

Clarification Questionnaire Exemption No. 5(b)

Exemption for „Lead in glass of fluorescent tubes not exceeding 0,2 % by weight “

Abbreviations and Definitions

CFL	Compact Fluorescent Lamps
EEE	Electrical and Electronic Equipment
LFL	Linear Fluorescent Lamps
TLED	It is assumed that TLED means LED tubes – this is not specified by LE
Pb	Lead
RoHS	Directive 2011/65/EU on the Restriction of Hazardous Substances in Electrical and Electronic Equipment
wt %	Weight percent

Background

The Oeko-Institut has been appointed by the European Commission, within a framework contract¹, 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 organisation (LightingEurope) has submitted a request for the renewal of the above-mentioned exemption, which has been subject to an initial evaluation. A summary of the main argumentation for justifying the request is provided below as a first basis to be used in the stakeholder consultation planned as part of this assessment.

Please read the summary of the argumentation provided to ensure that your line of argumentation has been understood correctly and provide answers to the questions that follow that address aspects requiring additional information and/or clarification.

1. Summary of argumentation of applicant on the justification of the exemption

1.1. Background

The current Formulation of exemption 5(b) in Annex III of the RoHS Directive is:

“Lead in glass of fluorescent tubes not exceeding 0,2 % by weight”

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

In 2015-2016, Oeko-Institut performed an assessment of exemption 5(b), initiated through the submission of a request for the renewal of the exemption by LightingEurope. The study (Gensch et al. 2016) recommended the renewal of this exemption for five years until 21 July 2021, with the same wording:

“Lead in glass of fluorescent tubes not exceeding 0,2 % by weight”

The revision of Annex III in relation to this exemption is still pending.

In January 2020, LightingEurope (2020) submitted a new application for the renewal of this exemption. LightingEurope requests the renewal of Ex. 5(b) for an additional 5 years, but proposes the following wording, with a view to extending the scope of the exemption:

*“Lead in glass of fluorescent tubes **and LED retrofit tubes (glass in lighting equipment)** not exceeding 0.2 % by weight”.*

1.1.1. Volume of lead to be placed on the EU market through the exemption

To estimate the amount of Pb to be placed on the EU market through this exemption, LightingEurope (2020) assumes an average Pb content of 500 ppm resulting from the recycled glass of old lamps. In 2022, 150 million fluorescent lamps will be placed on the EU-28 market per annum and about 50 million LED replacement lamps², with an average weight of 0.1 kg per lamp, of which the glass accounts for ca. 75 wt % (weight percent) per lamp “= 50.000 tons; hereof 0.05/0.2% lead”. It is roughly estimated that 8 tons of lead would enter the EU-28 market bound in lamp glass with 30 tons being the worst case, assuming all lamp glass would contain 0.2% lead (which is stated to be an unrealistic assumption).

1.2. Technical description

LightingEurope (2020) explains that lead (Pb) was used in the past for functional reasons in the production of glass for fluorescent tubes, and was contained in the glass at a concentration of up to 20%. Leaded glass is explained to have been easier to process in all steps of glass smelting and glass soldering, leading to lower failure amounts in the manufacture of fluorescent tubes. Pb, however, was successfully phased out and is no longer needed for functional purposes. Nonetheless, despite not being intentionally added, Pb is still present in the glass of fluorescent tubes due to the use of secondary glass recovered from the waste management of fluorescent tubes in the manufacture of new tubes. As this glass can contain differing amounts of Pb, a maximum content of 0.2 wt % Pb can be contained in the glass of fluorescent or LED retrofit tubes, though from internal measurements, most lamps do not exceed the threshold of 0.1 wt % in glass.

1.3. Applicant’s justification for the requested exemption

LightingEurope (2020) state that fluorescent lamps and LED retrofit tubes have a long lifetime. Seeing as lead in glass of fluorescent tubes was allowed in the EU until 2010 and is still allowed in most countries outside the EU (e.g. in China), lead-containing recycled glass can be expected to be available for the foreseeable long term, probably decades. Lead in the glass is said to be safe, as it will not leave the glass matrix under any circumstances.

² LightingEurope 2020 reference the VHK 2018 MELISA Model for this data.

1.3.1. Availability of alternatives

It can be understood that newly manufactured glass could be used as a substitute and would not have reliability limitations. The main argumentation is based on the environmental benefit of using recycled glass, resulting in the placing of Pb on the EU market through lamp glass.

1.3.2. Environmental and health arguments

According to LightingEurope (2020) the main justification for the exemption is that the use of recycled glass reduces the energy consumption required for glass production by significantly, as the recycled glass amount needs up to 30% less energy for manufacture. Typically, in a glass production plant, 30 - 40 % recycled glass is used, whereas technically up to 80% is estimated to be possible. However, such high amounts require the recycled glass be nearly identical to the produced glass. Thus, the main source for the recycled glass is mainly glass from lamp recycling. The lead content (as well as mercury content) is measured regularly in the glass production plant.

LightingEurope (2020) expects a large amount of fluorescent lighting installations to be replaced in the coming years in light of the transition to LED installations. This might lead to a temporary increase in the Pb content in recycled glass. The exemption is to allow the use of glass recovered from these installations to be used in the manufacture of special purpose fluorescent lamps or for glass tubes for TLEDs. LightingEurope express concern that the denial of the exemption could lead to the limitation of the use of recycled glass for lamp glass production and thus to wasted glass, as well as to higher costs for ongoing product conformity assessments.

2. Clarification Questions

Please find below the answers provided by LightingEurope.

1. LightingEurope request to extend the scope of the exemption to “LED retrofit tubes (glass in lighting equipment)”.
 - a. Please explain for what types of EEE this request is made and particularly what is understood to be included under the term lighting equipment.

LightingEurope believes that the term “lighting equipment” refers to RoHS Directive Annex I and covers products falling in Category 5. LightingEurope requests the exemption for lamps used in Category 5 EEE e.g. luminaires.

The exemption is intended for products and components (e.g. lamps) using soda lime glass as a material, using during the production process a fraction of recycled glass stream on top of virgin minerals. So far only “fluorescent tubes” are in the scope. Fluorescent tubes are used by products falling in the Annex III exemptions 1-3. LightingEurope considers the following lighting equipment to be included:

- glass in LED lamps where recycled glass can be used to increase resource efficiency
 - glass in luminaires containing fixed installed LED modules, replacing luminaires for fluorescent lamps, where recycled glass can be used to increase resource efficiency. In such cases lead is not intentionally added.
- b. If the exemption is necessary for other than the glass tubes of fluorescent lamps and glass tubes of LED retrofits for fluorescent lamps, please provide an exhaustive list of other components of relevance and elaborate the justification for such articles which are currently not further addressed in the renewal application.

We address this question in our response to question 1(a) above. Soda lime glass is used as a protective envelope for the fluorescent lamps and the LED retrofit lamps. The glass provides excellent electrical isolation in both lamp types and a vacuum tight container in the case of fluorescent lamps.

LightingEurope believes the exemption is important to fulfil increasing EU requirements for the use of recycled materials in new products, in the production process of glass added as a fraction to the virgin minerals stream, as well as to reduce energy consumption in glass production. Glass is used as a functional or decorative material in many luminaires, irrespective whether it is used stand-alone (Cat. 5) or as part of a Cat 1-11 products, e.g. in a kitchen hood.

2. LightingEurope mentions that “*The lamp glass used in low pressure discharge lamps is mainly soda-lime glass (soft glass)*”. Please specify whether the composition of glass of other articles to be added to the scope of this exemption is also typically soda lime glass.

With regard to “lead in glass of fluorescent tubes and LED retrofit tubes (glass in lighting equipment)”, to the knowledge of LightingEurope, only soda lime glass is used.

3. Annex XVII of Directive 2012/19 (WEEE recast) specifies components and materials that need to be “*removed from any separately collected WEEE*” and refers among others to mercury containing components and gas discharge lamps. This suggests that mercury containing fluorescent lamps and mercury-free LED retrofits for fluorescent lamps would be separated and subsequently also glass fractions derived of such treatment. Please provide information on the collection and treatment of articles falling under the scope of this exemption, to clarify if there are any differences in the waste management of fluorescent lamps, LED retrofits for fluorescent lamps and any other equipment to benefit from the exemption should its scope be extended.

We believe that depending on the system in place in the different EU countries, lamps are either collected and handled in the same waste stream or in other countries, there is a separation. During treatment fluorescent lamps are usually separated from LED lamps especially LED lamps containing plastic tubes and covers. Whether the glass fractions are separated depends on the recycling technology applied. Irrespective of the process:

- The same glass tubes, consisting of a fraction of recycling materials is used for new fluorescent lamps, as well as for LED lamp glass
 - Most LED lamps are produced outside the EU. In the production countries, the ban of lead in lamp glass was introduced later or is not yet in force. Recycled glass batches containing lead are used in the production of lamp glass in those countries and added as a fraction to the virgin minerals stream in a furnace, increasing the risk of lead content levels in final glass tubes. The exemption is necessary to avoid the unnecessary scrapping of products in accordance with circular economy principles. (see Image 1, in answer to question 4 as an example).
4. LightingEurope write that in “*section 7, some screenshots are provided of recycled glass exceeding the specified and contractually agreed lead content*”, however such images were not provided. Please provide such images and an explanation of how the use of recycled glass exceeding the Pb limit allowed in glass of lamps according to Ex. 5(b) is avoided.

This was an image of a measurement protocol of Pb content of incoming recycling glass fraction of a glass production site in Augsburg, Germany, which was used in the exemption renewal application

LightingEurope submitted in 2015. The image was deleted in our 2020 renewal application, as the production site has meanwhile been shut down. The reference to this image in our 2020 application is simply an oversight and we ask you to please ignore it, we should have deleted this phrase. In the interest of transparency and for reference only, we include the image below (Image 1).

To give another example, the test report from SGS that has been submitted confidentially and should not be shared, contains another test report for an incident with soda lime glass tubes used for TLED lamps. It illustrates that the lead content was 1418 ppm, and this glass lamp batch needed to be scrapped as the lead content was in this case > 1000 ppm. The reason for this was that a certain fraction of recycled glass (containing lead) is used in the glass furnaces production process.

Glass of legacy fluorescent products from recyclers does contain a certain lead content (see Image 1 included for reference only), which is commonly re-used and added as a certain fraction of recycled glass in the glass furnace for new soda lime glass production. This reuse of recycled materials favours the environment as it prevents landfilling. It can however result in a lead content between 1000-2000 ppm for certain batches of glass productions of an LED lamp glass that was manufactured with glass produced in a country/region with no or more recent lead restrictions.

In such a case, the complete molten content of the glass furnace is > 1000 ppm and cannot be used for TLED tubes and needs to be scrapped (tons of glass tubes for one furnace batch).

Therefore, we propose a higher lead content threshold of max 2000 ppm, as currently also valid for fluorescent lamp glass, which creates more opportunities and more room of operation for glass producers to use recycled glass fractions during glass production to avoid scrapping of glass tubes and/or LED lamps by lamp manufacturers in case the lead content is between 1000 and 2000 ppm.

Prüfbericht Nr.	CBO13-002157-1	Auftrag Nr.	CBO-00196-13	Datum	28.03.2013
Im Königswasser-Extrakt					
Elemente					
Elementübersicht					
Probe Nr.	13-033693-05				
Bezeichnung	Edsr - 25.02.2013 - 22.620				
Blei (Pb)	mg/kg	OS	2.600		
Blei (ber. als PbO)	mg/kg	OS	2.800		
Aus HF-HNO3-HCL-Mikrowellendruckaufschluss					
Probe Nr.	13-033693-05				
Bezeichnung	Edsr - 25.02.2013 - 22.620				
Blei (Pb)	mg/kg	3.060			

Prüfbericht Nr.	CBO13-002156-1	Auftrag Nr.	CBO-00196-13	Datum	28.03.2013
Im Königswasser-Extrakt					
Elemente					
Elementübersicht					
Probe Nr.	13-033693-04				
Bezeichnung	Edsr - 26.02.2013 - 21.260				
Blei (Pb)	mg/kg	OS	8.400		
Blei (ber. als PbO)	mg/kg	OS	9.000		
Aus HF-HNO3-HCL-Mikrowellendruckaufschluss					
Probe Nr.	13-033693-04				
Bezeichnung	Edsr - 26.02.2013 - 21.260				
Blei (Pb)	mg/kg	8.820			

Image 1 – Measurement protocol of Pb content from a former glass production site in Augsburg, Germany

In case parts of your contribution are confidential, please provide your contribution in two versions (public /confidential). Please also note, however, that requested exemptions cannot be granted based on confidential information!

Finally, please do not forget to provide your contact details (Name, Organisation, e-mail and phone number) so that Oeko-Institut can contact you in case there are questions concerning your contribution.

3. Literaturverzeichnis

Gensch, Carl-Otto; Baron, Yifaat; Blepp, Markus; Moch, Katja; Moritz, Susanne (2016): Study to assess renewal requests for 29 RoHS 2 Annex III exemptions [no. 1(a to e - lighting purpose), no. 1(f - special purpose), no. 2(a), no. 2(b)(3), no. 2(b)(4), no. 3, no. 4(a), no. 4(b), no. 4(c), no. 4(e), no. 4(f), no. 5(b), no. 6(a), no. 6(b), no. 6(c), no. 7(a), no. 7(c) - I, no. 7(c) - II, no. 7(c) - IV, no. 8(b), no. 9, no. 15, no. 18b, no. 21, no. 24, no. 29, no. 32, no. 34, no. 37] - Pack 9.
<http://rohs.exemptions.oeko.info/>. Unter Mitarbeit von O. Deubzer und A. Gibbs.

LightingEurope (2020): Request to renew Exemption 5(b) under Annex III of the RoHS Directive 2011/65/EU. Lead in glass of fluorescent tubes not exceeding 0.2 % by weight. Hg. v. LightingEurope.