



ASSOCIATION CONNECTING  
ELECTRONICS INDUSTRIES®

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European Commission  
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1049 Brussels – BELGIUM  
[ENV-ROHS-DIRECTIVE-REVIEW@ec.europa.eu](mailto:ENV-ROHS-DIRECTIVE-REVIEW@ec.europa.eu)

RE: The Review of the Directive 2002/95/EC of the European Parliament and of the Council on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, Invitation for Comments on Policy Options and for Information Supply

The IPC - Association Connecting Electronics Industries Government Relations and Environment, Health and Safety Committees submit the following comments to the European Commission regarding the above referenced Restriction of Hazardous Substances (RoHS) Directive Review. The electronics industry has invested an enormous amount of time and resources to comply with existing RoHS substance restrictions and the full technical, social, and cost implications of the RoHS Directive's implementation are still being discovered. IPC urges the Commission to avoid restricting additional substances, eliminating existing technology exemptions or adding additional electronics equipment to the RoHS scope while industry, governments and the public are still facing a variety of implementation challenges. Any expansion of the RoHS scope, including removal of existing exemptions must be thoroughly reviewed for technical feasibility. Should the Commission deem additional substance bans to be absolutely necessary, a full life cycle assessment of the substance and its substitutes must be conducted in order to ensure that the substitution does not have unintended adverse environmental and human health impacts. IPC believes that any further substance restrictions beyond RoHS would more appropriately be addressed under the current REACH (Registration, Evaluation and Authorization of Chemicals) Directive to avoid unnecessary confusion and regulatory overlaps.

IPC is a global trade association with over 275 member companies located in the European Union. IPC represents all facets of the electronics interconnect industry, including design, printed circuit board manufacturing and electronics assembly. Printed circuit boards and electronic assemblies are vital components of all electronic devices including computers, cell phones, pacemakers, and sophisticated missile defense systems.

Through leadership and innovation, the electronics industry has continuously striven to improve manufacturing processes and products so that materials of concern are

minimized or eliminated where feasible. Through the Environment, Health and Safety and Government Relations Committees, IPC advocates cleaner, safer manufacturing worldwide and encourages laws and regulations which promote the global competitiveness of the industry. Our industry has collectively spent billions of dollars worldwide on RoHS compliance to redesign products and components; conduct comprehensive reliability testing on redesigned products using replacement materials; implement materials declaration and due diligence processes; and overhaul inventory management and component tracking systems throughout a global supply chain that includes hundreds of thousands of companies.

IPC urges the Commission to fully evaluate the life cycle (design, use and end of life) impacts of the proposed substitutes before restricting substances currently in use. There should be clear and compelling evidence that potential substitutes are available, are reliable over the long-term and are preferable from a life cycle perspective. Until life cycle assessments are conducted proving that the environmental and human health impacts across the alternative's life cycle are better than the substances being replaced, the Commission should not restrict any further substances under RoHS.

It is important to note that materials selection is an extremely complex issue. Electronics manufacturers use certain materials of concern because of their unique energy efficiency, safety or performance characteristics when no viable or environmentally-preferable substitutes exist. With electronics, drop-in substitutes are rarely feasible. The substitution of one substance for another can create a cascade of performance and functionality issues. The search for alternatives is complicated by limited alternatives, higher costs and possible risks posed by those alternatives. For example, the shift from lead bearing solder alloys to lead-free alloys has created reliability concerns within solder joints. Because the lead within the alloys provides greater ductility within solder joints, the ductility of tin-lead solder joints is greater than the ductility of high tin content lead-free solder joints. Although the high tin content solder joint may be stronger, the thermal stresses applied are transferred to other locations within the assembly causing failures within the board or the components. This is just one example of the many technical issues which continue to challenge the electronics industry during its implementation of the RoHS Directive.

In their Review of the RoHS Directive Categories 8 and 9<sup>1</sup>, ERA Consultants identified five main concerns related to the reliability of lead free solders: manufacturing defects, thermal fatigue, tin whiskers, vibration and effects of g-forces, and corrosion. With regards to thermal fatigue, ERA found that, "Estimation of field life from accelerated test data should be possible within the next five years but this is not yet possible with sufficient certainty for the most safety critical applications." In regards to g-force effects,

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<sup>1</sup>ERA Technology, Review of Directive 2002/95/EC (RoHS) Categories 8 and 9 – Final Report, July 2006 and September 19, 2006.

ERA reported that, “lead-free solders have been shown to be less reliable at high g-forces...” ERA also reported that, “Recent research has shown that printed circuit boards made using lead-free materials can be more susceptible to corrosion than their tin/lead counterparts.” Industry is working diligently to address these concerns but they cannot be addressed overnight. IPC therefore recommends that the Commission not eliminate the existing technology exemptions that apply to the tin-lead solder interconnect, nor include categories 8 and 9 from the WEEE directive as covered RoHS products at this time.

Review of the U.S. Environmental Protection Agency (EPA) Lead-Free Solder project<sup>2</sup> illuminates the environmental trade-offs inherent in material substitutions. The study evaluated the environmental impacts of tin-lead solder versus lead-free alternative solders. Because tin-silver-copper solder in electronics requires higher processing temperatures than tin-lead solder tens of thousands of solder machines worldwide now operate at higher temperature. The higher operating temperatures required for the manufacture of lead-free electronics has resulted in significantly higher energy usage during manufacturing. The increased energy use associated with manufacturing lead-free electronics was projected by the study to cause higher air pollution, acid rain, stream eutrophication, and global warming impacts than the tin-lead soldered electronics. The environmental impact of the lead-free alternatives is an important factor that was not considered during the European Union’s decision to restrict the use of lead in electronics based solely on its potential toxicity. EPA’s study serves as an important reminder that there are environmental trade-offs when substituting one substance with another. A complete application of the precautionary approach would be to examine the potential impacts of likely substitutes prior to instituting a ban of a critical substance. IPC urges the Commission to be mindful of the importance of fully considering all life cycle impacts before materials are banned or eliminated from use.

IPC is also concerned that the addition of new substance restrictions to the RoHS Directive would interfere with the current EU approach on chemicals regulation under the Registration, Evaluation and Authorization of Chemicals (REACH) Directive. While REACH will also have a significant impact on the electronics industry, it would be more sensible to address any further substance bans under REACH in order to prevent overlapping and duplicative chemical regulations. By expanding RoHS to include new substance restrictions, the Commission would undermine REACH’s intent to streamline the European Union’s chemical regulations. IPC remains hopeful that the REACH process will include a more thorough life cycle evaluation of the substances and its alternatives, resulting in an efficient and effective chemical regulatory system.

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<sup>2</sup> U.S. Environmental Protection Agency. August 2007. *Solders in Electronics: A Life-Cycle Assessment*. Available at <http://epa.gov/dfe/pubs/solder/lca/index.htm>.

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IPC understands and supports the need for cost effective, science-based regulations that are protective of the public welfare and environment. In its RoHS Review, the Commission must ensure that any new substance restrictions are based on comprehensive life cycle analyses. If additional substance restrictions are necessary, they should be handled under the REACH process where chemical risks will be fully evaluated. Any expansion of the RoHS scope, including removal of existing exemptions, must conform to the highest technical review standards and should not contribute to further reliability concerns. The IPC Government Relations and Environment, Health and Safety Committees look forward to working with the Commission during its RoHS Review. Should you have any questions, please contact Fern Abrams at 703-522-0225 or [fabrams@ipc.org](mailto:fabrams@ipc.org).

Sincerely,

Fern Abrams  
Director, Government Relations & Environmental Policy