Consultation Questionnaire Exemption 8(g)(ii) of ELV Annex II

Table 1: Current wording, scope and expiry date of the exemption 8(g)(ii)

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| No. | Exemption | Scope and dates of applicability |
| 8(g)(ii) | Lead in solders to complete a viable electrical connection between the semiconductor die and the carrier within integrated circuit flip chip packages where that electrical connection consists of any of the following:  (1) a semiconductor technology node of 90 nm or larger;  (2) a single die of 300 mm2 or larger in any semiconductor technology node;  (3) stacked die packages with dies of 300 mm2 or larger, or silicon interposers of 300mm2 or larger. | Vehicles type-approved from 1 October 2022 and spare parts for these vehicles.  This exemption shall be reviewed in 2024. |

# Acronyms and Definitions

EEE Electrical and electronic equipment

ELV Directive 2000/53/EC on end-of-life vehicles

FCP Flip chip package

Lead-free Not containing lead in the application(s) in scope of the exemption to be reviewed

Pb Lead

RoHS Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment

# Background

Bio Innovation Service, UNITAR and Fraunhofer IZM have been appointed[[1]](#footnote-2) by the European Commission for the evaluation of applications for new exemptions and the renewal/continuation of exemptions currently listed in Annex II of the ELV Directive 2000/53/EC.

This questionnaire has been prepared for the stakeholder consultation held as part of the evaluation. The objective of this consultation is to collect information and evidence for subsequent review to assess whether the exemption is still justified according to the criteria listed in Art. (4)(2)(b)(ii) of Directive 2000/53/EC (ELV Directive)[[2]](#footnote-3).

Additional background information can be found on the exemption review page accessible through the following link: [www.elv.biois.eu](http://www.elv.biois.eu)

**We welcome your contribution to this stakeholder consultation. We recommend reading the below section before you answer the questions.**

# Main Observations in Previous Reviews of Exemption 8(g)(ii) and Technically Equivalent Exemptions

Exemption 8(g) was reviewed[[3]](#footnote-4) last time in 2018 under the ELV Directive2, resulting in the adoption of exemptions 8(g)(i) and 8(g)(ii) in place of exemption 8(g). At the time, the consultants concluded that granting an exemption with a more narrow scope, in alignment with exemption 15(a) of RoHS Annex III [[4]](#footnote-5), would be in line with Art. 4(2)(b)(ii) of the ELV Directive. To allow the automotive industry to transition to the scope changes, it was recommended that the existing exemption was to remain valid for a transition period as exemption 8(g)(i) and to introduce exemption 8(g)(ii) with a more narrow scope in alignment with exemption 15(a) of RoHS Annex III, as reproduced in Table 1.

The consultants noted that, at the time, ACEA et al. had claimed the need to include certain high current flip chips on lead frames into the scope of the exemption. In the absence of evidence and of clear technical information that and why the use of lead was unavoidable in these components for automotive uses, the consultants at the time conclduded that Art. 4(2)(b)(II) did not allow them to recommend including these components into the scope of the future exemption.

Exemption 15(a) on Annex III of Directive 2011/65/EU (RoHS) is the equivalent to exemption 8(g)(ii) on Annex II under the ELV Directive. Exemption 15(a) was last reviewed [[5]](#footnote-6) by Deubzer et al. (2022). At the time, the consultants concluded that the applicants did not provide substantiated evidence that would allow the consultants to recommend the exemption renewal in line with the conditions for exemptions laid out in RoHS Art. 5(1)(a), i.e. it could not be clarified whether and how far substitution or elimination of lead were still scientifically and technically impracticable. It remained unclear why larger node (≥ 90 nm) flip chip packages were still used and intended to be used another five or seven years in new EEE placed on the EU market while smaller node lead-free alternatives had been available since 2007. For the other clauses of exemption 15(a), the applicants did not clarify whether and how far the technological state of the art would allow restricting the scopes of these exemption clauses, i.e. whether, how far and under which conditions dies larger than 300 mm² could be produced without the use of lead solders. For the stacked die FCPs, no conclusion was feasible whether and under which conditions the use of organic/plastics interposers instead of silicon interposers could support the substitution of lead and thus allow restricting the scope of this part of the exemption. The concultants therefore did not recommend a renewal of exemption 15(a) but recommended a transition period of 12 months before its expiration. To date, the European Commission has not yet published a decision on the adoption of this recommendation.

# Questions

1. Are FCPs in scope of exemption 8(g)(ii) still used today in newly designed electronic systems employed in vehicles in scope of the ELV Directive? In your response, please differentiate by the three sub-clauses of this exemption.
2. In which types of electronic systems in vehicles are FCPs in scope of this exemption still used today? Please provide a list of relevant systems, their functionality, the functionality provided by the FCPs, and reasoning as to why lead-containing FCPs are still needed for each application, differentiated by the three sub-clauses of exemption 8(g)(ii).
3. Modern passenger cars are said to contain between 1,000 and 3,000 semiconductor chips[[6]](#footnote-7). What share of those / how many of those are FCPs in scope of exemption 8(g)(ii), approximately? Which share of those make use of each sub-clause of ex. 8(g)(ii)?
4. The exemption only covers flip chip packages. For what reasons does the automotive industry require this particular package type and does not opt for an alternative type that does not require leaded solder?
5. Semiconductors fabricated with smaller than 90 nm technology nodes, that do not require lead in solders, have been available since at least 2007.
   1. Are there any technical reasons why > 90 nm FCPs are still used electronic systems in vehicles despite newer, lead-free semiconductors < 90 nm being available?
   2. In your view, to which degree is this an economic issue more than a technical issue? Please substantiate your response with arguments.
   3. Please name the companies that still manufacture the semiconductors that are used in FCPs under sub-clause 1 of this exemption.
6. As was stated by the applicant during the review process of ex. 15(a) under RoHS 5, *“New products introduced into the market in the last several years are assembled with Pb-free bumps even though the die size is greater than 300 mm2”*. In our view, this confirms that clause (2) and potentially clause (3) are no longer technically needed. Please share your view, substantiated with arguments.
7. For what reasons do stacked die packages use >300 mm2 silicon interposers – are there technical reasons why these are not fabricated using plastic / organic interposers which could facilitate the use of lead-free solders?
8. 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.
9. What is the amount of lead in the scope of exemption 8(g)(ii) that would be contained in vehicles
   1. placed on the EU market
   2. worldwide

in case the exemption is continued? Please provide an approximate calculation or substantiated estimate.

1. Overall, please let us know whether you agree with the necessity to continue the exemption and your arguments for or against the continuation.
2. Is there any other information you would like to provide?

# Your contact details

Name:

Entity:

E-mail:

Phone number:

**Please note that answers to these questions can be published in the stakeholder consultation, which is part of the evaluation of this request. 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 also add “CONFIDENTIAL” to the file name to prevent confusion.**

**We ask you to kindly provide the information in formats that allow copying text, figures and tables so that they can be included into questionnaires and the review report.**

1. It is implemented through the specific contract 070201/2020/832829/ENV.B.3 under the Framework contract ENV.B.3/FRA/2019/0017 [↑](#footnote-ref-2)
2. C.f. EUR-Lex, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L0053> [↑](#footnote-ref-3)
3. Gensch et al. (2019): Review in the light of scientific and technical progress of exemptions 8(e), 8(f)(b), 8(g) and 14 and re-evaluation of entry 8(j) of Annex II to Directive 2000/53/EC (ELV) (Pack 3). Available: <https://data.europa.eu/doi/10.2779/98707> [↑](#footnote-ref-4)
4. Exemption 15(a) on Annex III of Directive 2011/65/EU (RoHS): https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02011L0065-20230901#tocId35 [↑](#footnote-ref-5)
5. Deubzer et al. (2022): Study to assess requests for renewal of 12 exemptions to Annex III of Directive 2011/65/EU (Pack 23). Available: <https://data.europa.eu/doi/10.2779/507661> [↑](#footnote-ref-6)
6. E.g. <https://polarsemi.com/blog/blog-semiconductor-chips-in-a-car/> [↑](#footnote-ref-7)