



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 extension of existing
exemption no. 5(b) of Annex III

LightingEurope proposes to continue using the existing wording which is:
Lead in glass of fluorescent tubes 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 per 21/07/2016, unless an application for renewal has been made to the Commission in accordance with Annex V.

With reference to the above, this request concerns the extension of the current Annex III exemption

5(b): Lead in glass of fluorescent tubes *not exceeding 0.2% by weight*

In principle lead in glass for fluorescent tubes has successfully been phased out by 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 recycling 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 glass of fluorescent lamps. According 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 recycling glass significantly reduces energy consumption for glass production (-30% for the recycled glass amount according experience of a LightingEurope member company). The rejection of the exemption could lead to the limitation of the use of recycling glass for lamp glass production as well as to higher costs for ongoing product conformity assessments.

Fluorescent lamps have 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 EU, e.g. in China, lead containing recycling glass will be available for a foreseeable long term, probably decades. This is especially valid if the lamp glass is produced outside EU.

Lead in the glass is on the other hand safe as it will not leave the glass matrix under any circumstance. The requested amount of lead is only minimal above the RoHS threshold limit for lead in homogenous materials.

For this reason an exemption for lead in glass of fluorescent tubes not exceeding 0.2 % by weight is required with a maximum validity period and with no expiry date.

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

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 lamp glass of fluorescent tubes. Fluorescent lamps are low pressure discharge lamps in the scope of RoHS Directive as Annex I, category 5 products (see below). Fluorescent lamps are low-pressure discharge lamps. When electric current flows through the lamp bulb (=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).

Lead has been added in fluorescent lamp glass production for decades in form of PbO. The heavy metal compound could successfully be phased out in the last 10 years from production processes. Due to the use of recycling 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 can slightly be exceeded, 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 most 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 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 category set out by 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 RoHS scope. 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.

Therefore lamp manufacturers do consider the low pressure discharge lamps, in which the “fluorescent tubes” in scope of this document are used, to belong to category 5 as individual products.

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 tubes

Lead in glass of fluorescent tubes in amounts <0.2% has no intended or unintended function. It is a contamination from recycling glass use 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 for a long time standard technology. 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 could be phased out in the last 4-8 years.

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 fluorescent tubes

The lead content in glass of fluorescent tubes can be up to 0.2% if recycling glass is used in the glass production process. The homogenous material is glass. Different glass parts in a lamp such as 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 would result in non-conformity of the fluorescent lamp towards the RoHS requirements. Producers of lamp glass tubes are continuously monitoring the lead content in recycling glass. In clause 9 some screenshots are provided of recycling glass exceeding the specified and contractually agreed lead content. These batches were not suitable for lamp glass production. Without the exemption the specification for recycling glass regarding lead content would have to be changed leading to less energy savings.

The amount of intentionally added substance entering the EU-28 market annually through application for which the exemption is requested: 0 tons. According LightingEurope experience in average of 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 roughly estimated 25 tons of lead would enter the EU-28 market bound in lamp glass. Worst case would be 100 tons assuming an average content of 0.2%

(Basis of the rough estimation: ca 680 Mio fluorescent lamps put on the EU-28 market per year (Eurostat data for 2013²), 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 the aspect of this exemption request.

According one source a reduction of energy consumption of 2,5% per 10% recycling glass is achieved (lamp glass production of LightingEurope member OSRAM GmbH, Augsburg, Germany). Typically in this glass production plant 30 - 40 % recycling glass is used. Technically (theoretically) up to 80% is estimated to be possible. For such high

² Preparatory Study on Light Sources for Ecodesign and/or Energy Labelling Requirements ('Lot 8/9/19)
Draft Interim Report, Task 2, Nov.2014, VITO, VHK

amounts it is essential that the recycling glass is nearly identical to the produced glass. Source for the recycling glass therefore is mainly glass from lamp recycling. Content of lead (as well as mercury) is normally measured regularly in the above mentioned plant.

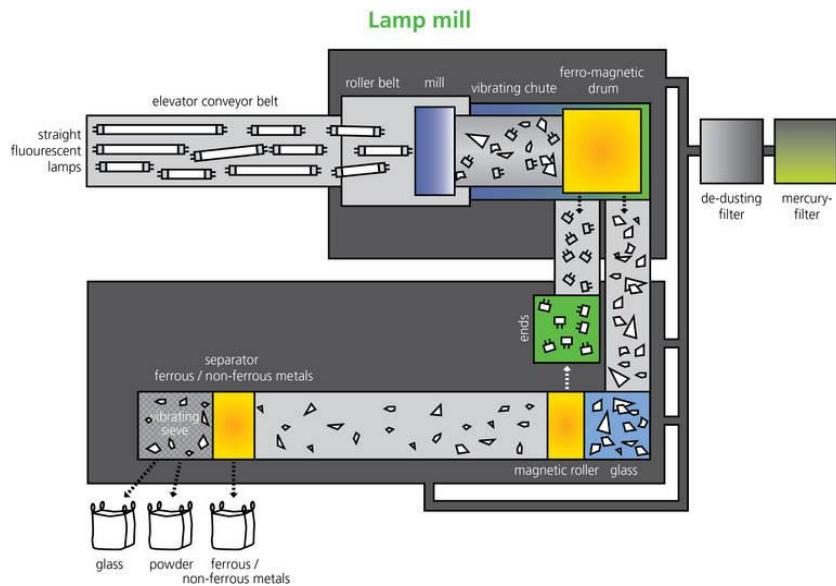
5 Waste management

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

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 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.

Below picture shows the various steps in the recycling process:



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 consequence of 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 Companies have founded Collection & Recycling Organizations in the EU Member-States, with the objective to organize the collection and recycling of gas discharge lamps. Goal is to comply with present and probable 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 respectively in their shops. Collection is done upon notification.
- Collection through municipalities:

Where infrastructure allows collection means are placed at municipality depots.



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

Campaigns are being executed or have been planned to re-enforce the role of the government to educate the population that gas-discharge lamps have to be disposed of in an environmentally friendly way.

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

Theoretically assuming a lead content of 500 ppm average roughly estimated 25 tons of lead would enter the EU-28 market bound in lamp glass. Worst case would be 100 tons assuming an average content of 0.2%

(Basis of the rough estimation: ca 680 Mio fluorescent lamps put on the EU-28 market per year (Eurostat data for 2013), average 0,1 kg per lamp; ca. 75% average glass per lamp = 50.000 tons; hereof 0.05/0.2% lead)

6 Substitution

Can the substance of this exemption be substituted?

Yes, by

- Design changes:
- Other materials:
- Other substance:

No

Justification: see in below chapters

6.1 Substituting lead in glass of fluorescent tubes

There is no alternative. Lead in glass of fluorescent tubes in amounts <0.2% has no intended or unintended function. It is a contamination from recycling glass use during glass production. There is no intended addition of lead or lead compounds other than in form of recycling 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 recycling 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

- | | | |
|---|---|---------------------------------------|
| <input type="checkbox"/> Authorisation | <input type="checkbox"/> Restriction | <input type="checkbox"/> Registration |
| <input type="checkbox"/> SVHC | <input type="checkbox"/> Annex XIV | |
| <input type="checkbox"/> Candidate list | <input type="checkbox"/> Annex XVII | |
| <input type="checkbox"/> Proposal inclusion Annex XIV | <input type="checkbox"/> Registry of intentions | |

Provide REACH-relevant information received through the supply chain.

Not Applicable

7 Removal of lead from fluorescent lamp tubes

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

Limitation of the use of recycling glass for lamp glass production, increasing number of random conformity checks, especially for lamps imported from outside EU. Measure could be implemented on short notice.

Manufacturers of lamp glass tubes are using recycling glass in order to save resources and energy. It is possible to introduce glass production processes limiting the amount of lead in glass to 0.1 % which is the RoHS limit for lead in homogenous materials.

However this limitation of the use of recycling glass for lamp glass production would make an increasing number of random conformity checks necessary, especially for lamps imported from outside EU. If quality controls would reveal batches of lamps exceeding 0.1% lead these lamps would not be allowed to be marketed in EU-28. These non-conform batches would then be exported out of EU-28 or would have to be recycled directly before the lamps are used if export is not possible or too expensive (repackaging).

7.1 Impact of Elimination

7.1.1 Environmental impacts:

Lead in glass of fluorescent tubes in amount of 0.2% is not intentionally added. According one source a reduction of energy consumption of 2.5% per 10% recycling glass is achieved (lamp glass production of LightingEurope member OSRAM GmbH, Augsburg, Germany). Typically in this glass production plant 30 - 40 % recycling glass is used. Strict process control and limited use of recycling 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 marketed in EU-28. These non-conforming batches would then be exported out of EU-28. If export is not possible or too expensive (repackaging) they would have to be recycled directly before the lamps are used. This would have 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 recycling glass. There were cases where imported lamps exceeded 0,1% (but not 0,2%) lead in glass. This can be overcome with changed specification, higher glass price, more monitoring (effort). 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. In consequence this would increase production costs and prices for fluorescent lamps.

8 Reduction of lead content in fluorescent tubes

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

Following there are 2 excerpts of laboratory test reports regarding lead in recycling glass (examples, in German language only). These measurements are part of the quality control process. They show that in practice recycling glass can indeed contain lead clearly exceeding 0.1%. The use of the corresponding batches of recycling glass could result in lead amounts exceeding 0.1% by weight in the lamp glass production if too much of the material is used. If in practice measurements reveal that lead in recycling glass does not meet the contractually agreed specification the batch has to be rejected. It must be noted that these batches are not necessarily homogenous in their overall composition.

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
Blei (ber. als PbO)	mg/kg	OS

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 - 28.02.2013 - 21.280	
Blei (Pb)	mg/kg	OS
Blei (ber. als PbO)	mg/kg	OS

Aus HF-HNO3-HCL-Mikrowellendruckaufschluss

Probe Nr.	13-033693-04	
Bezeichnung	Edsr - 28.02.2013 - 21.280	
Blei (Pb)	mg/kg	8.820

Excerpts of 2 measurement reports regarding lead contained in recycling glass. These measurements are made to verify that the delivered materials are meeting the agreed specifications (Source: Osram GmbH, Augsburg).

10 Information that should be regarded as proprietary

Not applicable