

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-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

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)

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

⁴ 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”*

General Statement

The Ballastwater Equipment Manufacturers Association (BEMA) is an independent, non-profit trade organization that represents vendors, suppliers, and key partners in the ballast water treatment industry. BEMA provides coordinated, technical, non-commercial guidance to the ballast water market, the community of regulators, ship owners, and testing organizations. BEMA’s primary purpose is to provide its members with leadership and a unified voice to promote the application of effective technology in ballast water treatment operations consistent with applicable regulations and sound engineering practice.

A number of BEMA members employ UV disinfection as a treatment technology, and these UV systems are dependent on the use of lamps containing a small amount of mercury. There are currently thousands of such UV systems deployed on vessels sailing in worldwide trades. There are no other lamp technologies currently available that are viable to replace mercury vapor lamps, nor are there likely to be in the near future.

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 exemption wording should be retained, and an extension should be requested at least until 2026 and beyond. The reasons are:

One of the largest threats to oceanic life on the planet is defined by the United Nations to be the threat of invasive species. Click [HERE](#) for further details on the International Convention for the Control and Management of Ship's Ballast Water and Sediments. One solution to this threat is the use of environmentally friendly technology like filter and UV-based disinfection systems for removing aquatic invasive species from ballast water. Each year approx. 10 billion tons of ballast water is transported around the globe. For many BEMA members using filter and UV technologies, the only efficient way of treating this water is by using lamps containing a small amount of mercury. The use of filter and UV systems to disinfect the water has no ecological impact on the environment.

The need for UV lamps in our industry is regulated through the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention). The goal is to have equipped all relevant vessels with a Ballast Water Treatment System (BWTS) by September 2024. Filter and UV technologies will be installed on a large number of the relevant vessels, and further increase will follow the population of the world fleet from 2024 onwards. The number of relevant vessels is estimated to be in excess of 30,000 globally by 2024.

The regulations guiding the market are driven by the IMO (International Maritime Organization) and the US Coast Guard, resulting in equipment Type Approvals. Marine Classification Societies have been authorized to issue Type Approval certificates based on rigorous testing performed for each system. All filter/UV systems employ lamps using mercury.

BEMA member companies have described how to collect and recycle used lamps to approved receiving points around the world in their respective product documentation. This will reduce the amount of mercury polluting the environment to an absolute minimum.

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

The existing wording “Mercury in other discharge lamps for special purposes not specifically mentioned in this Annex” should be retained without modification. Eliminating the exemption or shortening the validity period does not make sense because the development of alternative solutions (e.g., based on UV LEDs) takes a long time, and there are currently no viable replacement lamp technologies, nor are there likely to be in the near future.

The availability of UV lamps containing mercury is indispensable for our industry since there are currently no other viable replacement technologies for UV disinfection in the ballast water treatment industry.

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 table 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 alternate substance while maintaining the specific beneficial properties of mercury discharge lamps have been ongoing for decades with no viable solutions to date.

There are other mercury-free types of discharge lamps and other light sources like UV-LEDs available with very severe limitations:

- Direct replacement (exchanging only the lamp) is not technologically 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
 - 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 the treatment system
- complications like cross-sensitivity to daylight and/or artificial lighting

- With respect to UV disinfection (water/air/surfaces), there currently is no real replacement available with a similar efficiency or with less impact on the environment. The affected markets carry well beyond vessel ballast water treatment systems.

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 mercury UV lamps with alternatives leads to a manifold of problems including quality issues, process downtime, productivity decrease, high investment costs, higher overall operational costs, but most importantly a non-functional product, which in its own right contributes to improve the environment significantly and on a much larger scale than the detriment of using mercury in the lamps.

There are currently no alternatives in the market as a substitute for the existing mercury UV lamps. Taking into consideration that ships operate globally, they might experience cold water, fresh, marine, and brackish water and turbid water on one single journey, loading and unloading in different harbours on one voyage. The BWTS has to cope with

all these different circumstances, and mercury lamps in filter/UV systems are the only viable way fulfilling the demands of the system set by legislation and Type Approval.

- 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 ballast water treatment applications.

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?

Competing technologies are used to treat ballast water, most notably systems that employ chemical injection or electrolysis (typically chlorine or chlorine-dioxide as the disinfectant, along with a neutralizing agent at discharge). BEMA has a number of members utilizing these technologies.

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?

Coastal ecosystems are extremely vulnerable to the threat of aquatic invasive species, and there can be a dramatic socio-economic impact to nearby communities that experience invasive species. There are numerous examples of this already (e.g., zebra mussels in the Great Lakes, tiger shrimp in the Gulf of Mexico, etc.).

The ballast water treatment market is huge, and thousands of vessels are already equipped with UV / Filter systems.

- 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 equipment on the market running with mercury discharge lamps would have to be considered as additional waste and would have to be disposed of. It is not economically and/or technologically feasible to retrofit existing equipment with alternative UV light sources.

If mercury UV lamps are no longer available, the entire BWTS has to be re-engineered and all existing equipment used to run the lamps would be obsolete. We are talking about hundreds of tons of electronic components.

The effect for our industry would be devastating. Everything around UV technology would need to be re-engineered and all Type Approvals would have to be renewed, with significant costs.

All vessels will have to replace their filter/UV systems with other ballast water technologies such as chemical injection or electrolysis.

- 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, re-tail, users of MRI devices, etc.

For our European members and sub-suppliers, the consequence would be to place the operations outside Europe. For European customers, the consequence would be that they could only obtain new lamps outside Europe and therefore have to stop running, or install chemical-based systems to operate within Europe.

- 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).

Many European-based BEMA members and sub-suppliers may be forced to close or move outside the EU, and the cost of exchanging the world's fleet will amount to billions of dollars.

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.

We/our customers would have to perform investments in systems and machinery to a total value of billions of euros.

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 very small amount of mercury that is really brought into the market by mercury-containing discharge lamps both in absolute amounts and compared to other industries using mercury. Used lamps are 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 minimize the 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”.

It is also important for us to emphasise the volumes of mercury used in lamps and largely recycled, and compare this with the spills coming from mining and other heavy industries. This is not for the sake of blaming others, but in order to get the best result and minimize the socio-economic impact.

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.

Ballastwater Equipment Manufacturers Association (BEMA)

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