2nd Clarification Questionnaire Exemption Ex. No. 6(b)-II

Exemption for „Lead as an alloying element in aluminium for machining purposes with a lead content up to 0,4 % by weight“

Abbreviations and Definitions

EEE	Electrical and Electronic Equipment
RoHS	Directive 2011/65/EU on the Restriction of Hazardous Substances in Electrical and Electronic Equipment

Background

The Oeko-Institut has been appointed by the European Commission, within a framework contract[1], for the evaluation of applications for exemption from Directive 2011/65/EU (RoHS), to be listed in Annexes III and IV of the Directive.

Your organisations COCIR, HARTING Stiftung & Co and Pepperl + Fuchs AG on behalf of the “RoHS Umbrella Industry Project” (hereafter referred to as “Umbrella Project”) have submitted a request for the renewal of the above-mentioned exemption and further input following a set of first clarification questions.

Against the background that some contributions submitted during the stakeholder consultation[2] request not to renew the exemption or to narrow it to specific applications, we would like to ask you the following clarification questions.

Clarification Questions

1. European Aluminium manufacturers (European Aluminium and EURAL® GNUTTI S.p.A.) have provided contributions during the stakeholder consultation requesting not to renew exemption 6(b)-II. They have provided an overview that outlines the composition of lead-free and leaded aluminium alloys. This shows that bismuth is not used as a replacement, but that bismuth is present in leaded alloys in the same quantity that it is present in lead free alloys.

    a. Against this background, please provide examples where “the bismuth concentration must be increased (closer to the upper limit of the specification) to achieve suitable machinability performance.”

    The following are some examples where the alloy specification of the lead-free alloy indicates a higher bismuth content.

Alloy	Pb content (%)	Bi content (%)
2011	0.2-0.4	0.2-0.6

[1] The contract is implemented through Framework Contract No. ENV.B.3/FRA/2019/0017, led by Ramboll Deutschland GmbH.

[2] The contributions are published at: https://rohs.exemptions.oeko.info/index.php?id=357

2011 LF	max 0.05	0.5-1.5
6064	0.2-0.4	0.5-0.7
6064 LF	max 0.05	0.5-1.5
AA2007	0.8-1.00	max 0.2
2030*	max 0.05	0.2-1.5

*stated as the technical equivalent to the original AA2007 alloy

It can be seen from these examples, although there may be more, that a higher bismuth content is either required or permissible. Given the price of bismuth (Bismuth price is $6.6/kg compared with lead at $2/kg), it will not be added if there a cheaper additive will perform the same function.

The question of whether the upper limit of the specification is used can only be determined by elemental analysis, specific to an alloy batch. Generally, this is only known by the manufacturers of the alloy, as the only aspect communicated within the supply chain utilizing the alloy is that the alloy is conform to the desired standard.

b. Please also specify the parameter for the machinability performance of relevance to such applications.

The technical requirements which lead imparts are described in section 4b of the exemption renewal request. Machinability is not measured by a single characteristic, but rather a wide range of variables, which relate to material and its physical properties, as well as the operating conditions (e.g. machining process parameters, geometry etc.). As such a singular description of machinability is not able to be defined.

2. In your answers to the first set of clarification questions, you described the following three niche applications: Cast and machined aluminium gear boxes from handheld tools; charge holders for MEMS sensor applications and stand-offs and spacers to electrically connect parts, such as heat sinks, in medical equipment.

A first review of the descriptions revealed that:

a. Cast and machined aluminium gear boxes from handheld tools: the example refers to the use of the casting alloy EN-AC-46000-D-F. This alloy is not within the scope of exemption 6(b)-II as its lead content comes from lead-bearing scrap and is thus covered by exemption 6(b)-I.

Can we conclude that this application does not need to be further considered under exemption 6(b)-II? If not, please explain why.

In the exemption 6bII wording is: “Lead as an alloying element in aluminium for machining purposes with a lead content up to 0,4 % by weight”. This exemption has no reference to the source of the aluminium and only relates to the reason for lead addition into aluminium. If this particular application would be transferred to exemption 6bI, only recycled aluminium could be used in future. The real intention for addition of

lead will be lost and only the administrative workaround would make the product RoHS complaint.

If enough scrap is not available, which may be the case sometimes (e.g. during a boom), then only primary aluminium will be available. Downstream users of aluminium sheet, rod, bar etc. who produce gears and all other parts will not know whether primary or recycled metal was used and as such this needs to be included in 6(b)-II.

b. Charge holders for MEMS sensor applications: the alloy used is EN-AW 2007; according to the TEAL SHEETS[3] on International Alloy Designations and Chemical Composition Limits for Wrought Aluminum and Wrought Aluminum Alloys, this alloy contains lead in the range of 0.8 -1.5%, which is above the allowance specified in the Ex. 6b-II threshold of 0.4%.

   As use of this alloy is prohibited in EEE placed on the EU market through RoHS exemption 6(b)-II, can we conclude that this application does not need to be further considered? If not, please explain why.

   This particular charge holder is a fixture used for processing purpose in manufacturing processes and is not part of an electrical tool. As it is supplied to the end user as a standalone mechanical article it will not be in scope of the RoHS Directive and so we agree that it does not require this exemption.

c. Stand-offs and spacers to electrically connect parts, such as heat sinks, in medical equipment: In this case it is claimed that “Aluminium alloys that are not intended for machining such as 6061 are too brittle and risk cracking when bent for rivet bonding.

   A conclusion on this application could so far not be reached. Please provide further information on:

   - the aluminium alloy used in this application;
   - the substitutes tested so far;
   - the machining processes to produce the components and the critical machining parameters that make the presence of lead necessary.

A number of different alloy specifications are used for this, depending on the application in question, however the specific alloys in question we unable to identified at this point.

Currently, 6061 has been the focus of investigation into alternatives, however it has demonstrated insufficient deformation behaviour to allow the complex geometrical shapes to be achieved. The determination of whether an alternative is suitable is not made on the basis of key parameters, rather in-situ tests, where not only the geometrical tolerances are achieved, but the thermal conductivity and performance of the heat sinks is comparable. Without the technical equivalence, there will be implications for the weight and performance of the equipment.

Investigations have started considering copper with a plated coating as an alternative, however they are not readily available and require custom design at this point. Once

[3] https://www.aluminum.org/sites/default/files/Teal%20Sheet.pdf

a suitable alternative is identified recertification will be required to be undertaken by the MDR, which is estimated to take 1-2 years to complete.