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. 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.

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"*

Richter lighting technologies GmbH is based in Heubach, Germany, and employs approximately 100 people. When the company was founded, we manufactured gas discharge tubes (neon lights). With the on-going LED developments, the company started to build LED driven lighting devices and systems. Thus, we have deep expertise on the technical properties of LEDs as well as on mercury lamps. Amongst other products, we develop and manufacture UV-C based air disinfection devices driven by mercury tube lamps.

For us, it is clearly evident that UV LEDs in their current stage of development are not able to replace mercury lamps. UV LEDs cannot be used economically due to their low efficacy especially in high power density applications.

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 re-quested duration of the exemption. To support your views, please provide detailed technical argumentation / evidence in line with the criteria4 in Art. 5(1)(a).

The wording should be retained, and an extension should be requested at least until 2026 and beyond. From our perspective, there is no alternative to this approach for many disinfection purposes. Further, in the current crisis of COVID pandemic, there is no time to wait until LED technology with similar technical specification will have been developed far enough.

Exemptions for materials and components may the considered in RoHS Art. 5(1)(a), if:

i. "their elimination or substitution via design changes or materials and components […] is scientifically or technically impractical"

ii. “the reliability of substitutes is not ensured”

iii. “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.

As long as no comparable substitutes are available (alternative solutions like UV LEDs as source still require further development time until it makes sense to employ them industrially), it does not make sense to forbid the only means to ensure functionality of a full product group (here: products for reliable air, water, and surface disinfection) as well as future development branches.

Assuming that at the current stage there are still applications for UV light not mentioned yet, we suggest not to change the previous wording as it does not exclude anything: “Mercury in other gas discharge lamps for certain purposes not explicitly mentioned in this Annex”.

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 chemical available showing the same or at least similar physical properties to be used as filler for discharge lamps. There were several tries to find replacements in the past, but obviously without any success up to now.

The only mercury-free replacement for the discharge lamps could be UV LEDs, but there are major disadvantages and limitations:

- Direct replacement of lamp is most often technically not feasible.
- New light sources require new power supply and/or additional electric components.
- Change in spectral range results in other modes of operation.
- Processes have to be change to fit the replacement lamps.
- Mechanical equipment has to be changed and redesigned in order to fit the new optical and radiometric properties.

From our point of view, there is no feasible substitute for UV disinfection providing the same technical advantages for the same cost in both manufacturing and operation of the respective devices. The wide variety of applications in food industry, health care, water treatment, surface treatment, and, last but not least, air disinfection in the scope of COVID crisis should abnegate the possibility to forbid mercury lamps.

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.

Without the suitable UV light sources, the full industrial complex of UV treatment cannot be operated anymore. We expect lots of companies being forced to interrupt or shutdown their production. With the lower doses provided by LEDs, all steps are to be performed less efficiently with lower speed, throughput for resulting higher 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.

Without any proper replacement technology available, a roadmap cannot be given. From our knowledge from the LED industry, development of new LED approaches requires longer periods of time as the UV LEDs are based on AlGaN which is much more difficult to grow and, thus, to manufacture high efficacy LEDs from it.

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?

We are totally aware of the problem imposed by the UV LED development. Although several manufacturer provide UV LEDs, none of them shows exceptionally good performance. We do not expect tremendous progress within the next few years due to the technical problems that have to be solved first.

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?

From our perspective, the market is huge and still growing. Thus, it is extremely difficult to make an educated guess on volumes here.

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?

Retrofit replacements for the lamps are most presumably not feasible for a majority of applications. This leads to additional waste disposal instead of the recycling process as they are currently established.

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.

If the UV companies basing their products on mercury lamps have to go out of business, lots of specialists would be sent to unemployment. A mercury ban would completely kill our disinfection device branch as well as the money spent for development. Currently, the normative regulations are generated and established. As these requirements cannot be met without mercury technology, the market will lose most of its devices for air disinfection with all the negative impact on manufacturing companies. Note that this directly affects all UV driven devices dedicated to fight against COVID virus!

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).

Unemployment costs for thousands of personnel. Heavy investment costs for companies into new machineries/equipment, at the same time costs for disposal of no longer usable machines and

equipment. Loss of product diversity since no longer all products can be produced for technological and/or economic reasons. Already signed investments in production machineries and UV lines are off the table. This will affect our suppliers and also sub-suppliers. On the other hand, this will affect our OEM clients as well, because they have to grant a 12- or 24-months warranty period on existing and new ordered UV lines. Our UV business would cease to exist.

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

We suspect that the authors of the pending mercury ban limit their view on the disadvantages of this substance, but omit the benefit. Lots of applications will be stopped without taking into account how useful they are for both industries and (end) customers. There is no forceful indication to disallow mercury lamps without having viable alternatives available.

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.