

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 appointed¹ 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 requests² 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 consultation³.

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 \(biois.eu\)](https://biois.eu/rohs-annex-iii-exemption-evaluation-stakeholder-consultation)

³ Clarification questionnaire available at [RoHS Annex III exemption evaluation - Stakeholder consultation \(biois.eu\)](https://biois.eu/rohs-annex-iii-exemption-evaluation-stakeholder-consultation)

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:
 - o For new equipment for certain applications where no functionally suitable alternatives are available
 - o As spare parts for in-use equipment as replacing end-of-life lamps avoids having equipment become electronic waste before due time”

Heraeus Noblelight is a manufacturer of special purpose lamps with wavelength from ultraviolet to infrared for industrial, scientific and medical applications. Our high intensity UV medium and low pressure gas discharge lamps contain mercury and are covered by exemption 4f of the RoHS Directive 2011/65/EU. The main markets of these lamps are

- Environmental Protection (Water, Air and Surface Disinfection)
- Photochemistry
- Automotive
- Coatings/Curing of coatings
- Electronics/Printed Electronics
- Food
- Medical
- Printing and Packaging
- Semiconductor
- ...

2. QUESTIONS

1. VDMA and LightingEurope² 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-requested 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 as this exemption covers a wide variety of lamp types and applications. This fact makes it nearly impossible to narrow the scope of the exemption accordingly without missing applications. Moreover, exemption 4f should be extended at least until 2026 and beyond considering the conditions listed in Art. 5(1)(a) of the Directive:

- It is not possible to replace Mercury in UV gas discharge lamps with another element/chemical as only mercury generates a specific spectrum with its unique properties which is required for these various applications.
- The benefits of UV lamps for environment and health outweigh the negative effects of mercury on the environment. UV lamps can be used for disinfection of wastewater, ballast water, air and surfaces (which became especially important during the Covid-19 pandemic). Closed EEE waste management cycles for these lamps guarantee that the mercury used in these lamps is recycled and does not generate environmental pollution.

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

The wording should be retained, and an extension should be granted at least until 2026 and beyond.

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.

Gas discharge lamps covered by exemption 4f generate a unique spectrum, mainly in the ultraviolet region (UV-A, UV-B and UV-C). There is no chemical substitution for mercury available as the properties of mercury and therefore the emitted spectrum are unique (see Annex I of VDMA exemption request). It is moreover not possible to reduce the amount of mercury within the lamp, as this would have negative effect on the intensity and lifetime.

There are other technologies available, which can to some extent be used, like UV LEDs in the UV-A and UV-B range, but there are limitations:

- direct replacement is usually not possible (other design, other peripheral electrical equipment required)
- limited spectrum and intensity emitted (UV LEDs and other technologies can only be used for certain applications, see Annex I of VDMA exemption request)

Moreover, emission in the UV-C range (esp. wavelength around 254nm) is especially required for disinfection purposes as this wavelength has shown to be very effective to destroy the DNA/RNA of bacteria, viruses and other microorganisms. This property is becoming even more valuable during the Covid-19 pandemic. UV LED in UVC range are still in development phase and therefore limited in their efficiency and intensity and moreover highly expensive.

Another mercury free alternative in the UV-C range is excimer technology. Excimer technology is less efficient in the considered wavelength range, which results in higher energy consumption, the lifetime is shorter and the system costs are substantially higher due to complex periphery that is necessary to operate Excimer lamps.

UV LEDs and Excimer lamps are an additional option but cannot replace all 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.
- 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.

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?

There is no chemical substitution for mercury available as the properties of mercury and therefore the emitted spectrum are unique (see Annex I of VDMA exemption request). It is moreover not possible to reduce the amount of mercury within the lamp, as this would have negative effect on the intensity and lifetime. The affected applications are dependent on the emitted spectrum of these lamps whereas the spectrum is again dependent on the mercury pressure inside the lamp.

As a manufacturer we also provide mercury free solutions like UV LEDs and Excimer lamps. But their application range is limited due to a limited intensity, higher costs and limited emitted wavelength availability. These technologies are an additional option but cannot replace all mercury lamps covered by 4f (see point 2a) which is why we highly recommend to extend the validity of exemption 4f.

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 don't have figures describing the market of 4(f) products as the product variety is huge. But still the amounts of 4(f) lamps placed on the market is small compared to lamps for general lighting purposes. The effects of a ban of 4(f) lamps in terms of Hg reduction would therefore be marginal.

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

Many processes/machines/equipment that is dependent on these kind of lamps, would simply no longer be usable. For those applications where an Hg free alternative is available a simple replacement of a UV discharge lamp containing mercury with mercury free alternative is not possible, the whole machine/equipment where the UV lamp is built into needs to be replaced which results in high amount of waste equipment which has per se not yet reached end of life and therefore results in high amounts of electrical waste.

- 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-requested 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.

A ban of lamps covered by exemption 4f would lead to a relocation of certain manufacturing sectors that depend on the lamp technology (see list of sectors in chapter 1) to outside EU, and loss of jobs within the sector of lamp manufacturers.

A ban would moreover lead to a problem in the drinking water sector. Many drinking water suppliers in the EU use UV gas discharge lamps for water disinfection instead of chemicals like chlorine or ozone. The installed base of equipment using high power lamps, especially in drinking water disinfection cannot be replaced by other equipment with reasonable effort and within a reasonable time. Furthermore, this would entail huge investment costs.

Besides drinking water disinfection there also is a high amount of applications for surface and air disinfection purposes which became very valuable during the Covid-19 pandemic. These applications would no longer be available on the EU market.

- 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).

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

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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.