Consultation Questionnaire Exemption No. 4(f) of RoHS Annex III

Current wording of the exemption:

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

Requested validity period: Maximum (5 years and 7 years (cat. 8 and 9) respectively)

ACRONYMS AND DEFINITIONS

UV	Ultra Violet
LED	Light-Emitting-Diode
Hg	Mercury
LEU	LightingEurope

1. INTRODUCTION

1.1. Background

Bio Innovation Service, UNITAR and Fraunhofer IZM have been appointed[1] by the European Commission through for the evaluation of applications for the review of requests for new exemptions and the renewal of exemptions currently listed in Annexes III and IV of the RoHS Directive 2011/65/EU.

VDMA and Lighting Europe submitted requests[2] for the renewal of the above-mentioned exemption. The request has been subject to a first completeness and plausibility check. The applicant has been re-quested to answer additional questions and to provide additional information, available on the request webpage of the stakeholder consultation[3].

The stakeholder consultation is part of the review process for the request at hand. 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.[4]

To contribute to this stakeholder consultation, please answer the below questions until the 27th of May 2021.

1.2. Summary of the Exemption Request

According to VDMA: "*The application for prolongation of the existing exemption refers to mercury-containing UV discharge lamps which are used for curing (e.g. of layers of inks and coatings, adhesives and sealants),*

[1] It is implemented through the specific contract 070201/2020/832829/ENV.B.3 under the Framework contract ENV.B.3/FRA/2019/0017
[2] Exemption request available at RoHS Annex III exemption evaluation - Stakeholder consultation (biois.eu)
[3] Clarification questionnaire available at RoHS Annex III exemption evaluation - Stakeholder consultation (biois.eu)
[4] Directive 2011/65/EU (RoHS) available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32011L0065:EN:NOT

for disinfection (e.g. of water, surfaces and air) and for other industrial applications (surface modification, surface activation) The application includes the following lamp types:

- ***UV medium-pressure discharge lamps (MPL) for curing, disinfection and other industrial applications*** *(internal operating pressure > 100 mbar). The UV medium-pressure lamps can be doped with iron, gallium or lead in addition to the mercury they contain.*
- ***UV low-pressure discharge lamps for special purposes*** *in the high power range. […]*

Typical applications to be covered by this application include curing, e.g. of inks and coatings, disinfection of water etc., and other industrial applications like surface activation and cleaning.

It is technically not possible to replace mercury in special UV lamps with other materials/chemicals in order to achieve the same widespread radiation distribution. LED-based technologies are increasingly being used, which in certain applications (e.g. curing) also offer many advantages over mercury-containing UV lamps. Nevertheless, LED technologies cannot be used as an equivalent replacement in many applications. "

According to LightingEurope, *"[…]* The renewal application concerns lamps and UV light sources defined as:

- High Pressure Sodium (vapour) lamps (HPS) for horticulture lighting,
- Medium and high-pressure UV lamps for curing, disinfection of water and surfaces, day simulation for zoo animals, etc…
- Short-arc Hg lamps for projection, studio, stage lighting, microlithography for semiconductor production, etc…

Replacement of mercury and mercury containing lamps is impracticable:

- *The lamps covered by exemption 4(f) must remain available on the EU market:*
  - *For new equipment for certain applications where no functionally suitable alternatives are available*
  - *As spare parts for in-use equipment as replacing end-of-life lamps avoids having equipment become electronic waste before due time"*

We are a producer of UV plants for disinfection purposes based in Germany and employ 30 people.
We manufacture plants for UV based disinfection of water, air and surfaces.
The percentage of UV-based products in our total production is 100%.
Our annual consumption of lamps is approx. 10.000 lamps.

Our experiences with alternatives to UV lamps are as follows:

Proof of concept for UVC LED technology shows that they are not suitable for replacing UVC Hg lamps for technical and economical reasons.

2. QUESTIONS

1. VDMA and LightingEurope[2] requested the renewal of the above exemption for the maximum validity periods with the same scope and wording for all EEE of cat. 3 and 5 (VDMA) and cat. 1-10 (LEU).

   a. Please let us know whether you support or disagree with the wording, scope and requested duration of the exemption. To support your views, please provide detailed technical argumentation / evidence in line with the criteria[4] in Art. 5(1)(a).

The wording should be retained, and an extension should be requested at least until 2026 and beyond. The reason is that there is no alternative for this environmentally friendly approach to disinfect water, air and surfaces without chemicals. Current Corona crisis shows the urgent need the availability of a scale able disinfection solution.

Reference to RoHS Art. 5(1)(a): Exemptions for materials and components may be considered, if:

- *"their elimination or substitution via design changes or materials and components […] is scientifically or technically impracticable"*
- *"the reliability of substitutes is not ensured"*
- *"the total negative environmental, health and consumer safety impacts caused by substitution are likely to outweigh the total environmental, health and consumer safety benefits thereof"*

   b. If applicable, please suggest an alternative wording and duration and explain your proposal.

From an industrial point of view, it does not make sense to shorten the validity period, as alternative solutions (e.g. based on UV LEDs) require a long development time. In particular, the development of new applications in the UVC sector still faces major challenges.

Furthermore, it can be assumed that VDMA and LightingEurope are not aware of all specific UV applications and therefore have not investigated and addressed them in detail. The previous wording of the exemption: "Mercury in other gas discharge lamps for certain purposes not explicitly mentioned in this Annex" should be kept unchanged.

The availability of UV lamps containing mercury is indispensable for our company that produces plants for UV based disinfection of water, air, and surfaces.

2. Please provide information concerning possible substitutes or elimination possibilities at present or in the future so that the requested exemption could be restricted or revoked.

   a. Please explain substitution and elimination possibilities and for which part of the applications in the scope of the requested exemption they are relevant.

There is no alternative (i.e. "alternative filler") to mercury used in discharge lamps in the Periodic Table of the Elements that is a direct and 100% compatible substitute. The physical properties of mercury make it a unique material and ideal for discharge lamps (high vapour pressure, low boiling point, spectral lines ideal for disinfection and photochemical reactions). Scientific and industrial approaches to replace mercury with alternative materials, while preserving the specific useful properties of mercury discharge lamps, have existed for decades, but have all been unsuccessful.

There are light sources such as mercury-free discharge lamps and UV-LEDs which can to some extent be used for similar treatment. However, there are some very significant limitations.

- Direct replacement (lamp replacement only) is often not technically possible.
- Replacing existing equipment or a process with an alternative light source (if possible) usually requires additional steps such as
- Replacing the power supply and peripheral electrical components
- Changing the UV measuring equipment (different spectral sensitivities)
- Changing the process speed (usually resulting in a significant reduction in speed and performance).
- Substantial redesign of mechanical equipment (different radiometric properties).

For UV disinfection (water/air/surfaces), there is currently no real substitute with the same cost efficiency. Markets concerned include general (drinking) water treatment plants, beverage industry (filling plants for PET bottles, glass bottles or other containers), food industry (sterilization and packaging), fish farming, healthcare industry, Covid-19 contraindications (air and surface disinfection), ballast water treatment in ships, etc.

Of course regarding disinfection often the alternative use of chemicals (e.g. chlorine) could be theoretically possible. But this approach cause threat to human health and in general to the environment.

b. Please provide information as to research to find alternatives that do not rely on the exemption under review (substitution or elimination), and which may cover part or all of the applications in the scope of the exemption request.

Replacing existing UV lamp systems with alternative systems poses a variety of problems, including quality issues, process interruptions, productivity losses, high capital costs and higher overall operating costs.

c. Please provide a roadmap of such on-going substitution/elimination and research (phases that are to be carried out), detailing the current status as well as the estimated time needed for further stages.

For numerous existing machines/processes/applications, currently there is no reasonable replacement available.

3. Do you know of other manufacturers producing devices of comparable features and performance like the ones in the scope of this exemption request that do not depend on RoHS-restricted substances, or use smaller amounts of these substances compared to the applications in the scope of this exemption?

Please note that also huge companies such e.g. LG have stopped further research/ production of UVC LED's because of material problems to establish reliable production processes.

4. As part of the evaluation, socio-economic impacts shall also be compiled and evaluated. For this purpose, if you have information on socioeconomic aspects, please provide details in respect of the following:

   a. What are the volumes of EEE in the scope of the requested exemptions which are placed on the market per year?

We guess the market is huge and there are very big players like Hereaus/ Xylem but we do not know exact figures describing the whole market. For our company/our customers up to 10.000 pieces of lamps are used per year.

   b. What are the volumes of additional waste to be generated should the requested ex-emption not be renewed or not be renewed for the requested duration?

Most equipment on the market that uses mercury discharge lamps should be treated and disposed of as additional waste. In many cases, it is not economically and/or technologically feasible to retrofit existing equipment with alternative light sources.

   c. What are estimated impacts on employment in total, in the EU and outside the EU, should the requested exemption not be renewed or be renewed for less than the re-quested time period? Please detail the main sectors in which possible impacts are expected – manufacturers of equipment in the scope of the exemption, suppliers, re-tail, users of MRI devices, etc.

Most employers of mercury-based UV technology would be confronted with a professional ban, leading to huge amount of unemployment and loss of products and productivity. Many companies and factories would stop existing. Since there is no alternative for disinfection applications on the market our company most probably needs to close in consequence of the ban.

   d. Please estimate additional costs associated should the requested exemption not be renewed, and how this is divided between various sectors (e.g. private, public, industry: manufacturers, suppliers, retailers).

Our business would cease to exist.

5. Any additional information which you would like to provide?

We believe that the responsible authors of the pending mercury ban dramatically underestimate the global impact of a mercury ban on industries, products, markets, and lastly employment opportunities and end consumers. For us as a manufacturer of UV based disinfection plants it is the absolutely wrong way – especially in the present Corona crisis.

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

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