

## Consultation Questionnaire Exemption No. 6a (renewal request)

### *Exemption for „Lead as an alloying element in steel for machining purposes and in galvanised steel containing up to 0,35 % lead by weight“*

#### Abbreviations and Definitions

EEE	Electrical and Electronic Equipment
EGGA	European General Galvanizers Association
EUROFER	European Steel Association
Pb	Lead

#### Background

The Oeko-Institut and Fraunhofer IZM have been appointed within a framework contract<sup>1</sup> 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.<sup>1</sup>

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

European Steel Association (EUROFER) and the European General Galvanizers Association (EGGA) request a modification of the current exemptions wording formulation as follows: *“Lead as an alloying element in steel for machining purposes and in batch hot dip galvanized steel items containing up to 0.35% lead by weight.”*

Dunkermotoren and Sensata Technologies request the exemption be renewed with the same wording formulation currently listed in Annex III of the RoHS Directive.

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>).

According to EUROFER and EGGA, the presence of Pb in steel is of relevance in machining steel, where lead improves machinability, and in batch galvanized steel, where lead is unintentionally present in the galvanised coating due to the use of recycled zinc ingots. The intentional addition of lead to the galvanizing bath is rapidly declining due to technical innovation.

EUROFER and EGGA do not specify the applications of steel containing lead as it is said to cover a diverse range. According to EUROFER and EGGA, batch galvanized steel is used in small components like fasteners, brackets, fixings etc.

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

Dunkermotoren uses lead based steel alloys in geared parts (“*Verzahnungsteile*”) in engine and transmission components (“*Motoren- und Getriebeteile*”) and indicates an improved machinability that is achieved by lead.

Sensata Technologies did not specify the components applied with steel containing lead. Sensata generally refers to the function of lead in all alloys covered under Ex. 6 (steel, aluminium and copper) such as improved “*micro-machining, electrical conductivity, galvanic corrosion resistance, mechanical relaxation, tribological behaviour etc.*”.

EUROFER and EGGA state that though there is intensive research into alternatives, no substitute for Pb provides improved machinability in line with the required specifications of substitutes regarding overall hot workability.

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

<http://rohs.exemptions.oeko.info/index.php?id=241>

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>

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

## Questions

1. The applicants EUROFER and EGGA have requested the renewal of Exemption No. 6a of Annex III, with the following proposed wording formulation:

*“Lead as an alloying element in steel for machining purposes and in batch hot dip galvanized steel items containing up to 0.35% lead by weight”*

- Do you agree with the scope of the exemption as proposed by the applicants?  
**No opinion as we feel the exemption can expire**
- Please suggest an alternative wording and explain your proposal, if you do not agree with the proposed exemption wording. **No opinion as we feel the exemption can expire**
- Please explain why you either support the applicant’s request or object to it.  
**Aware that all RoHS exemptions might not be reviewed at some point, we embarked on a program to extensively research and test alternate low carbon steel materials. This project started over three years ago and resulted in discovering steel grades and subtle changes to machining practices that result in minimal productivity reduction. We therefore support the discontinuation of exemption 6a allowing lead in steel for machining purposes. We feel the environmental benefits outweigh the slight cost increase. Our plan is to find creative ways to minimize and hopefully eliminate any cost increase. We also feel this position is the appropriate response to requests we received from a number of our customers for fastener product which is RoHS compliant without the use of any exemptions. However we do feel strongly that adequate transition time be provided, see response to question 9.**
- To support your views, please provide detailed technical argumentation / evidence in line with the criteria in Art. 5(1)(a). **We have found that we can run traditional grades of low carbon, rephosphorized, resulfurized, free machining steels nearly as efficiently as the 12L14 grade we have historically used. Additional details in responses below.**

-  Öko-Institut e.V.

2. Please describe in which applications steel containing Pb is used in EEE.

- Please provide an exhaustive list of applications and describe their typical characterisations. PennEngineering is a designer and manufacturer of specialty fasteners. See our product literature at the link below for an overview of our product. In particular, see bulletin K for fasteners used in EEE.

[http://www.pemnet.com/comp\\_lit\\_files/](http://www.pemnet.com/comp_lit_files/)

Please also specify the functionality of lead in these applications (e.g. specific function and properties, performance criteria, etc.). Some product geometry can be produced by forging in which case lead offers no advantage and leaded steel is not used. For geometry that cannot be forged, product is produced by machining from bar and leaded steel offers the following advantages in our machining environment.

- Slightly longer tool life leading to higher efficiency (less downtime)
- Better surface finish
- Slightly higher surface speed in some cases
- Slightly higher feed rate in some cases

- Please indicate how much Pb would be placed on the EU market through these applications per annum. If data is not available, please explain why and provide rough estimations. We currently use a little over 2,000,000 lb of UNS G12144 (12L14) leaded steel per year. At the nominal lead content of 0.25 % this is over 5,000 lb of lead per year. This amount is global, we estimate that approximately 25 % of our sales of leaded product goes to EEE in the EU.

3. Please provide data as to whether the 0.35% threshold of lead in steel can be reduced further for either galvanised applications or for machining purpose applications.

No input here, our interest is in machining only.

4. Please provide an exhaustive list of properties obtained through the intentional addition of Pb to steel alloys. For each property, please detail what performance indicators are or could be used to compare between Pb-based and Pb-free steel alloys and what range of performance is relevant for alloys falling under Ex. 6a. Our input here will be kept to a minimum because we are not arguing for an extension of exemption 6a. From our experience with lead in low carbon free-machining steel grades, the four most important comparison parameters are listed below.

- Surface finish
- Tool life
- Surface speed
- Feed rate

Values will vary with the machining conditions, but any comparison of steel grades under the same machining conditions will show the advantage of leaded steel in these parameters. In our machining environment we have found alternative steels that get us within 10 % of leaded steel performance.

5. Please provide information concerning possible substitutes or developments that may enable reduction, substitution or elimination, at present or in the future, of steel containing lead for machining purposes:

- In this regard, please provide information as to alternatives that may cover part or all of the applicability range of steel containing lead for machining purposes;
- Please provide quantitative data as to application specifications to support your view.

We are well aware that other elements such as bismuth, selenium, tellurium, tin and calcium have been used to replace lead. Of these, bismuth, selenium and tellurium are the most commercially viable. Because environmental legislation is constantly changing, and because there are some environmental concerns with selenium and tellurium, we stayed away from steels with these two elements out of concern about future restrictions. We are still open to bismuth steels, but there are concerns about price and availability of bismuth.

We focused on traditional grades such as 12L14, 11SMn30, and 11SMn37 because they are commercially available in the bar sizes we use and because we believe these grades will not be subject to future environmental restrictions.

We found that for most of our product, these grades can be run at the same surface footage and feed rates as 12L14 leaded steel with some reduction in efficiency. In the majority of cases the decreased efficiency is from more frequent tool changes driven by faster deterioration of the surface finish. We are making changes to tool materials and other subtle proprietary changes to minimize the loss of efficiency.

6. Please provide information as to research initiatives which are currently looking into the development of possible alternatives that could be applicable to part of to all of the application range of steel containing Pb for machining purposes.

- Please explain what part of the application range is of relevance for such initiatives (in what applications may substitution be possible in the future).
- 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.

As a fastener supplier development of new steel grades is outside of our capability. However, we do monitor the industry and try new grades when they become commercially available in the small bar sizes we use.

7. Please provide details on the batch galvanizing processes:

- Please provide information as to where recycled zinc with an unintentional content of Pb is typically obtained (what end-of-life applications?) to clarify how the lead is introduced.
- How do you expect the Pb content to decrease in the future as articles reach end-of-life, which have been manufactured after the RoHS and ELV Pb restrictions came into force?
- Can you provide information on the further development of the Pb content in recycled zinc ingots intended for use in EEE over the next 5 years?
- Please provide information on batch hot dip galvanization where Pb is still added intentionally.
  - i. If the intentional addition of Pb to batch galvanizing processes cannot currently be avoided please explain why and in what cases and specify the time frame for this change.

- ii. Please provide an estimation of the share of batch hot dipped galvanized applications where Pb is intentionally added and the share where Pb is present as an impurity of zinc.
- iii. What trends related to these shares are expected in light of technical process adaptations in the coming 5-10 years?

**No input here, our interest is in machining only.**

8. From the available information it is observed that there are differences related to the function of Pb and the reasons for its presence, in steel alloys where Pb is added intentionally and in steel alloys where it is not. A split of the exemption is thus to be considered, differentiating between steel alloys where Pb is not intentionally introduced and between steel alloys where Pb is added to obtain certain properties:

- Do you agree with such a split of the exemption? Please explain why you either support or reject it. To support your views, please provide detailed technical argumentation / evidence in line with the criteria in Art. 5(1)(a) to support your statement.
- Could the formulation additionally be specified relative to the dimensions or weight of batch galvanized steel components in which Pb is present, adding a size/weight threshold to the exemption formulation?

Please explain if the exemption for Pb where it is intentionally added as an alloying element in steel for machining purposes can further be specified in relation to the properties and performance ranges specified in Question 4?

**No opinion as we feel the exemption can expire**

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9. Are there any other aspects you deem to be of importance for the requested exemption?

**If the exemption is modified or eliminated we respectfully request the maximum transition period currently allowed by the EU RoHS Directive of 18 months. If possible, we request an even longer transition period. Most of our leaded steel fasteners are commercial of the shelf items sold through distribution. There is currently significant inventory of steel fasteners with up to 0.35 % lead content in the distribution channels that will be unacceptable to the vast majority of our customers if it is no longer RoHS compliant by exemption. Our customers will stop accepting non-complaint product many months before it becomes non-complaint in order for them to build their product and place it on the market before the exemption expiration date.**

**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!**

## **Contact Information:**

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