

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 requested 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 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>

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"*

General Statement

We are a producer of test equipment for the graphic arts and coating industries, based in the Netherlands and employ 30 people in our HQ and another 30 persons in subsidiaries in Germany and outside the EU.

We manufacture the following products: printability testers, abrasion and rub resistance measuring devices, Ink drying equipment, UV dryers, drying time testers, equipment to determine migration from and through conventional and UV coatings.

We use UV lamps for the following applications: independent UV dryers for all printing technologies, integrated UV dryers for on-line curing of inks and coatings printed over wet inks.

The percentage of UV-based products in our total production is: 10-15% in number, 20-25% in value.

Our annual consumption of lamps is: 200-300

The number and type of machines / devices with mercury-based UV technology is: 6 different types of machines in volumes of 1-20 per type per year

Our experiences with alternatives to UV lamps are as follows:

- Replacement by LED is only partly possible due to the limited curing bandwidth for the currently available coatings and inks
- In many cases a combination of UV radiation and heat are required at almost the same moment, it has proven not to be possible to get them economically feasible
- For research applications it was noticed that it is generally no known where the development starts or ends and a wide spectral response is needed, this is only possible using Hg radiators.

UV lamps are still required for the following reasons: because there are no LED alternatives for very specific wavelengths, there are no photo initiators available for all different wavelengths required in the market. In specific markets, e.g. high security printing, there are no alternatives for the coatings for security reasons.

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. The wording should be retained, and an extension should be requested at least until 2026 and beyond. The reasons are that for our specific applications where coatings and inks have to be cured the variation of materials and their photo-reactive ingredients are so wide in spectral responsiveness that there are no LED or other sources which cover the spectral needs of even a majority of these materials. There where the spectral wavelength covers the needs there is in most cases the need of so large spatial area needed that the parts to be cured/dried cannot get close enough to the radiation source for sufficient curing which makes all very inefficient.
 - b. Reference to RoHS Art. 5(1)(a): Exemptions for materials and components may be considered, as the elimination or substitution via design changes or materials and components is with current state of the art scientifically and technically impracticable and the reliability of substitutes is not ensured in most of the applications. As many applications refer to high security documents, e.g. banknotes and ID documents, 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 and the impact on security of these documents.
 - c. Suggested alternative wording: 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. Furthermore, it can also be assumed that not all specific UV applications are well-known to VDMA and LightingEurope and have therefore been neglected to be investigated and considered in detail. The

previous wording of the exception: "Mercury in other discharge lamps for special purposes not specifically mentioned in this Annex" should therefore be retained unchanged

- d. With regard to the following current and future developments/processes/products, the availability of UV lamps containing mercury is indispensable for our company:
 - i. Curing of thick layers of varnish in a single pass, multi-pass is not possible/permitted because of the absorption of the liquid parts of the coatings into the substrate.
 - ii. Curing of specific (semi-)conductive films which need in combination with the, generally wide spectrum, UV energy also substantial IR = heat energy to perform a (pre-)sintering of the applied functional ink. Complete separation of these two processes is not possible.
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. Substitution or elimination are currently not possible for many applications of our products. There where possible we have moved to using LED devices but there are different drawbacks of these:
 - i. Much larger area required
 - ii. Much closer to the printed substrate
 - iii. Very high costs of LED units in case of laboratory scale instruments
 - iv. Very small bandwidth resulting in multiple units needed to cover a reasonable bandwidth
 - b. The ink industry is on a continues search for alternatives for the current photo initiators. It is expected that in a timeframe of 5-7 years most conventional inks and varnishes will be replaced by LED-curable versions. For the special applications and for functional inks this will be more difficult, the total volume is too small for large research and the combination of properties makes it virtually impossible to change until end-of-life when these are no more used at all.
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?
- a. (Un)fortunately are we not the only company on the world, there are many suppliers of such lamps and systems in Asia and eastern Europe who are not affected for their general market by EU regulations. As a consequence our products will become (much) more expensive and will not be able to compete on the world-wide market.

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?
 - i. We are selling in normal years ca. 20 instruments per year (different size, different number of lamps) in EU countries and 40-50 outside the EU. On top we sell about 200 replacement lamps per year for instruments of up to 20 years old.
 - 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?
 - i. As the limitations will only be applicable to EU+ this will result in about 100 instruments becoming obsolete, where we assume that a substantial part of the users will buy the lamps from China/Taiwan and other countries as it will be impossible to prevent this. All our non-EU customers will buy also from there but may do this already.
 - 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? We are only active in laboratory test instruments using UV curing.
 - i. For us the impact will be limited, one internal person will have to be re-schooled to another job and at least one person at a subcontractor.
 - ii. The risk is much larger, if this makes our products un-sellable entirely it will cost 4-5 full time units of which for 4 we will not have replacement work, and our subcontractor will have to close, resulting in 40-50 employees losing their job not considering their suppliers and subcontractors.
 - 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). As a major part of our instruments go to the high security printing industry and the printed electronics industries, they will not have a replacement possibility for the time being. This will cause that banknote printers will move back to non-coated banknotes with a life-time of 30-40% of the current notes. With costs of 5-15 cents per printed banknote this will move into billions of Euros.
5. Any additional information which you would like to provide?

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