

Consultation Questionnaire Exemptions 6(a) and 6(a)(I) of RoHS Annex III

Table 1 shows the current wording of the exemptions on Annex III of the RoHS Directive.

Table 1: Currently valid wordings of exemptions III-6(a) and III-6(a)(I)

No.	Current exemption wording	Current scope and dates of applicability
III-6(a)	Lead as an alloying element in steel for machining purposes and in galvanised steel containing up to 0,35 % lead by weight	Applies to categories 8, 9 and 11. Expires on <ul style="list-style-type: none"> - 21 July 2021 for cat. 8 other than in-vitro diagnostic medical devices, and cat. 9 other than industrial monitoring and control instruments - 21 July 2023 for category 8 in-vitro diagnostic medical devices - 21 July 2024 for category 9 industrial monitoring and control instruments, and for category 11
III-6(a)(I)	Lead as an alloying element in steel for machining purposes containing up to 0,35 % lead by weight and in batch hot dip galvanised steel components containing up to 0,2 % lead by weight	Applies to categories 1 to 7 and 10 Expires on 21 July 2021 for categories 1 to 7 and 10.

ACRONYMS AND DEFINITIONS

COM European Commission

EEE Electrical and electronic equipment

IMCI Industrial monitoring and control instruments

1. Background and objectives of this review

Bio Innovation Service, UNITAR-SCYCLE and Fraunhofer IZM have been appointed¹ by the European Commission for the evaluation of applications for new exemptions and the renewal of exemptions currently listed in Annexes III and IV of the RoHS Directive 2011/65/EU.

EUROMOT and TMC requested the renewal of exemption 6(a) with its current wording for the maximum validity periods for cat. 11 and cat. 9 industrial monitoring and control instruments (IMCI). The National Association of Manufacturers (NAM) support EUROMOT's request. The applicants were requested to respond to clarification questionnaires prior to this stakeholder consultation to provide missing information. These questionnaires, along with the exemption applications, and – if submitted - supporting evidence from other stakeholders, are accessible on the consultation web page².

The stakeholder consultation is part of the review process for the exemption request at hand. It addresses third parties – not the applicants – to provide and to evaluate information and evidence according to the criteria listed in Art. 5(1)(a) of Directive 2011/65/EU.³

Exemptions 6(a) and 6(a)(I) were reviewed by Baron et al. (2022)⁴ resulting in the below recommendation.

¹ It is implemented through the specific contract 070201/2020/832829/ENV.B.3 under the Framework contract ENV.B.3/FRA/2019/0017

² Consultation web page: <https://rohs.biois.eu/requests2.html>

³ Directive 2011/65/EU (RoHS) available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32011L0065:EN:NOT>

⁴ C.f. Öko-Institut, https://rohs.exemptions.oeko.info/fileadmin/user_upload/RoHS_Pack_22/RoHS_Pack-22_final_report_amended_February_2022.pdf

Table 2: Proposed renewal of exemptions 6(a) and 6(a)(I) in the last review in 2022

Exemption formulation	Duration
6(a): Lead as an alloying element in steel for machining purposes containing up to 0,35 % lead by weight and in galvanized steel containing up to 0,35 % lead by weight	<ul style="list-style-type: none"> – 21 July 2023 for category 8 in vitro diagnostic medical devices; – 21 July 2024 for category 9 industrial monitoring and control instruments, and for category 11.
6(a)-I: Lead as an alloying element in steel for machining purposes containing up to 0,35 % lead by weight	Expires on 21 July 2024 for all categories
6(a)-II: Lead in batch hot dip galvanised steel components containing up to 0,2 % lead by weight	Expires on 21 July 2026 for all categories

Source: Baron et al. (2022)

The European Commission (COM) have not yet officially published their decision as to the adoption of the above recommendation. The COM wishes the consultants to assess in this current review round whether there are any substantial reasons in line with Art. 5(1)(a) against the adoption of the above recommendation for EEE of categories 8, 9 and 11 (RoHS Annex I). This implies that the consultants will assess whether the validities of exemptions whose renewal is requested for cat. 8, 9 or 11 may exceed the validities recommended in the previous review (Table 2). Table 3 reflects the potential scope and wording if the exemptions are renewed for cat. 9 industrial monitoring and control instruments (IMCI) and for cat. 11.

Table 3: Renewal of exemption 6(a)-series for cat. 9 IMCI and cat. 11

No.	Exemption	Scope and dates of applicability
III-6(a)	Lead as an alloying element in steel for machining purposes and in galvanised steel containing up to 0,35 % lead by weight	<p>Applies to categories 8, 9 and 11.</p> <p>Expires on</p> <ul style="list-style-type: none"> - 21 July 2023 for category 8 in-vitro diagnostic medical devices - 21 July 2024 for category 9 industrial monitoring and control instruments, and for category 11
III-6(a)(I)	Lead as an alloying element in steel for machining purposes containing up to 0,35 % lead by weight	<p>Applies to categories 1 to 11.</p> <p>Expires on</p> <ul style="list-style-type: none"> - 21 July (2024+A) for cat. 9 industrial monitoring and control instruments - 21 July (2024+ C) for cat. 11 - 21 July 2024 for all other categories

III-6(a)(II)	Lead in batch hot dip galvanised steel components containing up to 0,2 % lead by weight	Applies to categories 1 to 11. Expires on - 21 July (2026 + B) for cat. 9 industrial monitoring and control instruments - 21 July (2026 + D) for cat. 11 - 21 July 2026 for all other categories
--------------	---	--

A can range between 0 and 7 years.

B and C can range between 0 and 5 years.

D can range between 0 and 3 years.

To contribute to this stakeholder consultation, please answer the below questions until 11 December 2023.

Please also see the applicants' request form and clarification questionnaire response and – if submitted – further information on the consultation web page⁵.

2. Questions

- 1) In their answers to the clarification questionnaire EUROMOT agree that exemption 6(a)(I) would cover their applications of lead in EEE of cat. 11 provided that the exemption would remain valid for five years, i.e. until 2029. They further on state that no additional time is to be permitted for exemption 6(a)(II) so that it can expire in 2026 for cat. 11.
 - a. In case you do not agree to EUROMOT's above conclusions, please support your views with detailed technical argumentation / evidence in line with the criteria in Art. 5(1)(a).

The use/presence of lead in galvanised steel is not addressed the renewal applications made by either EUROMOT or TMC. We strongly disagree that “no additional time is to be permitted for exemption 6(a)(II) so that it can expire in 2026 for cat. 11” and we understand that this was not the intention of these Pack 27 renewal applications. The technical situation for lead in galvanized steel is largely unchanged from the situation reviewed by Baron et al (2022) and it would be the intention of the Umbrella Project to seek to further renew this Exemption 6(a)(II) dependent on the timing of the Commission response to the current application. That application would likely include all categories, including 9 and 11. In fact, Category 11 is the most relevant for the exemption 6(a)(II).

UP (Umbrella Project) Exemption #6a WG Participants' proposal is that all EEE Categories and subcategories covered under Ex. 6(a) (all Cat. 8, Cat. 9 and Cat 11 EEE

⁵ Consultation web page: <https://rohs.biois.eu/requests2.html>

Categories and subcategories under scope of Ex. 6(a)) would be merged into Ex. 6(a)-I in the future (which would then be valid for All EEE Categories and subcategories 1-11), with the following proposed wording for All EEE Categories and subcategories 1-11 “Lead as an alloying element in steel for machining purposes containing up to 0,35 % lead by weight and in batch hot dip galvanised teel components containing up to 0,2 % lead by weight”.

b. Do you agree that that exemption is required for cat. 11 for another five years until 2029? Please provide arguments and evidence for your opinion.

We could support the consultant proposal in Table 3 which reflects the potential scope and wording of the renewed exemptions for cat. 9 industrial monitoring and control instruments and for cat. 11. However, we would support an extension also of all the other categories as the already requested wording and requests the maximum validity periods foreseen in the RoHS 2 Directive (which means 7 years for Cat. 8 and Cat. 9 EEE and 5 years for all other categories).

Recommendation Oeko-Institut		Recommendation RoHS Umbrella Project
Recommendation	Expiry date & scope	6(a)/6(a)-I: “Lead as an alloying element in steel for machining purposes containing up to 0,35 % lead by weight and in batch hot dip galvanised steel components containing up to 0,2 % lead by weight.” Expires on: – 21 July 2026 for category 1-7 and 10 – 21 July 2028 for category 8 and 9 (other than in vitro and industrial) – 21 July 2030 for category 8 in vitro – 21 July 2031 for category 9 industrial – 21 July 2029 for category 11
6(a): Lead as an alloying element in steel for machining purposes containing up to 0,35 % lead by weight and in galvanized steel containing up to 0,35 % lead by weight	– 21 July 2023 for category 8 in vitro diagnostic medical devices; – 21 July 2024 for category 9 industrial monitoring and control instruments, and for category 11	
6(a)-I: Lead as an alloying element in steel for machining purposes containing up to 0,35 % lead by weight	Expires on 21 July 2024 for all categories	
6(a)-II: Lead as an alloying element in batch hot dip galvanised steel components containing up to 0,2 % lead by weight	Expires on 21 July 2026 for all categories	
Justification/Explanation RoHS Umbrella Project		
<ul style="list-style-type: none"> UP proposal: „Old“ 6(a) (broader scope and higher concentration limits for galvanized steel) is merged into renewed 6(a)-I (narrower scope and lower concentration limits for batch galvanized steel) for all categories. Oeko recommendation: Splitting the exemption would generate administrative burden with no benefit for the environment or human health. Key point: Shorter renewal period for lead in machining steels will give inadequate time for collation of additional information and/or further experience of substitution. 		

The reason for that is described in the applicant’s description for requested exemption and it is mainly related to the substitution issue on which UP are still working and need additional time to conduct and finalise researches. Machinability enhancing additives (lead, bismuth, increased sulfur, sulfuric telluride, tin, phosphorus and calcium) were tested in three different steels in a project in the early 2000s. The findings are summarised with a focus on bismuth and are presented in aggregated form in the application. It is concluded that lead is preferred in regards to higher production rates, reduced cutting forces, lower tool wear rates, more finely broken chip morphology and improved surface finish; bismuth being the best available substitute so far does not show the same hot workability, which makes it only a theoretical substitute. The aspect

of “hot workability” is most important. The UP application considers environmental implications of bismuth. The LCA provided by Nuss and Eckelmann (2014) comparing impacts at the life cycle stages mining, purification, and refining of different metals is provided to support the argumentation against bismuth and for lead. Furthermore, an LCA on environmental impacts of leaded and non-leaded low carbon free cutting steels including energy used during machining was provided with the application (Coleman et al. 2015). The system boundaries include raw material extraction and production, steel manufacturing, component machining and electricity production. The study concludes that “for the part considered in the machining trials the global warming potential of the final part was ~9% lower for the leaded steel compared to a non-leaded steel”. Thus, in general, lead-free steels require less energy mainly in component machining, no quantified conclusions can be drawn for steel objects that have not been tested.

c. Are you aware of lead-free substitutes being used in EEE of cat. 11 in applications that are in the scope of the requested exemption?

Not only for substitutes used in cat. 11, but used in general, the UP (Umbrella Project) Exemption #6a WG Participants do not have enough information so far for instance on 11SMn30-EM + C as a possible alternative, so we cannot conclude if it can be used for all specific applications.

However, we know that machining operations account for a large proportion of the cost breakdown of the manufacture of steel components for automobiles. For decades, low levels of lead (<0,35%) have been added to many free cutting steels and some heat treatable engineering steels to improve machinability. However, during the last years a lot of efforts have been carried out in order to obtain an alternative to lead that is technically and commercially viable.

For free cutting steels and engineering steels requiring machinability improvement, some attempts at increasing the sulphur, calcium or tin contents and reducing the lead content have been performed; however, non-lead alternative grades have given poorer chip form and surface finish ⁶.

Between different alternatives, bismuth has been able to substitute for lead under certain conditions, although the reduced hot ductility and the increased cost of Bi addition may make it uneconomic, particularly for large scale application⁶.

Since 2014, Bismuth is considered one of the 30 critical raw materials, whose sustainable supply is one of the pre-requisites to achieve climate neutrality, adopted by European Green Deal Communication in 2019⁷. Furthermore, bismuth will imminently be listed as one of 11 a ‘strategic raw materials’ in Annex I of the EC Critical Raw Materials Act⁸. That Act requires Member States to substitute bismuth as part of the efforts to conserve those materials. This is the main reason why bismuth can’t replace

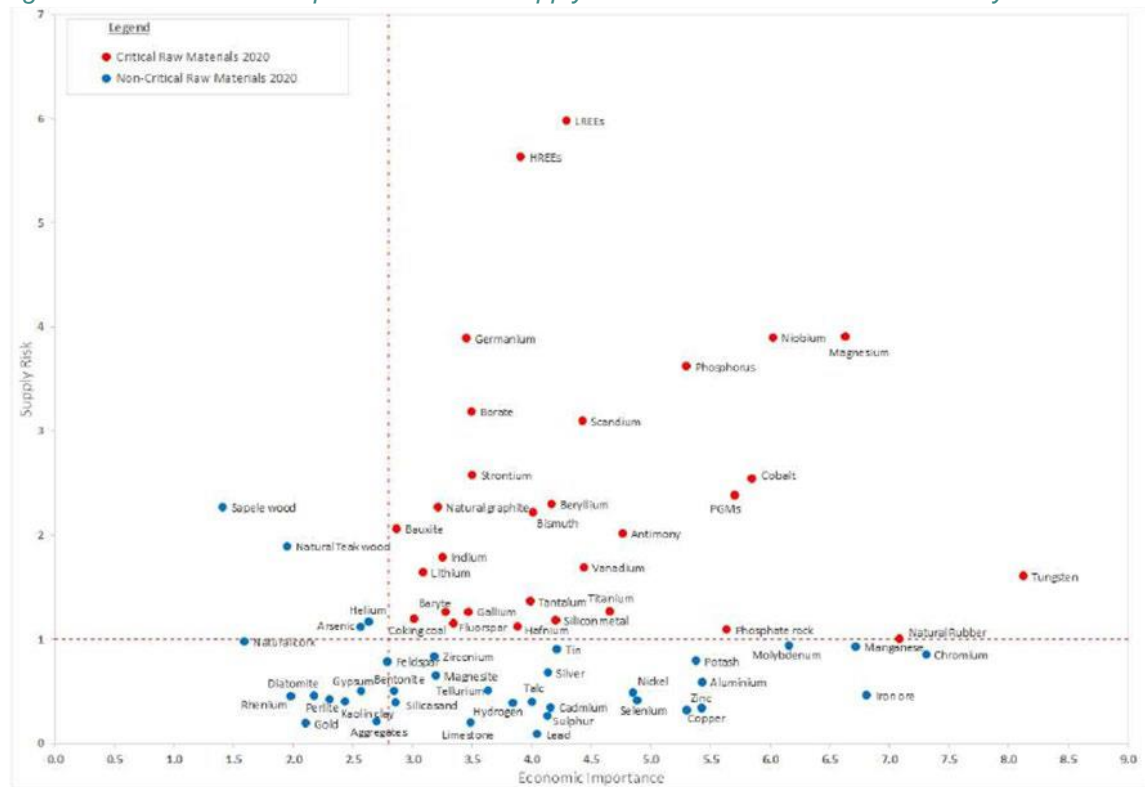
⁶ RFCS Contract No 7210-PR/306 « Technically and commercially viable alternatives to lead as machinability enhancers in steel used for automotive components manufacture »

⁷ European Commission, 2020, « Study on the EU’s list of Critical Raw Materials »

⁸ Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) 168/2013, (EU) 2018/858, 2018/1724 and (EU) 2019/1020

lead for the whole global production of free cutting steels and engineering steels with improved machinability^{9,10}.

Figure 1. Economic importance and supply risk results of 2020 criticality assessment



UP (Umbrella Project) Exemption #6a WG Participants inform that there is a link to the EU funded research projects and its final report is:

<https://op.europa.eu/en/publication-detail/-/publication/6b46dd1c-5944-48d7-8c4c-e009d62ca1ba>. The report can be freely downloaded from the link above.

Aim of the study is to investigate technically and commercially viable alternatives to lead in free cutting and engineering steel grades.

Conclusion of the study states that "This work has confirmed that leaded steels have generally shown the best performance in tests at lower cutting speeds with high-speed steel tools and in deep hole drilling. Non-leaded alternative grades generally gave poorer chip form and surface finish. It has been shown that, of the alternatives, bismuth is able to substitute for lead under certain conditions, although the cost of the addition may make it uneconomic, particularly for large-scale application. Calcium can also substitute in C45 steels for use at higher cutting speeds. Steels containing tin generally

⁹ ECSC Research Contract 7210. MA/408 « free-machining steels substitutive of leaded steels » CSM S.p.A. Italy.

¹⁰ European Commission, 2017, « Study on the review of the list of Critical Raw Materials »

did not show good performance. The alternative grades generally showed equivalent fatigue performance to the leaded grades. “

2) TMC claim that the recommendations of Baron et al. (2022) in Table 2 which are specified in Table 3 are not applicable to cat. 9 IMCI. It is understood that this disagreement refers to the exemption wordings regardless of the potential renewal period, and that the arguments against the adoption of exemptions 6(a)(I) and 6(a)(II) are at least partially based on additional administrative burdens which this may cause.

From the technical perspective, compared to exemption 6(a) the proposed exemption 6(a)(I) does not restrict the scope for lead in steel for machining purposes. Restrictions apply to galvanised steel in exemption 6(a)(II), which limits the scope to batch hot dip galvanised steel and reduces the maximum allowed lead concentration to 0.2 % down from 0.35 % in exemption 6(a).

- a. Since the use of lead in galvanised steel is not mentioned in TMC’s renewal request, the question arises whether it is relevant for cat. 9 IMCI. Please comment.

As identified during the review by Baron et al (2022), it is possible that galvanized steel containing lead is used in industrial monitoring equipment. Galvanized steel components such as fasteners are difficult to track through the supply chain as they are used for a wide variety of applications and are delivered from stock that is not specific to WEEE categories.

- b. If galvanised steel is relevant for cat. 9 IMCI, is exemption 6(b)(II) technically applicable to cat. 9 IMCI?

Yes

- c. If it is applicable, can exemption 6(b)(II) expire on 21 July 2026 for cat. 9 IMCI like in the case of cat. 11?

No (see above remarks within question 1)).

3) Are you aware of lead-free substitutes that are used in cat. 9 industrial monitoring and control instruments?

4) TMC provided a socioeconomic analysis related to lead in steel for machining purposes, i.e. lead in galvanised steel is not addressed. The document is available online in the consultation folder for this exemption.

Do you agree with the underlying method, data and conclusions?

We again emphasize that the use of lead in galvanised steel is not addressed by TMC because it is outside the scope of their application. The absence of a socioeconomic analysis in this application should not prejudice the conclusions of Baron et al (2022).

5) Is there any additional information which you would like to provide?

No

Please note that answers to these questions can be published on the stakeholder consultation website and in the review report. If your answers contain confidential information, please provide a version that can be made public along with a confidential version, in which proprietary information is clearly marked.

Please do not forget to provide your contact details (Name, Organisation, e-mail and phone number) so that the project team can contact you in case there are questions concerning your contribution.

It would be helpful for the review process if you could kindly provide the information in formats that allow copying text, figures and tables to be included in the review report.