EUROPEAN ALUMINIUM

Please find below the input from European Aluminium on the Exemption 2(c)-I of ELV Annex II - Aluminium alloys for machining purposes with a lead content up to 0,4 % by weight

European Aluminium represents the full aluminium value chain in Europe. Our 80+ members include primary aluminium producers; downstream manufacturers of extruded, rolled and cast aluminium; producers of recycled aluminium and national aluminium associations are representing more than 600 plants in 30 European countries. Aluminium products are used in a wide range of markets, including automotive, transport, high-tech engineering, building, construction and packaging.

FOREWORD:

Clarification of the exemptions of lead in aluminium in the ELV Directive

Currently, the ELV covers two exemptions for Lead in Aluminium Alloys:

• 2(c)(i). Aluminium alloys for machining purposes with a lead content up to 0,4 % by weight

• 2(c)(ii). Aluminium alloys not included in entry 2(c)(i) with a lead content up to 0,4 % by weight, which applies to aluminium alloys where lead is not intentionally introduced but is present due to the use of recycled aluminium.

The revision of 2 (c)(ii) "lead in aluminium alloys due to the use of recycled aluminium" is reviewed in 2024 and thus not within the revision presently at stake.

This is important as according to the targeted manufacturing processes, two categories of Aluminium alloys are used in the automotive industry, namely casting alloys and wrought alloys. Both categories of aluminium alloys differ in their raw material resources, production processes and required different percentages of alloying elements. This is in order to fulfil the required properties and functionality of the final product. It does not make sense to compare the alloy categories with each other. And it is crucial that these two exemptions are treated separately.

Main Aluminium alloy categories

1- Casting Aluminium alloys usually require a higher percentage of alloying elements when compared to wrought Aluminium alloys. Today, most of the end-of-life Aluminium scrap ends in casting alloys. Due to the longevity of aluminium products and higher lead limits in the past, different amount of lead is embedded in the scrap. In order to be able to continue to recycle end-of-life scrap and preserve the aluminium material loop in the most environmentally friendly way, it is important to allow to produce casting alloys with a certain level of Lead. This tolerated amount is 0,4% in the present ELV Directive exemption 2(c)(ii). It broadly reflects the global available material standards for recycled Aluminium. Nevertheless, there is a declining trend. The Aluminium industry has already reacted on this. The recent update of the standards EN 1676:2020 'Aluminium and Aluminium alloys. Alloyed ingots for remelting. Specifications' and EN 1706:2020 'Aluminium and Aluminium alloys - Castings - Chemical composition…' will support that move since alloy compositions have been revised with a maximum lead content reduced to 0,29%.

However, it is our understanding that this aspect is rather covered by exemption 2c(ii), which is not at stake now, but rather in the revision in 2024

2- Wrought aluminium alloys are used for rolled, extruded and forged parts (not for cast parts). Wrought aluminium alloys for machining purposes are mostly not manufactured using scrap deriving from end-of-life recycling aluminium, and when Lead is needed, it must be added intentionally. Lead has been used for technical reasons, mainly to give machinability properties to its alloys. Factories related to wrought aluminium alloys, in order to produce lead-containing alloys, are obliged to store and use pure lead metal, and the quantities are in the range of several hundred tons per month per factory. Pure lead metal can cause health problems for the workers, according to latest research and studies.

QUESTIONS:

1. **Please explain whether the use of lead in aluminium for machining purposes addressed under exemption 2(c)-I of the ELV Directive is still unavoidable so that Art. 4(2)(b)(ii) of the ELV Directive would justify the continuation of the exemption. In the last review of this exemption, it was found that aluminium for machining purposes still required 0.4 % of lead addition.**
    a. **Which lead-free aluminium alloys have become available meanwhile for machining purposes?**

Lead-free wrought aluminium alloys for machining purposes are globally available and Aluminium producers have developed lead-free alternatives with properties compatible with lead-containing alloys in use for any applications. Aluminium extruders started back in 1996 to develop alloys with high machinability which could replace the lead-containing ones. Now, thanks to the big experience accumulated during decades, there are in the market all possible lead-free alloys which could replace any kind of lead-containing alloy, for any end-use application, for all kind of families of alloys from 2000 series (Al-Cu based) to 6000 series (Al-Cu-Mg series). These alloys have been tested and approved by several major automotive brands worldwide, in all applications from brake parts and pistons, transmission valves, safety parts and components, whether used in high or low temperature environments, whether in contact with fluids, lubricants, coolants, whether anodized or not. All parts passed all the requirements also in terms of respecting tight tolerances, surface roughness, superficial aspect, anodizing response, mechanical properties. The aluminium industry is immediately able to supply any quantity needed of lead-free alloys.

A non-exhaustive list of Lead-free alloys i.e. containing a maximum lead content of 0.1% is: EN-AW 2007A, 2007B, 2028C, 2033, 2041, 2044, 2045, 2077, 6020, 6023, 6026 (*in its lead-free version '6026 LF')*, 6028, 6065, 6262A.

Most of them have either Tin (Sn), or Bismuth (Bi), or a combination of both. Sn and Bi are low-melting elements which facilitate machinability. All existing lead-containing alloys with lead limited to 0,4% max (as per actual ELV limit) have Bi in combination; new Bi-only alloys do not have more Bi than lead-containing alloys, so the total quantity of Bi between lead-free alloys and non-lead-free alloys remains the same. It is important to underline that some wrought alloys for machining purposes containing Pb only, without Sn or Bi, have a content of Pb ≥ 0,4% (see

EN 573-3), e.g. 2007 (min 0,8 - max 1,5%) , 6262 (min 0,4 - max 0,7%), 6012 (min 0,4 max 2,0%), and therefore they are already unacceptable according to current ELV limits.

b. **For which machined applications can they be used?**

Lead-free wrought aluminium alloys are intended and already used for many automotive parts. As example: brake parts and pistons, transmission valves, safety parts and components, whether used in high or low temperature environments, whether in contact with fluids, lubricants, coolants. They can also be anodized after machining.

c. **Can the content of lead be reduced for machining applications where lead-free Al is not viable or available?**

As stated above, lead free wrought aluminium alloys are available, they have been tested and approved in all applications where led-containing alloys were used by major automotive brands worldwide. Aluminium industry is able to support a phase-off of lead-containing wrought aluminium alloys already now. How fast the phase-off could be, depends only on the downstream.

2. **Please explain the efforts your organisation has undertaken to find and implement the use of lead-free alternatives for automotive uses. Please refer to alternatives, which at least reduce the amount of lead applied or eliminate its necessity altogether.**

Please note that this response only applies to wrought aluminium alloys for machining purposes, exemption 2(c)(i):

All aluminium extruders worldwide developed the wrought aluminium alloys listed under question nr 1. Those alloys are sold and largely used as replacement of lead-containing alloys since several years. Some OEMs already qualified several of these alloys and some OEMs are still busy with this process. It is important to underline that the development of these alloys has been possible also thanks to the availability of certain OEMs who tested the alloys and suggested and oriented the appropriate corrections which determined the success of latest lead-free alloys.

3. **Please provide a roadmap specifying the necessary steps/achievements in research and development including a time scale for the substitution or elimination of lead in this exemption.**

Please note that this response only applies to wrought aluminium alloys for machining purposes, exemption 2(c)(i):

Lead-free wrought aluminium alloys are already globally available and used by several OEMs. We acknowledge that the car industry needs time to adapt and qualify these new alloys. We are not experts in the details of the development cycles, we prefer not to give a timeline.

4. **Aluminium (Al) used in vehicles may consist at least partially from recycled aluminium, which contains lead (Pb) that was not intentionally added. This required the exemption**

to allow a Pb content of around 0.4 % to enable the use of recycled aluminium even where it is not required, in particular in cast aluminium. In the last review[2], ACEA et al. expected that the Pb content in scrap aluminium (Al) will gradually decrease from around 0.4 % in 2010 to around 0.2 % in 2023.

a. **Can you confirm this trend, or do you have substantiated different figures indicating a different trend? What is the actual lead content in Al scrap?**

This question is not relevant for the exemption for machining alloys 2(c)(i).

As explained in the foreword, our understanding is that unintentionally lead additions in casting alloys, due to the use of lead-containing aluminium scrap, is covered by exemption 2c(ii) and this exemption should be reviewed in 2024.

Therefore, the figures referred to in the above question will be evaluated in detail in a few years, as part of the review of entry 2 c (ii). However, we would like to underline that the 'Lead content of 0.2 % in aluminium scrap in 2023' announced by ACEA et al. during the last review, is too optimistic. The next step we see is rather 0,3% and should be supported by the recent update of standards EN 1676:2020 'Aluminium and Aluminium alloys. Alloyed ingots for remelting. Specifications' and EN 1706:2020 'Aluminium and Aluminium alloys - Castings - Chemical composition…' where alloy compositions have been revised with a maximum lead content reduced to 0,29%.

b. **Contaminations in aluminium, for example from shredded end-of-life vehicles, cannot be removed as easily as contaminations from precious metals and copper fractions. Al scrap therefore is diluted with more or less primary Al regularly to achieve the aspired purity and quality of the Al material. The Pb content in secondary Al produced from (diluted) Al scrap must therefore be lower than in the Al scrap. What is the current content of lead in secondary aluminium?**

This question is not relevant for the exemption for machining alloys 2(c)(i), but only for the exemption for aluminium for casting applications (2(c)(ii) that will be revised in 2024

Giving an average lead content in secondary/recycled aluminium is not relevant since each incoming batch is different, it varies depending on market situation, and therefore requires a different level of dilution or lead addition for lead-containing alloys that are still sold today.

As a correction to the above question 4 b: The aluminium industry does its best to avoid the need for dilution by keeping scrap separated as much as possible. And when dilution is needed, it can be done not only with primary aluminium but also with other scrap sources which are not containing lead.

5. **What is the amount of lead that would be contained in in vehicles?**
    a. **placed on the EU market**
    b. **worldwide**

   in case the exemption is continued? Please provide a rough calculation or substantiated estimate.

European Aluminium is not able to reply to this question. (ACEA and CLEPA have better data)

6. **Overall, please let us know whether you agree with the necessity to continue the exemption and sum up your arguments for or against the continuation.**

New Lead-free wrought aluminium alloys (i.e. max lead content of 0.1%) for machining purpose have been made globally available on the market since the last consultation, opening the path towards phasing out intentional additions of Lead in Aluminium, with first cases of successful substitution in the automotive sector already happening. The aluminium industry is ready to give any support its customers need to replace the lead-containing wrought aluminium alloys. However, to enable necessary validation and parts' development regarding functional and safety requirements, we understand that the automotive industry needs a phase out time and can support this if the objective is to completely phase out the lead-containing wrought aluminium alloys.

Our experts are ready to supply any additional information that would be required.

ANNEX:

Correlation with RoHS and REACH

The European Commission released during July 2014 the paper "REACH and Directive 2011/65/EU (RoHS) a common understanding[1]". Such paper acknowledged the potential overlaps that could arise when one instrument already regulates a substance and an initiative is launched under the other in relation to the same substance; this being the case for lead[2] that was added to the candidate list of Substances of Very High

[1] REACH and Directive 2011/65/EU (RoHS) a Common Understanding (Ref. Ares(2014)2334574 - 14/07/2014) Retrieved from: http://ec.europa.eu/DocsRoom/documents/5804/attachments/1/translations

[2] 10 new substances added to the Candidate List. (ECHA, 2018). Retrieved from: https://echa.europa.eu/es/-/ten-new-substances-added-to-the-candidate-list

Concern (SVHC) under REACH on 27 June 2018. It is therefore complicated for industry stakeholders to follow through with all the developments in the field of RoHS, in the context of REACH and on occupational exposure[3].

It gets even more complicated when it is the case of two vertical pieces of legislation such as RoHS (Directive 2011/65/EU) and ELV (Directive 2000/53/EC) that both list restricted substances. For the case of RoHS under its Annex III and for the case of ELV Article 4(2)(a) and Annex II.

An undetermined amount of parts must comply both with RoHS and ELV, and as both Directives are made with the same aim to limit toxic elements, they both shall arrive to the same conclusions. European Aluminium reports a big confusion in the market, industry is not precisely aware of the indications, mixing-up between exemptions, their expirations and renewals. As on the year 2018 for RoHS the Commission determined an expiration date of May 18 2021 for Exemption 6(b)-II regarding lead for machining purposes, we warmly suggest to proceed with an expiration for the exemption 2(c)-I, with a timing that the Commission will decide taking into consideration all parts involved.

Moreover, REACH Regulation will likely forbid the production of aluminium with a lead content higher than 0.3% sometime around 2025-2026, so for European Companies it will be impossible to produce nor use such alloys any further. Please take into consideration that if the future goal is to reduce Pb to max 0,1% w/w, for wrought alloys for machining purposes, an intermediate step of 0,3% would only double the costs of developments, as it would be necessary to start tests for new alloys (as old modified alloys are scientifically new alloys), new tests, and time would not be enough. So, from the wrought alloys for machining purposes producers' point of view, a reduction to 0,3% in the 2(c)(i) exemption is pointless, we suggest reducing directly to 0,1%.

[3] ECHA to provide recommendations for occupational exposure limits. (ECHA, 2019). Retrieved from: https://echa.europa.eu/-/echa-to-provide-recommendations-for-occupational-exposure-limits