Specific questions exemption 23

"Lead in finishes of fine pitch components other than connectors with a pitch of 0.65 mm or less with NiFe lead frames and lead in finishes of fine pitch components other than connectors with a pitch of 0.65 mm or less with copper lead frames"

The following specific questions should be answered in your stakeholder contribution if you support exemption 23 to be continued / amended / discontinued:

Note:

During the last evaluation in 2006, the main arguments for the justification of this exemption at that time were:

- The principle mechanisms of whisker growth on lead-free tin finishes are known, but there is a great deal of uncertainty regarding the influence of environmental and processing factors (e.g. high air humidity and high temperature) that might affect whisker growth. Currently failures resulting from whiskers from tin-based lead-free finishes in fine pitch components cannot be excluded reliably and generally.
- Discussions on whisker standard tests for tin finishes are ongoing without a result yet due to these uncertainties. Hence, no standard test is available at the moment allowing reliable results on whiskering of tin-based lead-free finishes.
- Whisker mitigation techniques for tin finishes applied by component manufacturers actually mitigate whisker growth, but it can not be excluded that tin whiskers might grow to a length that could be critical for fine pitch components.
- No long time experience on whisker formation from lead-free tin-based finishes exists.
- Nickel-palladium (Ni/Pd) and nickel-palladium-gold (Ni/Pd/Au) are technically viable lead-free substitutes for components with copper lead[1]-frames, but not available sufficiently to cope with the demand until July 2006. Component manufacturers focused their efforts on tin-based lead-free platings.
- No such whisker free alternative finishes is available on nickel-iron lead-frames.
- A general recommendation to use tin-based lead-free finishes cannot be given at the moment. Users of fine pitch components will have to decide on a case-to-case base.
- A lack of production capacity and availability of fine pitch components with NiPdAu plating was assumed.

[1] Technical remark: The word "lead" in "lead-frame" in this context does not refer to the chemical element lead (Pb), but means the chassis on which chips are attached in components.

- For NiFe-lead-frame components, NiPd and NiPdAu finishes technically are not a viable alternative. NiFe-lead-frames and Cu-lead-frames both have their technical indications of use (electrical and thermal conductivity, coefficient of thermal mismatch between chip and lead-frame,…) and thus cannot generally be substituted with each other. Substitution of NiFe-components by copper-lead-frame components with NiPd or NiPdAu finishes therefore is no generally viable alternative.

The following recommendation for a wording of the exemption had been given in June 2006:

“Lead in finishes of fine pitch components others than connectors with a pitch of 0.65 mm or less with NiFe lead-frames until 2010.
Lead in finishes of fine pitch components others than connectors with a pitch of 0.65 mm or less with copper lead-frames until 2008”.

1. Was has changed since the **last evaluation** in 2006? Are the above mentioned arguments still valid?
2. Has a **phase out** of the use of lead in finishes of fine pitch components others than connectors with a pitch of 0.65 mm or less with copper lead-frames taken place? If not, until when is it technically feasible?
3. The exemption was recommended to expire in 2008 assuming that production capacities for gold**-based finishes** would be available as a safe alternative for fine pitch components with tin-based finishes. Please explain the status of availability for such components.
4. Please justify why the exemption should be **continued/withdrawn** with respect to the above mentioned arguments, or any other arguments and evidence supporting your statement.
5. What experiences exist with tin-based or other lead-free and **RoHS-compliant finishe**s on fine pitch or other components (with and/or without mitigation techniques applied)?
6. Please explain the status of an internationally accepted **whisker test**.
7. Please explain the latest status of whisker research and tests on **NiFe leadframes** and the status of qualification of tin-based finishes for fine pitch applications.
8. Please explain the latest status of whisker research and tests on **copper lead-frame**s (whisker mitigation techniques etc.) and the status of qualification of tin-based finishes for fine pitch applications.
9. In case an exemption is still required, please provide a **roadmap** with activities, milestones and timelines towards the replacement of lead in these applications.