included in the XML file, for reasons that will become apparent. Treatment of the elements of a robust human-readable lab report is provided in Appendix A for reference.

The conventions defined here are intended to maximize the value of lab reports to the companies who use them as essential verification for compliance claims. A lab report optimized for automated evaluation of critical parameters is more valuable to a user who can assimilate it automatically than a report that must be read manually. A complete lab report is more valuable to its user than one with missing features.

This standard is one of several in the 175x series of standards that permits segmentation of declaration details based on the subject and scope of the declaration. This standard describes essential information exchange content with respect to analytical lab reports.

NOTE OF CAUTION

Laboratory analysis may be done at any level of production; from the homogeneous material level to sub-product levels and the finished product.

Users of this standard linking a particular laboratory report to a product, sub-product, or homogeneous material within an IPC-1752A declaration or other product compliance document are advised to establish that link at the level of the product (product, sub-product, homogeneous material) that was actually analyzed by the laboratory producing the report. For instance, a report on a lab analysis starting out with a product should be associated to the product analyzed, not directly to any particular subproduct or homogeneous material within that product. The reason for this caution is that a lab tear-down procedure seldom, if ever, results in duplication of the engineering structure of the starting point item, and therefore, establishing correlation of tear-down samples to the original building blocks becomes practically impossible. The rule of thumb is to apply a test report to the item tested. If a homogeneous material result is desired, test that material, not the product made from it in combination with other materials.

CLARIFICATION

This standard implies no mandate, from IPC or otherwise, for the provision of laboratory reports as part of any supplier-customer relationship. The provision of laboratory reports is purely an arrangement between one business partner and another. The exchange of such reports may or may not accompany 1752 files.

ATTACHING VERSUS MERGING FILES

A laboratory report XML file may be attached to another IPC-175x sectional declaration. However, the laboratory report file must be a stand-alone file whose XML formulation is attached (embedded) and not simply merged or combined with other IPC-175x sectional declarations.

There are two reasons for this stipulation:

1) The lab report XML uses fields from IPC-1751A to identify the lab producing the report, the product being analyzed, and other parameters—fields which would already be populated with other data from the manufacturer in a merged file, and a conflict would ensue unless the lab report is included within another 175x file as an attachment; and
2) Merging files would preclude using more than one lab report per IPC-1752 declaration, since the multiple entries for each cell from multiple lab reports would result in conflicting information, and at the same time, any number of lab reports may need to be referenced when issuing a product compliance report.

Refer to IPC-1751A for further information on attaching files in the 175x series. See Appendix D for a map of IPC-1751A features used in IPC-1753.

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Laboratory Report Standard

1 SCOPE

This standard establishes the requirements of an XML convention for exchanging certain information of laboratory analytical test reports between members of a supply chain.

This standard defines the requirements for an XML file of lab report results, but it derives from the constituents of a companion human-readable file. Laboratories providing analytical services to the electronics industry have always, and will continue to, create a human-readable report for their clients. This standard allows for an XML file to be used in order to enable computer evaluation of lab report results.

The set of parameters of a robust human-readable lab report file is identified in Appendix A. Not all data within such a lab report is amenable to computerized evaluation. In order to keep the size of an XML file of lab report results small for processing efficiency, some elements of the human-readable file need only be present in the human-readable file. Pictures of samples, lab credentials, case narrative, and other information, for instance, although essential for a complete lab report, would not contribute to the objective of efficient computer evaluation of the analytical results.

This standard is intended for use by companies wishing to receive certain lab report results in a computer-readable format in addition to a human-readable report. These companies will have a software system for gathering and evaluating product environmental compliance information from their suppliers. Such companies need only request that their supplier or lab provide an XML file of analytical results in accordance with this standard. No ''Request-Response'' mode is needed, as it is envisioned that lab reports can and will be used multiple times in multiple contexts. For instance, a company may provide a material to many different customers, but it need only test the material once and then send those same results to the several customers.

Furthermore, this standard is intended to provide benefit to the labs themselves who must create reports to satisfy their customers, provided those customers' needs are satisfied by the specifications defined here. If the lab need only support one standardized format for computer-readable exchange of information, their task is simplified versus learning and creating software to support multiple custom data formats.

The laboratory performing the analysis will create the reports, both the XML file and the human-readable file.

This standard is not intended for use by the public when making purchasing decisions.

1.1 Purpose – XML Data Requirements The purpose of the XML file is to contain those elements of a lab report that provide essential support for claims of compliance to regulations or specifications, those that are most often evaluated or compared to other numeric characteristics of corresponding items. The reason for an XML representation of these elements is to allow for computer recognition and processing of critical parameters. XML files are widely compatible with various uptake software programs.

Organizations that create reports and electronic files according to this standard will consist of independent analytical laboratories or those companies who have an internal analytical laboratory creating reports for external use. The benefit to these organizations is that constructing reports to one widely accepted standard format is easier than constructing myriad custom-formatted reports.

Organizations that will use laboratory report files in XML format include those companies who wish to verify that laboratory analytical results support compliance claims *using software*. The benefit to these organizations is cost-effective, thorough, efficient, and flawless assimilation of supporting laboratory report information through automation. The larger the number of laboratory reports applicable to a company's products, the greater the benefit of automation.

1.2 Purpose – Human-Readable Lab Report The purpose of the human-readable file (described in Appendix A) is to contain any and all elements of a well-formed laboratory report.

The human-readable lab report signed by an authorized agent of the lab and locked against further editing is a requirement of laboratory accrediting organizations for ISO 17025 accreditation. Labs must produce such reports as a condition of their accreditation. The data in the original human-readable, non-editable lab report is therefore of primary authority, and any discrepancy between the human-readable report and the XML file data **shall** be resolved in deference to the human-readable file. The data within a companion XML file is expected to be identical to the corresponding data in the human-readable file.