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 requested 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] 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

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:*
  - *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"*

General Statement

We are a producer of *cups and pots for dairy products based in* Moscow Region, Russia and employ 120 people.
We manufacture the following products: *cups and pots for dairy* products, beverage disposables, extruded sheet film for thermoforming.
We use UV lamps for the following applications: dry-offset printing on plastic cups.
The percentage of UV-based products in our total production is: 30%
Our annual consumption of lamps is: 10 pcs. high power lamps and 30 pcs low power lamps.
The number and type of machines / devices with mercury-based UV technology are totally 5 machines: VanDam 570 S COM HS, VanDam 560 COM III, VanDam 560, Polytype BDM-611/920 UVD (8F) and Polytype BDM-512 BB-10661.
Our experiences with alternatives to UV lamps are as follows: no experiments made on the moment because of negative existing information on the issue.

UV lamps are still required for the following reasons: Dry offset printing machines are using such lamps. Other less powerful UV lamps are widely used (about 30 units with UV lamps) in our workshops for sterilization purposes which is very important under current circumstances of Covid-19 pandemic. The use of air sterilization also helps greatly to prevent spreading of Covid-19 at our factory: there were no serious cases of this disease at our factory for the last 1,5 years.

Specific Statements

Please state your opinion on as many questions stated below as possible. Provide specific and detailed information rather than general statements wherever possible.

If you don't feel qualified to answer the specific questions below, please give detailed arguments and reasons why you still support the renewal of the exemption as requested by VDMA and LightingEurope.

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.

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

Dry offset printing machines at our Company are using UV mercury-containing lamps for instant ink curing process. Other less powerful UV lamps are widely used (about 30 units with UV lamps) in our workshops for air sterilization and disinfection purposes which is very important under current circumstances of Covid-19 pandemic. The use of air sterilization helps greatly to prevent spreading of Covid-19 at our factory also: there were no serious cases of this disease at our factory for the last 1,5 years.

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.

The periodic system of the elements offers 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 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
  - necessity for inert production environments (expensive use of nitrogen or carbon dioxide)
  - change of UV measurement equipment (different spectral sensitivity)
  - change of process speeds (usually substantial speed and productivity decrease)
  - heavy redesign of machine equipment
  - complications like cross-sensitivity to daylight and/or artificial lighting

- With respect to varnishes and inks, replacement technologies based on LEDs can usually not provide the same degree of surface hardness, scratch resistance and product durability for our factory application: the fast-food containers or dairy products cups decorated through dry-offset printing technique must never suffer from the above mentioned issues. Furthermore, all the food packaging, which is our Company is involved with, must comply with the highest health and medical standards of consumer and food products.

- 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

- With respect to UV disinfection (water/air/surfaces), there currently is no real replacement available with a similar cost efficiency. The affected markets include general (drinking) water treatment plants, the beverage industry (bottling plants for PET bottles, glass bottles, or other containers), the food industry (sterilizing and packaging), fish farming plants, health industry, Covid-19-countermeasures, vessel ballast water treatment, and many more.

It seems there exist no good suitable alternatives to mercury lamps for air disinfection at our factory: we experimented with introducing LED lamps with the declared allegedly “strong UV radiation” and “suitable for disinfection” properties, with no practical effect, which was revealed by chance only. The story is that several green-leaved pants were placed in pots in a distance in one of the auxiliary premises where the new LED disinfectant lamps were located. The plants never faded. When the case with the plants was revealed and analysed the mercury containing old sterilization lamps were installed back in place. The plants faded and vanished within a short time. Thus, we saw practical proof that the new LED disinfection lamps had different spectral characteristics vs mercury containing lamps and appeared unsuitable for disinfection or sterilization purposes. Moreover, the alternative LED “disinfection” lamps appeared very bright and have very uncomfortable blue spectrum for human eyes, with no bacteria-killing effect though. The old-type air sterilization units with shielded UV lamps appear efficient vs LED-type units.

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.

Except the above mentioned UV bactericidal lamps we have had no more experience regarding replacement of existing UV lamp systems in dry-offset printing on plastic cups with alternatives. From open sources we have only third-party information on such experiences which lead 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 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 for dry-offset printing on plastic cups which our Company is involved in.

Alternative products, when used with the alternative peripherals (other inks, varnishes, pre-treatment), can have comparable features and performance in some applications (e.g., ink jet printing, general printing) but not in all other applications, like printing on plastic cups for dairy products, which need the specific spectrum of mercury for their performance.

It may not be possible to simply replace the UV lamps with mercury-free products. It depends on the respective application whether alternative systems (like UV-LEDs) can be used and which changes need to be made to the machines and processes (e.g., materials, handling) and the design of the overall system.

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?

For our company 50 pieces of UV mercury-containing lamps for different applications are used per year.

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.

If UV lamps are no longer available, the following processes and entire machines are no longer usable: printing machines utilizing dry-offset technology for decorating plastic cups for dairy products and fast-food packaging.

This would have the following effects for our company: 5 machines would have to be stopped and this lead to at least 30% loss in orders and probably to lead to even more losses because most of the clients switch to dry-offset printing technology decoration requirements due to much less expensive decoration techniques versus other known methods like decorating with carton or shrinking plastic sleeves or applying in-mould labelling (IML) technology or sticky labels placing.

Stored UV materials, replacement lamps and machinery of a total (residual) value of 650 000 € would have to be scrapped.

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 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 (e.g., lamp manufacturers, power supply manufacturers, quartz suppliers, UV measuring device manufacturers, printers and coaters).

It would have the following impact on our company: at least 6 operators of the machines and qualified specialists in dry-offset printing will have to be fired.

The following business area would be discontinued: budget-price dry-offset printing on plastic cups. This business area would be transferred to locations outside of the EU/EEA and/or lead to upsurge of prices or costs for food-products packaging decoration.

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 is predicted.

Heavy investment costs for companies into new machinery/equipment, at the same time costs for disposal of no longer usable machines and equipment. Our company most probably will have to invest into purchasing other machinery alternatives utilizing other types of decoration technologies (e.g. shrink- sleeving machines, desto-cups making, sticky- labels placing machines) which may

amount up to 2 mln €.

Loss of product diversity since no longer all products can be produced for technological and/or economic reasons: our clients will have no alternative way to minimize expenditures on their products decoration and labelling.

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.

The dramatic socio-economic outcome of a mercury-ban bears no meaningful relation to the comparatively very small amount of mercury that is really brought into the market by mercury-containing discharge lamps. 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 environmen*t and personal health.

This is particularly very important, resolving and promising on the roadmap for justified adherence to the continued use of mercury-containing UV discharge lamps versus the complete elimination of these for the critically-bound applications.

Nowadays we encounter some cases of indifferent attitude to inappropriate treatment or disposing of Hg-containing lamps. These are still the cases in some developing countries with absent or non-strict regulations in the field of environmental and population health control. This is not the case in our country: there is a regulation that such lamps cannot be disposed of as conventional waste or rubbish. Our company hands the old mercury-containing lamps over to specialized licensed commercial operators which deal with proper utilization and recycling of mercury-containing products.

We would like to strongly encourage policy makers to invest their effort into a well-organised recycling system including increasing the public awareness on the necessity of actively participating in the recycling loop. This is a win-win situation for all involved parties to the best outcome of having the best technologies available for the specific needs and *without banning* certain products, machines, technologies or markets for “the worse”.

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.

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