

Consultation Questionnaire Exemption Request No. 4(f)

“Mercury in other discharge lamps for special purposes not specifically mentioned in this Annex” “

Abbreviations and Definitions

BAT	Best available technology
CFL	Compact Fluorescent
EEI	Energy Efficiency Index
Hg	Mercury
HID	High Intensity Discharge -
LCD	Liquid crystal displays
LED	Light emitting diode
LEU	LightingEurope
Mpcs	Million pieces
PCB	Printed circuit boards
UV	Ultraviolet
VDMA	The German engineering federation Verband Deutscher Maschinen- und Anlagenbau
VskE	The German Association for Label and Narrow Web Converters

Background

The Oeko-Institut and Fraunhofer IZM have been appointed within a framework contract¹ for the evaluation of applications for the renewal of exemptions currently listed in Annexes III of the new RoHS Directive 2011/65/EU (RoHS 2) by the European Commission.¹

LightingEurope (LEU), the German engineering federation Verband Deutscher Maschinen- und Anlagenbau (VDMA) and the German Association for Label and Narrow Web Converters (VskE). have submitted requests for the renewal of the above mentioned exemption, which have been subject to a first completeness and plausibility check. The applicants have been requested to answer additional questions and to provide additional information, to be made available on the request webpage of the stakeholder consultation (<http://rohs.exemptions.oeko.info/index.php?id=228>).

¹ Contract is implemented through Framework Contract No. ENV.C.2/FRA/2011/0020 led by Eunomia

All three applicants apply for the renewal of Ex. 4(f), with the current wording formulation listed in Annex III of the RoHS Directive and requesting the maximum available duration allowed.

LEU explain the scope of Ex. 4(f) to cover all the lamps for special lighting purposes, which do not belong to any of the groups identified in the exemptions 1(a)-4(e) by technology and application in Annex III of RoHS Directive 2011/85/EU. This is understood to exclude low pressure discharge lamps (fluorescent lamps - compact, linear and cold cathode - and UV lamps without phosphor coating operating at low pressure) and high pressure discharge lamps (high pressure sodium vapour; high pressure sodium mercury; and metal halide lamps). The scope of Ex. 4(f) is thus concluded to cover lamps which are not fluorescent, which have a higher internal pressure compared to fluorescent lamps and that are used for special purposes for example in short-arc mercury lamps for producing LED components, in lamps for projection or in UV curing applications. LEU provides multiple examples in its request, providing explanatory information and demonstrative pictures.

According to VskE, the request focuses on UV lamps which are defined as “high intensity discharge lamps” (HID) according to commission regulation EC No. 245/2009 (ecodesign requirements for fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaires able to operate such lamps), Article 2, Section 9.

VDMA explain that their application for extension of the existing exemption to refer to Hg discharge lamps which are used for curing / polymerisation (e.g. of layers of ink and coating, adhesives and sealants) and for disinfection (e.g. of water, in the medical field, beverage bottles).

From the information provided by the applicants, it can be understood that the scope of Ex. 4(f) covers lamps for special lighting purposes used in industrial processes, in commercial, medical or scientific environments, but sometimes also found in private areas. Examples are various UV lamp (e.g. curing lamps, development of polymers, photochemistry etc.), projector lamps, High Pressure Mercury Short Arc lamps (e.g. LCDs, PCBs, visual and fluorescence microscopy, aviation industry, semiconductor production etc.), High Pressure Electrodeless Ultra-Violet Light Sources, High Pressure Sodium lamps for special purposes and others.

According to LEU, Hg is used in medium-pressure lamps in a liquid form and generates UV radiation in a range between 200 and 440 nm. During the starting phase of these lamps, the mercury is vaporised and raised to higher energy unstable levels (i.e. excited). The drop from these higher energy levels (return of the electrons from the higher energy level) causes the emission of UV light with the characteristic spectral lines. These spectral lines supply the necessary photons for UV curing and disinfection.

LEU explains that the Hg vapour is essential for the function of the lamp: all of the Hg is evaporated and the resulting pressure is chosen in such a way that

- the system can provide the exact power to the lamp,
- the discharge radiates as effective as possible,
- generates the required wavelengths for the desired application and finally
- with a brightness that allows the most effective collection of the light.

The amount of substance entering the EU market annually through Ex. 4(f) lamps is estimated based on different market studies and input of single manufacturing companies submitted to LEU. There is no single database or reliable evaluation that would give accurate data. The following amount of mercury is the best estimation of LEU.

Lamp type	Mercury range per lamp	Mercury put on EU market
Lamps for projection purposes	10-40 mg depending on Wattage, average 15mg	45 kg (maximum)
Short arc mercury lamps	Up to 100g per lamp, average ca. 1g	20 kg
UV Curing lamps	Typical range 10-3000 mg	75kg (year 2014)

Regarding possible substitutes the applicants state that there is no alternative substance and technology with the same performance characteristics provided by Hg containing lamps. In some areas first products are available based on opto-semiconductor and laser technology, e.g. for new applications LEDs are a substitute in horticulture lighting applications; for projection lamps LED's and lasers also provide substitutes for new applications. LEU, however explain, that LEDs are not backwards compatible with projectors mounted with Hg containing lamps.

For UV applications there are also UV LED lamps available that may be considered as an alternative technology for medium pressure mercury lamps used in UV curing applications, but their performance characteristics are very different to UV mercury lamps and are they are explained not to be commercially available. In contrast to mercury lamps, LEDs create only narrow banded light and are mainly available in the UVA and visible light range. Mercury discharge lamps supply UV light ranging from UVC through to UVA, of which especially the short-wave ranges with high radiation doses are used for polymerisation and disinfection. In this respect, LED-UV lamps can, at present, only be used in selected applications due to the low performance and limited emission ranges.

VDMA further comments that UV-LEDs cannot be used for disinfection since wavelengths of 265 nm or lower are required for the destruction of DNA. In this application area there are mercury free solutions, such as excimer lamps, however it is explained that these have only been successful in a few applications in niche markets.

Against this background, applicants do not expect LED alternatives to allow for a full phase-out of Ex. 4(f) lamps within the coming 5 years, and thus request a renewal of the exemption.

For details, please check the applicant's exemption request at:

<http://rohs.exemptions.oeko.info/index.php?id=239>

The objective of this consultation and the review process is to collect and to evaluate information and evidence according to the criteria listed in Art. 5 (1) (a) of Directive 2011/65/EU (RoHS II), which can be found under:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32011L0065:EN:NOT>

If you would like to contribute to the stakeholder consultation, please answer the following questions:

Questions

1. The applicants have requested the renewal of Ex.4(f) with the current wording formulation: *“Mercury in other discharge lamps for special purposes not specifically mentioned in this Annex”* “
and with the maximum validity period possible.
 - a. Do you agree with the scope of Ex. 4(e) as proposed by the applicants? To support your views, please provide detailed technical argumentation / evidence in line with the criteria in Art. 5(1)(a).
 - b. Please suggest an alternative wording and explain your proposal, if you do not agree with the proposed exemption wording or with the wording of one or more of the entries.
2. Please describe the 4(f) lamps and their applications covered by this exemption. If possible specify your information in relation to lamp sub-groups.
 - a. Please provide an exhaustive list of relevant applications sub-groups according to uses (e.g. curing, disinfection applications etc.) and/or lamp characteristics (spectral output, etc.) and where possible provide explanatory information where it is not available in the exemption renewal applications of LEU, VDMA and VskE.
 - b. Please explain if the exemption could further be limited to relevant application areas (product sub-groups).
3. From the VDMA and VskE applications for the renewal of this exemption, it appears that the exemption could be limited to discharge lamps operating mainly in the UVB-UVC spectrum.
 - a. Please state if you agree with this proposal or not;
 - b. If relevant, please specify the relevant spectrum to which the exemption could be limited;
4. LEU states that lamps covered by Ex. 4(f) have higher internal pressure compared to fluorescent lamps falling under other exemptions.
 - a. Please support this with the help of technical parameters related to application specifications (i.e. for the lamp sub-groups said to fall under the scope of this exemption);
 - b. Please clarify the differences in internal pressure between Ex. 4(f) lamps and other fluorescent lamps in general and particularly lamps falling under Ex. 4(a) (for example in terms of low pressure, no phosphor coating, unique UVC range).
5. It is explained that UV LED lamps are available and may be considered as an alternative technology for medium pressure mercury lamps used in UV curing applications, but their performance characteristics are said to be very different to UV mercury lamps.
 - a. Do you agree with these statements?

- b. To support your views, please provide detailed quantitative data (table overview) to clarify application specifications and differences between Ex. 4(f) lamps and such candidate alternatives (see also requests of VDMA e.V. and VskE²)
 - c. Please clarify what efforts are being made to develop Hg free alternatives (LED alternatives or other possible technologies) for the full application range of high pressure lamps or for a specific part thereof. Please provide details as to such initiatives, their timeframes and expected results.
6. Please clarify if for specific application sub-groups, a renewal of the exemption could be limited to the application of Hg in lamps to be used in installations placed on the market in the past. If this is not possible at present, please specify if a short term transition period would enable such a change (for example, for lamps placed on the market before 2017).

Please note that answers to these questions are to be published as part of the available information relevant for the stakeholder consultation to be carried out as 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.

² Please see: <http://rohs.exemptions.oeko.info/index.php?id=238> for application documents related to this exemption.