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European Commission
DG Environment, Unit G4 – Consultation Directive 2002/95/EC
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To Whom It May Concern:
I am writing in regards to the "Stakeholder consultation on adaptation to scientific and technical progress under directive 2002/95/EC of the European Parliament and the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment for the purpose of a possible amendment to the annex". Specifically, I would like to respond to item number 5, Lead used in compliant-pin VHDM (Very High Density Medium) connector system.

Tyco Electronics does not support an exemption for the continued use of lead in compliant-pin VHDM connector systems. The exemption as currently proposed is inappropriately targeted to products of a specific manufacturer. In addition, there is no need for the exemption in view of the fact that Tyco Electronics, the world's largest connector manufacturer, is selling these products in a lead-free version.

Do feasible substitutes currently exist in an industrial and/or commercial scale?
Yes, alternatives do exist. Tyco Electronics has been researching lead free versions of our products for more than 5 years. Our research into compliant-pin connector technology has proven that a pure tin surface finish can be substituted for a tin/lead surface finish in these connector systems.

Do any restrictions apply to such substitutes?
There are no known legal restrictions for a substitution of pure tin for tin/lead.

What are the costs and benefits and advantages and disadvantages of such substitutes?
The cost of pure tin plating is within 10% of the cost of plating tin/lead. This comprises a small fraction of the overall cost of manufacturing these connector products. Other plating alternatives, such as gold plating, exist and may be capable of functioning reliably in compliant-pin connector applications. However, plating with pure gold can have a substantial cost impact and could increase the total product cost by as much as 10%.

The advantage of pure tin as a substitute for tin/lead is primarily in the elimination of lead use. There are no engineering or performance improvements offered by substituting tin for tin/lead.

The disadvantages of using pure tin are modest increases in the forces required to insert compliant pins into the printed circuit board (PCB). The increased forces can, in some cases, lead to damage of the interconnection. This type of damage can be

overcome through well-known design practices. A report on this subject is available on the Tyco Electronics website.[1]

A second possible disadvantage of pure tin is the risk for tin whisker formation. Tin whiskers are single crystals of tin that spontaneously grow from the surface of pure tin plating.[2] Tin whisker risk can be mitigated several ways, some of which are outlined by the NEMI tin whisker users document.[3] These mitigation practices have been in manufacturing practice at Tyco Electronics since February 2003.

Tyco Electronics has invested heavily in the research and development of lead free connector technology. We believe that lead free versions of compliant pin products are technically and economically feasible. However, if the TAC determines that an exemption for compliant-pin connectors should be part of the 2002/95/EC, then we propose the wording of the exemption be changed. The current wording uses the terminology VHDM ® (Very High Density Medium), which is a registered trademark of Teradyne Connection Systems. As such, the exemption as it is written preferentially applies to products from a single company and those who have licensed their compliant-pin technology. A more standardized way of describing the exemption is proposed below:

> Lead used in compliant-pin connector systems. Complaint-pin refers to a number of well-known interconnection technologies that mechanically and electrically join a connector to a printed circuit board. By design, the connector is mechanically separable and is not soldered to the printed circuit board.

Thank you for the opportunity to provide stakeholder opinions in this matter. Feel free to contact me for any additional information or clarification.

Best Regards,

Dr. Robert D. Hilty, P.E.
Director Materials Research
Tyco Electronics

[1] http://www.tycoelectronics.com/environment/leadfree/pdf/Tyco_IPC_2003_Chou.pdf
[2] Galyon, G, “Annotated Tin Whisker Bibliography”, ftp://nemi.org/webdownload/newsroom/TW_biblio-July03.pdf
[3] ftp://nemi.org/webdownload/projects/ese/TW_User_Group_position0304.pdf