

Consultation Questionnaire Exemption No. 6c (renewal request)

Exemption for „Copper alloy containing up to 4 % lead by weight“

Abbreviations and Definitions

EEE	Electrical and Electronic Equipment
LEU	LightingEurope

Background

The Oeko-Institut and Fraunhofer IZM have been appointed within a framework contract¹ for the evaluation of applications for the renewal of exemptions currently listed in Annexes III of the new RoHS Directive 2011/65/EU (RoHS 2) by the European Commission.¹

The following applicants have submitted requests for the renewal of the above mentioned exemption.

Dunkermotoren GmbH request the exemption for:

Blei als Legierungselement in Kupfer-Zink-Legierungen für Bearbeitungszwecke mit einem Massenanteil von höchstens 1 % Blei für Verzahnungsteile für weitere 5 Jahre.

Five applications were made requesting a renewal of the exemption with the same wording by:

- Bourns, Inc.
- Framo Morat
- LightingEurope;
- PHOENIX Contact GmbH&Co. KG and HARTING KGaA
- Sensata Technologies

A further application submitted did not fulfil the minimum requirements of applications for exemptions stipulated in Annex V of the Directive and shall not be evaluated as such, though the applicant can still make a contribution as part of the stakeholder consultation.

The applications have been subject to a first completeness and plausibility check. The applicants have been requested to answer additional questions and to provide additional information that shall be made available on the request webpage of the stakeholder consultation (<http://rohs.exemptions.oeko.info/index.php?id=228>).

Mechanical moving components – gears

The applicant Dunkermotoren explains that worm / planetary customised gear units (“*Schnecken-Planeten- Sondergetriebe*”) snail gears (“*Schneckenräder*”), helical gears (“*Schraubräder*”), external and internal geared spur gears (“*außen- und innenverzahnte Stirnräder*”) and parts for engine

¹ Contract is implemented through Framework Contract No. ENV.C.2/FRA/2011/0020 led by Eunomia

components (“*Motorenteile*”) are manufactured from leaded copper alloys with a lead content of less than 1 % by weight.

Dunkermotoren explain lead to be needed for improved machinability and for improved sliding / friction (“*Gleiteigenschaften*”) properties;

Both applicants state that they have tested lead free alternatives, whereas it is understood that Dunkermotoren has already identified an alternative material candidate, which is currently still being tested.

Other components

According to the applicant Bourns Inc., leaded copper alloys are needed for brass shafts and bushings “*other brass applications*”. Bourns Inc. explain that the leaded copper alloy can be processed precisely and fast in the screw machines. Besides, lead provides corrosion resistance.

The applicant PHOENIX Contact GmbH&Co. KG and HARTING KGaA indicate contact spring legs, crimp contacts and also gear pinions as applications of leaded copper alloys. PHOENIX Contact GmbH&Co. KG and HARTING KGaA generally refer to the following functions of lead as chip breaker, internal lubricant, increase of corrosion resistance, prevention of cracks, but specify the following characteristics for the following components:

- a high relaxation behaviour achieved with leaded copper alloys reduces the contact forces in spring contacts;
- a higher ductility achieved with leaded copper alloys prevents cracks in crimp contacts;
- in mechanical connecting parts such as e.g. gears, it is claimed that wear resistance is achieved through the use of leaded copper alloys;

Sensata does not specify the components for which the exemption renewal is requested and generally refers to the function of lead in all alloys covered under exemption 6 (steel, aluminium and copper) such as improved “*micro-machining, electrical conductivity, galvanic corrosion resistance, mechanical relaxation, tribological behaviour etc.*”.

LightingEurope requests the exemption for contact-pins of various lamps. LEU state that the presence of lead results in a higher ductility of the copper-alloy pins. On the other hand LEU state that lead free alloys are already available on the market by one supplier, raising concern that the current supply would not be able to satisfy the present demand of the market.

Whereas Sensata Technologies and Bourns Inc. did not specify own substitution efforts, PHOENIX Contact GmbH&Co. KG and HARTING KGaA summarized research performed by RWTH Aachen² on less favourable machining properties of CuZn42 and CuZn21Si3 alloys.

For details, please check the applicant’s exemption requests at:

<http://rohs.exemptions.oeko.info/index.php?id=243>

The objective of this consultation and the review process is to collect and to evaluate information and evidence according to the criteria listed in Art. 5 (1) (a) of Directive 2011/65/EU (RoHS II), which can be found under:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32011L0065:EN:NOT>

² Lung, D.; Nobel, C.; Klocke, F. (2013): Entwicklung einer Hochleistungserschpannung für schwererschpannbare bleifreie Kupferknet- und -gusslegierungen : Schlussbericht der Forschungsstelle(n) Nr. 1, Werkzeugmaschinenlabor (WZL) der RWTH Aachen; <http://publications.rwth-aachen.de/record/230384>

If you would like to contribute to the stakeholder consultation, please answer the following questions:

Questions

1. Some applicants have requested the renewal of Ex. 6c of Annex III, with the same wording formulation. The applicant Dunkermotoren have requested the renewal of Ex. 6c, however indicate that a lower threshold for the lead content of <1% by weight would also be feasible.
 - a. Please specify with which of the proposed formulations you agree.
 - b. Please suggest an alternative wording and explain your proposal, if you do not agree with one of the proposed exemption wording.
 - c. Please explain why you support or object the various proposals. To support your views, please provide detailed technical argumentation / evidence in line with the criteria in Art. 5(1)(a).
2. Please describe in which applications leaded copper alloys are used in EEE.
 - a. Please provide an exhaustive list of applications and describe their typical characterisations.
 - b. Please specify the functionality of lead in these applications (e.g. specific function and properties, performance criteria, etc.).
 - c. As for machinability, please specify which machining processes are applied and specify where and how the absence of lead would affect the efficiency of the machining process.
3. Please indicate how much lead would be used under these applications per annum. If data is not available, please provide estimations for the EU market.
4. Are there technical developments that allow a further reduction of lead? Can the limit of 4% be reduced for the full application range or for a certain application group? If not, please explain why this is currently technically or scientifically impossible / impracticable.
5. Please provide information concerning possible substitutes or developments that may enable reduction, substitution or elimination, at present or in the future, of leaded copper alloys:
 - a. In this regard, please clarify for alternatives if they would be applicable to the full range or only to part of the application range of leaded copper alloys in EEE.
 - b. Please provide quantitative data as to application specifications (performance indicators relevant to various properties) to support your view.
6. Please provide information as to research initiatives which are currently looking into the development of possible alternatives for some or all of the application range of leaded copper alloys:
 - a. Please explain what part of the application range is of relevance for such initiatives (in what applications may substitution be possible in the future).
 - b. Please provide a roadmap of such on-going research (phases that are to be carried out), detailing the current status as well as the estimated time needed for further stages.

7. It can be understood that the following properties are of importance in applications for which leaded-copper alloys are used at present, or for the manufacture of such applications:
- In manufacture of applications where machinability is of importance:
 - ductility properties;
 - lubrication properties;
 - chipping properties;
 - In the use of applications:
 - Ductility properties;
 - Corrosion resistance properties;
 - Lubrication properties;
- a. Please confirm that this list is exhaustive, or alternatively clarify what additional properties are of relevance for applications of leaded copper alloys;
 - b. For each property please specify what performance is required so that it is clear how to compare between possible substitutes and leaded copper alloys – i.e. for each property please indicate a performance indicator as well as the acceptable level of performance that needs to be exhibited by substitutes;
 - c. Please indicate if there exist interrelations between certain properties and if these would impact the range of acceptable performance;
 - d. Please if the exemption formulation could be adapted to reflect the need for these properties in relevant applications and propose a formulation respectively;
8. Are there any other aspects you deem to be of importance for the requested exemption?

In case parts of your contribution are confidential, please clearly mark relevant text excerpts or provide your contribution in two versions (public /confidential).

Finally, please do not forget to provide your contact details (Name, Organisation, e-mail and phone number) so that Oeko-Institut/Fraunhofer IZM can contact you in case there are questions concerning your contribution. Please also note, however, that requested exemptions cannot be granted based on confidential information!