

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

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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)

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## 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<sup>1</sup> 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<sup>2</sup> for the renewal of the above-mentioned exemption. The request has been subject to a first completeness and plausibility check. The applicant has been requested to answer additional questions and to provide additional information, available on the request webpage of the stakeholder consultation<sup>3</sup>.

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.<sup>4</sup>

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<sup>1</sup> It is implemented through the specific contract 070201/2020/832829/ENV.B.3 under the Framework contract ENV.B.3/FRA/2019/0017

<sup>2</sup> Exemption request available at [RoHS Annex III exemption evaluation - Stakeholder consultation \(biois.eu\)](http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32011L0065:EN:NOT)

<sup>3</sup> Clarification questionnaire available at [RoHS Annex III exemption evaluation - Stakeholder consultation \(biois.eu\)](http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32011L0065:EN:NOT)

<sup>4</sup> Directive 2011/65/EU (RoHS) available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32011L0065:EN:NOT>

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), 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"*

We are producer of UV curing products, like adhesives, resists and emulsions for screen printing. Most of our customers use UV lamps to cure these products. Our experience with alternatives to UV lamps are negative, because of lower curing speed, no safety in production and faulty products. For most applications LEDs are no alternative of the same quality level.

## 2. QUESTIONS

1. VDMA and LightingEurope<sup>2</sup> 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<sup>4</sup> in Art. 5(1)(a).

The wording should be retained, and an extension should be requested at least until 2026 and beyond. The reasons are: *Their elimination or substitution via design changes or materials and components is scientifically and technically impracticable.*

With regard to current and future developments/processes/products, the availability of UV lamps containing mercury is indispensable for our company.

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

From an industrial point of view, the shortening of the period of validity does not make sense, because the development of alternative solutions (e.g., based on UV LEDs) takes a lot of time. Especially, the development for new applications in the UVC area is still facing major challenges.

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.

Currently there is no alternative to mercury in discharge lamps (i.e., an "alternative filling") that would be a direct 100% compatible replacement. The physical properties of mercury make this material quite unique and ideally suited for discharge lamps (high vapor pressure, low boiling point, specific spectral lines in areas that are ideal for disinfection and photochemical reactions). Scientific and industrial approaches to compatibly replace mercury with an alternative substance while maintaining the specific beneficial properties of mercury discharge lamps have been ongoing for decades and have all failed.

There are other mercury-free types of discharge lamps and other light sources like UV-LEDs available, which can, to some extent, be used for similar processes. There are, however, some very severe limitations:

- Direct replacement (exchanging only the lamp) is in most cases technologically not possible
- Replacement of existing machines/processes with alternative light sources (if available) usually requires additional steps, which may include:
  - replacement of power supplies and peripheral electrical components
  - replacement or alteration of inks and varnishes
  - use of other substrates

- necessity for (other) pre-treatment technology
- change of UV measurement equipment (different spectral sensitivity)
- heavy redesign of machine equipment
- complications like cross-sensitivity to daylight and/or artificial lighting

The use of replacement technologies usually has a heavy impact on the underlying chemistry of curable inks and varnishes, requiring high amounts of (toxic) photoinitiators.

- 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.

According to our experience, replacement of existing UV lamp system with alternatives leads to a manifold of problems including quality issues, process downtime, productivity decrease, high investment costs, higher overall operational 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.

We don't see the existence of a roadmap for the complete substitution/elimination of mercury-based discharge lamps in most fields of application. There are other technologies available (see above point ...) which might justify investment into new machines and which might gain market share with respect to conventional UV applications over time. But for numerous existing machines/processes/applications, 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?

Since 100% replacement on existing installations is not possible, there is also no comparable product or device available with comparable features and performance.

Alternative products, when used with the alternative peripherals (other inks, varnishes, pre-treatment, ....), can have comparable features and performance in some applications, but by far not in all other applications which need the specific spectrum of mercury for their performance.

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 do not know exact figures describing the whole market exactly.

- 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?

Most existing machines on the market running with mercury discharge lamps would have to be considered as additional waste and would have to be disposed of. In many cases, it is economically and/or technologically not feasible to retrofit existing equipment with alternative light sources.

- a. 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 requested time period? Please detail the main sectors in which possible impacts are expected – manufacturers of equipment in the scope of the exemption, suppliers, retail, 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.

We don't have exact figure and can only state to the best of our knowledge that thousands of companies exist only in the EU that employ UV technology based on mercury lamps. Some of them rely to up to 100% on the availability of mercury lamps.

- a. 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 machinery/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.

## 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.

Used lamps can be recycled and the mercury content can be reused for new lamps. If all participants in the market actively use the recycling opportunities, the mercury content for discharge lamps can be confined to closed-loop processes without damage or impact to the environment and personal health.