

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 family-owned producer of multilayer parquet flooring according EN 13489 based in Austria and employ 255 people. We manufacture engineered 2-layer and 3-layer wooden flooring and we use UV lamps for curing our UV-coating (free of solvents, free of formaldehyde etc.)

The percentage of UV-based products in our total production is 48% of our parquet flooring, which has been coated by UV-based products.

Our annual consumption of lamps is around 30 lamps.

We have 10 UV-curing units also containing inert atmosphere unit for future improvements and developments.

Our experiences with alternatives to UV lamps are as follows: all alternatives provide worse technical properties compared to UV-coats or they are much worse for the environment (cleaning waste water treatment etc).

UV lamps are still required for the following reasons: we are totally convinced that there is no better way to protect surface both technically very well and with lowest waste. There is plenty of future developments for UV-technology such as inert technology and Excimer matting technology, reduction of photo initiators etc. That's the reason for our ongoing investments for UV-technology.

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 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, and an extension should be requested at least until 2026 and beyond.

The reasons are:

- *there is no practical and technical solution for elimination or substitution via design changes or materials and components. The advantages are proven both scientifically and technically.*
- *no substitutes are reliable enough or giving less impact to the environment. The benefits outweigh compared to the risks of UV-technology.*

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

From our 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) still takes a lot of time. All benefits existing on theoretical calculations have not been proven in parquet industry for UV LED, as the savings of energy have to be used for active cooling. The curing is not satisfying for top coats at all.

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 as there has not been any real alternative until now to reach same surface properties on the same level of impacts to the environment.

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 photochemical reactions on our UV-coats). 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 not possible in our UV-line
- 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
 - installation of active cooling systems due to necessity of higher energy for parquet due to higher distance to the substrate
 - necessity for (other) pre-treatment technology
 - change of UV measurement equipment (different spectral sensitivity)
 - change of process speeds (usually substantial speed and productivity decrease) due to the need of higher energy when using UV-LED
 - heavy redesign of our machine equipment
 - complications like cross-sensitivity to daylight and/or artificial lighting

With respect to varnishes, replacement technologies based on LEDs can usually not provide the same degree of surface hardness, scratch resistance and product durability (automobile industry, wood industry)

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

- 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.

We have tried to run UV-LED, but the surface quality and the curing was poor and the biggest disadvantage was the little distance to the substrate. As wood sometimes has an unforeseen bow the distance of the UV-LED cannot be that little as in printing for example. When enlarging the distance, the power of UV-LED drops dramatically and it's not cured properly anymore. To overcome this, we might have to add more photoinitiators which we intend to reduce as they are harmful.

The investments in additional optics and cooling are tremendously high, the chemistry of our UV-coats would get more harmful to the people living on our parquet flooring to this is no real alternative to us.

- 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.

Please ask scientists or research institutes to answer this question in a better way than I can do that. We are industrial user and do not see any detailed roadmap to substitute this technology in intermediate time period.

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 waterborne varnishes, pre-treatment,), do not offer the same surface properties on parquet flooring compared to UV-coats. All waterborne systems have major issues on surface quality, haptics and above that huge challenges of waste water treatment.

UV-LEDs have not been implemented to parquet industry due to above problems of minimum distance to substrates and density of curing energy. If the wet surface touches the UV-LED-unit the board is damaged and has to be sorted out, in worst cases it has to be wasted. So the ecological loss of scratching the surface of wooden parquet is much higher than the benefits of UV-LED.

Furthermore the chemistry of the UV-coats must be changed to a more harmful one due to higher shares of photo initiators.

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. For our company roughly 30 pieces of lamps 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, our whole UV-curing line including all machines there would not be useable anymore. Stored UV materials, replacement lamps and machinery of a total value of € 30.000,- would have to be scrapped in our company.

Financial effect for our company without UV-coated parquet flooring: loss of almost 40% of our turnover!

- 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.

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.

But we don't know exact figures here.

- 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).

We don't have exact figure and so we can only assume the effects on our company.

As there is no real alternative to mercury doted UV-lamps we would have to stop selling UV-coated parquet flooring, which would result in:

- *We would lose at least 25% of our staff and could not supply many of our customers only buying UV-coated parquet flooring from us.*
- *The following business area would be discontinued: one third of our Germany market (our biggest market), almost 40% of our China market, 100% of our US-market, all south Italy market and so on.*

- The following business area would be transferred to locations outside of the EU/EEA: Actually more than 85 Mio. m² of wooden flooring is produced in EU annually, by banning UV-coats as a consequence of missing alternatives to mercury doted UV-lamps the majority of this volume will be lost to productions outside EU/EEA.
- Heavy investment costs of more than 2 Mio. Euros for our company into new machinery/equipment, which is not proven to be able to substitute as all the tests until now have failed. 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. We would lose one of our two main surface treatments!
- Our business would cease to exist.

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 environment and personal health.

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.

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.