



LIGHTINGEUROPE
THE VOICE OF THE LIGHTING INDUSTRY

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

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1 Name and contact details

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2 Reason for application

LightingEurope submits this application to: request for the renewal of existing exemption **no. 5(b) of Annex III**

LightingEurope proposes to use the proposed **new wording** which is: *Lead in glass of fluorescent tubes and LED retrofit tubes (glass in lighting equipment) not exceeding 0.2 % by weight*

LightingEurope requests a duration of Maximum validity period required

3 Summary of the exemption request

Per DIRECTIVE 2011/65/EU Article 5(2) Annex III Exemption 5(b) will expire automatically on 21/07/2016, unless an application for renewal has been made to the Commission in accordance with Annex V.

The present request concerns the extension of the current Annex III exemption 5(b): “Lead in glass of fluorescent tubes not exceeding 0.2% by weight” with a proposal for new wording to read:

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

In principle, lead in glass for fluorescent tubes has successfully been phased out by the lighting industry several years ago. Leaded glass in the past used to contain ca. 20 %

lead, added in form of PbO in the production process. Today in lamp glass production, no lead is added intentionally for any functional reason.

For glass production, recycled glass from end-of-life lamps is used today for new glass tubes. As this glass can contain differing amounts of lead, a maximum content of 0.2 wt% lead can be contained in the glass of fluorescent or LED retrofit tubes. According to internal measurements, by far most lamps do not exceed the threshold of 0.1% in glass. From time to time, this threshold can be slightly exceeded in some batches of lamp glass. Use of recycled glass significantly reduces energy consumption for glass production (30% for the recycled glass amount according to the experience of a LightingEurope member company). A lot of the very old lighting installations for fluorescent lamps will be replaced the coming years with new LED-based luminaires. This is partly because of the new environmental regulations and the sustainability drive in companies and governments and partly because of planned (building) renovation activities. Old fluorescent luminaires can only be replaced with new LED based luminaries from now on, since new fluorescent luminaires are no longer sold. We cannot judge how many old lamps with a high lead containing glass will be recycled. The lighting industry wants to be sustainable and be allowed to use this recycled glass in new products e.g. for special purpose fluorescent lamps or for glass tubes for TLEDs. The denial of the exemption could lead to the limitation of the use of recycled glass for lamp glass production and wasted glass that might otherwise have been used very well for lighting purposes, as well as to higher costs for ongoing product conformity assessments.

Fluorescent lamps and LED retrofit tubes have a long lifetime and as lead in glass of fluorescent tubes was allowed in the EU until 2010¹ and is still allowed in most countries outside the EU, e.g. in China, lead-containing recycled glass will be available for the

¹ Commission Decision 2010/571/EU of 24 September 2010

foreseeable long term, probably decades. This is especially valid if the lamp glass is produced outside the EU.

Lead in the glass is considered safe, as it will not leave the glass matrix under any circumstances.

The requested amount of lead is only minimally above the RoHS threshold limit for lead in homogenous materials.

For these reasons, an exemption for lead in glass of fluorescent tubes and LED retrofit tubes (glass in lighting equipment) not exceeding 0.2 % by weight is required with a maximum validity period and with no expiry date.

4 Technical description of the exemption request

4.1 Description of the lamps and their applications

4.1.1 *Lamps and applications covered by this exemption*

The exemption covers the lamp glass of fluorescent lamps and LED retrofit tubes (glass in lighting equipment).

Fluorescent lamps are low pressure discharge lamps in the scope of RoHS Directive as Annex I, category 5 products (see below). When electric current flows through the lamp bulb (i.e. the discharge tube), mercury atoms in a gas phase inside it are excited and produce UV radiation. This UV light is then converted into visible light by the fluorescent coating on the internal surface of the glass tube of the lamp bulb. The composition of the coating determines light colour and colour rendering. The lamp glass used in low pressure discharge lamps is mainly soda-lime glass (soft glass).

For LED retrofit lamps the glass has the following advantages: a high electrical isolation value, it is fully transparent, it has a good thermal resistance and it is available in high volumes. The glass can be recycled to a large percentage.

Lead has been added in fluorescent lamp glass production for decades in the form of PbO. The heavy metal compound has already been phased out in the last 10 years from production processes. Due to the use of recycled glass in the lamp glass production process, the glass tubes can be contaminated with minimum amounts of lead, so that the general RoHS limit of 0.1% limit may be exceeded slightly, up to 0.2%.

4.1.2 Annex I category covered by this exemption

List of relevant Annex I categories for this exemption

- 1 2 3 4 5
 6 7 8 9 10 11

Application in other categories, which the exemption request does not refer to:
not applicable

Equipment of category 8 and 9:
not applicable

The requested exemption will be applied in

- monitoring and control instruments in industry
- in-vitro diagnostics
- other medical devices or other monitoring and control instruments than those in industry

LightingEurope is of the opinion that lamps in general are category 5 because the majority are used for general illumination. However, they have some of the characteristics of components (used in luminaires), consumables (finite lifetime and regularly replaced) and spare parts (lamps in luminaires have to be replaced when they cease functioning). Some manufacturers of electrical equipment in other RoHS categories may install LED retrofit tubes or fluorescent lamps into their equipment for general illumination purposes and so they will need to use lamps that comply with the RoHS Directive, however the products that they place on the market are not category 5, but may be household appliances, medical devices or potentially in any RoHS category 1 - 11.

LightingEurope is aware of the difficulty to unambiguously classify certain lamps in the categories set out by the RoHS legislation. For lamp manufacturers it is essential to have legal certainty regarding the possibility to put the products on the market, irrespective of the planned application, as manufacturers are not able to control the use of the lamps in products falling in other categories in or out of the scope of RoHS. In practice, most lamps are installed in buildings for lighting applications (category 5). The way that lamps are used has no effect on lamp design so will not affect this exemption request.

4.2 Description of the substance

4.2.1 Substance covered by this exemption

LightingEurope is asking for exempting

Pb

Cd

Hg

Cr-VI

PBB

PBDE

4.2.2 Function of the substance in fluorescent and LED retrofit tubes

Lead in LED retrofit tubes (glass in lighting equipment) and glass of fluorescent tubes in amounts <0.2% has no intended or unintended function. It is a contamination from recycled glass used during glass production.

In the past, up to 20% lead in glass was used, added in form of lead oxide (PbO). Use of lead glass in lamps was standard technology for a long time. Leaded glass was much better processable in all steps of glass smelting and glass soldering, leading to lower failure amounts. Due to changes in the production processes, lead in glass is phased out already. The renewal of old fluorescent lamp installations might lead to a temporary increase in the lead content in recycled glass and it is to prepare for this that LightingEurope requests the renewal of this exemption.

4.2.3 Location of the substance

Lead can be found in the glass matrix of low pressure discharge lamps, if lead-contaminated recycling glass is used for glass production.

4.2.4 Amount of lead in LED retrofit tubes

The lead content in LED retrofit tubes (glass in lighting equipment) can be up to 0.2% if recycled glass is used in the glass production process.

The homogenous material is glass. Different glass parts in a lamp such as the tube or flare are considered by LightingEurope as different homogenous materials. Therefore, a higher content of lead in any separate glass part could not be set off against the sum of lead in all glass parts, but rather would result in non-conformity of the fluorescent lamp with the RoHS restriction.

Producers of lamp glass tubes are continuously monitoring the lead content in recycling glass. In section 7, some screenshots are provided of recycled glass exceeding the specified and contractually agreed lead content. These batches were not suitable for lamp glass production. Without the exemption, the specification for recycled glass regarding lead content would have to be changed leading to less energy savings.

The amount of intentionally added lead in applications benefiting from this exemption and entering the EU-28 market is **0 tons**. According to LightingEurope experience, on average across all low pressure discharge lamps, the legal threshold of 0.1% wt in homogenous material glass is not exceeded.

Theoretically, assuming a lead content of 500 ppm average resulting from the recycled glass of old lamps, roughly estimated 8 tons of lead would enter the EU-28 market bound in lamp glass. Worst case would be 30 tons, assuming an average content of 0.2% and if all lamps would have the 0.2%, but we know this is far from reality and therefore not a realistic assumption.

(Basis of the rough estimation: in 2022 150 Million fluorescent lamps will be put on the EU-28 market per year and about 50 Million LED replacement lamps (Melisa model 2018²), average 0,1 kg weight per lamp; ca. 75% average glass per lamp = 50.000 tons; hereof 0.05/0.2% lead)

4.2.5 Environmental assessments, LCAs

The lead is not added intentionally. LightingEurope is not aware of LCAs covering exactly this aspect of this exemption request.

Typically, in a glass production plant, 30 - 40 % recycled glass is used. Technically (and in theory) up to 80% is estimated to be possible. For such high amounts it is essential that the recycled glass is nearly identical to the produced glass. The main source for the recycled glass is therefore mainly glass from lamp recycling. The lead content (as well as mercury content) is measured regularly in the glass production plant.

² VHK, Model for European Light Sources Analysis (MELISA) (study commissioned by the European Commission), 25 October 2017.

5 Waste management

5.1 Waste streams

- Article is collected and sent without dismantling for recycling
- Article is collected and completely refurbished for reuse
- Article is collected and dismantled:
 - The following parts are refurbished for use as spare parts: _____
 - The following parts are subsequently recycled: _____
- Article cannot be recycled and is therefore:
 - Sent for energy return
 - Landfilled

LED retrofit tubes and fluorescent lamps are in the scope of EU Directives 2002/96/EC - WEEE and 2012/19/EU – WEEE Recast. Take back systems are installed in all EU Member States: end users and most commercial customers can bring back the lamps free of charge. Double capped linear fluorescent lamps and LED retrofit tubes are collected separately from general household waste and separately from other WEEE waste. Also, a dedicated recycling process exists for lamps because, according to legislation, the mercury shall be removed from the gas discharge lamps. Mercury is recovered in specialised facilities by distillation.

The diagram below illustrates the various steps in the recycling process:

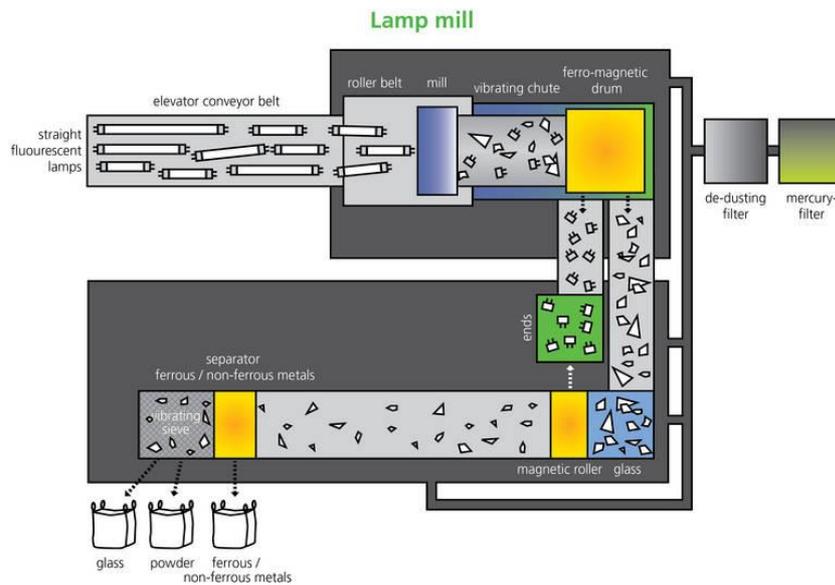


Image 1: Recycling steps of fluorescent lamps in Indaver (Belgium). Source: www.indaver.be/waste-treatment/recycling/mercurial-waste.html

European legislation on Waste Electrical and Electronic Equipment makes producers responsible for end of life products within this category as from August 13th, 2005.

Target setting as required the present legislation is 45% of EEE placed in the market by 2016, rising to 65% in 2020 per year for all categories.

European lamp manufacturing companies have founded Collection & Recycling Organizations in the EU Member-States, with the objective to organize the collection and recycling of gas discharge lamps. The goal is to comply with present and possible future EU legislation and meet or exceed national targets.

In general, the following channels have been established in the respective member-states providing countrywide coverage:

- Direct collection from large end users:
Containers have been made available, ad hoc or permanently, and will be collected upon notification by the end user that the container is full.
- Collection through distribution:
Wholesalers and Retailers place collection means at their premises or shops respectively. Collection is done upon notification.
- Collection through municipalities:

Where infrastructure allows, collection means are placed at municipality depots.



Image 2: Stibat/Wecycle-collection street as present in the Dutch Do-it-yourself shops of Gamma.

Campaigns are being executed or have been planned to reinforce the role of the government to educate the population that LED retrofit tubes have to be disposed of in an environmentally friendly way.

According to LightingEurope experience, on average of all lamps, the legal threshold of 0.1% wt in homogenous material glass is not exceeded.

As summarised under [section 4.2.4](#):

Theoretically, assuming a lead content of 500 ppm average resulting from the recycled glass of old lamps, roughly estimated 8 tons of lead would enter the EU-28 market bound in lamp glass. Worst case would be 30 tons, assuming an average content of 0.2% and if all lamps would have the 0.2%, but we know this is far from reality and therefore not a realistic assumption.

(Basis of the rough estimation: in 2022 150 Million fluorescent lamps will be put on the EU-28 market per year and about 50 Million LED replacement lamps (Melisa model 2018³), average 0,1 kg weight per lamp; ca. 75% average glass per lamp = 50.000 tons; hereof 0.05/0.2% lead)

³ VHK, Model for European Light Sources Analysis (MELISA) (study commissioned by the European Commission), 25 October 2017.

6 Substitution

Can the substance of this exemption be substituted?

Yes, by

Design changes:

Other materials:

Other substance:

No

Justification: see chapters below

6.1 Substituting lead in glass of LED retrofit and fluorescent tubes

There is no alternative.

Lead in the glass of LED retrofit tubes and fluorescent tubes in amounts <0.2% has no intended or unintended function. It is a contamination from recycled glass used during glass production. There is no intended addition of lead or lead compounds other than in the form of recycled glass.

There are no substitutes, there is no changed reliability. Lamps using less than 0.1% lead are fully reliable.

The rejection of the exemption could lead to the limitation of the use of recycled glass for lamp glass production, as well as to higher costs for ongoing product conformity assessments.

6.2 Links to REACH, according to RoHS Directive Article 5(1)(a)

Do any of the following provisions apply to the application described?

Not applicable

Authorisation

SVHC

Candidate list

Proposal inclusion Annex XIV

Restriction

Annex XIV

Annex XVII

Registry of intentions

Registration

Provide REACH-relevant information received through the supply chain.

Not Applicable

Based on the current status of Annexes XIV and XVII of the REACH Regulation, the requested exemption would not weaken the environmental and health protection afforded by the REACH Regulation. The requested exemption is therefore justified as other criteria of Art. 5(1)(a) apply.

7 Removal of lead from LED retrofit and fluorescent lamp tubes

No actions have been taken to develop alternatives for lead in fluorescent tubes as lead is not intentionally added.

Manufacturers of lamp glass tubes are using recycled glass in order to save resources and energy.

Not renewing this exemption would lead to a limitation of the use of recycled glass for LED retrofit tubes (glass in lighting equipment) production.

It would result in an increase in the number of random conformity checks, especially for lamps imported from outside the EU. If quality controls would reveal batches of lamps exceeding 0.1% lead these lamps would not be allowed to be placed on the EU market. These non-conforming batches would then be exported out of the EU market or would have to be recycled directly, without the lamps ever being used, if export is not possible or too expensive (for example because the lamps need to be repackaged before shipment.)

It would therefore also result in recycled glass being discarded and thus the creation of avoidable waste.

7.1 Impact of Elimination

7.1.1 *Environmental impacts:*

Lead in glass of LED retrofit tubes in the amount of 0.2% is not intentionally added. Typically, in a glass production plant, 30 - 40 % recycling glass is used.

Strict process controls and limited use of recycled glass would lead to higher energy consumption. This is even more critical if already produced lamps are regarded. In case quality controls show lead in glass in amounts of 0.1 – 0.2% these lamps would not be allowed to be placed on the EU market. These non-conforming batches would then be exported out of the EU. If export is not possible or too expensive (repackaging), they would have to be recycled directly, even though the lamps will have not been used. This would have a clear negative environmental impact.

7.1.2 *Health and consumer safety impacts:*

There is no health impact irrespective whether lead content is below 0.2% (as requested) or less than 0.1% (RoHS general limit), as lead is bound in glass.

7.1.3 Socioeconomic impact of substitution

Economic effects related to substitution:

- Increase in direct production costs
- Increase in fixed costs
- Increase in overhead
- Possible social impacts within the EU
- Possible social impacts external to the EU
- Other:

Lead is present in recycled glass. There were cases where imported lamps exceeded 0,1% (but not 0,2%) lead in glass. Addressing this would require changing specifications and would result in higher glass prices and more resources invested into monitoring. In case imported lamp batches are not conforming, lamps have to be recycled directly or have to be repacked and exported with high economic effort. As a consequence, this would increase production costs and prices for fluorescent lamps.

8 Reduction of lead content in LED retrofit tubes and fluorescent tubes (glass in lighting equipment)

The reduction is not possible, lead is not intentionally used. The requested amount is only slightly above the legal threshold limit.

9 Other relevant information

Not applicable

10 Information that should be regarded as proprietary

Not applicable