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 re-quested 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.

1.2. 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),*

[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

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"*

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 re-quested duration of the exemption. To support your views, please provide detailed technical argumentation / evidence in line with the criteria4 in Art. 5(1)(a).

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

Answer

We support the request for the renewal of the exemption „ Mercury in other discharge lamps for special purposes not specifically mentioned in this Annex" for the maximum validity period.

For the crosslinking of UV-coatings we do not see a replacement for Hg-lamps which can achieve a similar performance and an equally broad versatility in use. For the near future we do not expect this situation to change.

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 ap-plications in the scope of the requested exemption they are relevant.

   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.

   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.

Answer

Alternative radiation sources for the crosslinking of UV-coatings

- gas discharge lamps with alternative filling

  To our knowledge all R&D activities to replace Hg in gas discharge lamps have been without success. Therefore a simple replacement of Hg-bulbs in existing equipment is no option.

- electron beam curing (EBC)

  EBC is a possible technology for curing coatings. It shows some advantages compared to the use of Hg-lamps, like photoinitiator-free coatings and high crosslinking density. On the other side EBC has significant disadvantages which make it very limited in use.

  EBC requires an inert nitrogen atmosphere in the curing zone. In many cases this can be very difficult and costly to achieve: small panels with high thickness, panels with drillings like for door hinges …

  In applications, where coated areas are cured from multiple directions with small sized Hg-lamps, the use of EBC is hardly possible due to radiation shielding requirements.

  Additionally the investment cost for each single EBC unit can exceed the cost for a UV-unit by factor ten. Considering a finishing line with appr. 10-20 UV-lamps this means EBC can not be an economical replacement.

- UV-LED

  UV-LED´s have the potential to replace Hg-lamps partially. In our field of business several finishing lines are already up and running with a combination of UV-LED´s and Hg-lamps. Using this combined curing technology has proven to be a reasonable way to work.

  Nevertheless UV-LED´s can not be considered as an overall replacement for Hg-lamps.

  The combination of todays UV-LED´s (wavelength+output) and todays chemistry (photoinitiators, synergists and resins) leads to many restrictions where UV-LED´s can not be used.
  - The lack of performance in surface curing makes UV-LED not suitable for curing topcoats in a way that surface resistance and durability are not affected.
  - The necessary adjustment between LED wavelength and photoinitator leads to strong yellowing effects which are not acceptable especially in the production of white surfaces.
  - The formulation of special topcoats, like high-gloss clearcoats or ultramatte topcoats is not possible due to the limitations in LED suitable raw materials.
  - UV-coatings for special low viscous applications, like edge coating are not possible to do with LED suitable raw materials.

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?

Answer

The following list shows producers of alternative equipment (without claim of completeness)

EBC:	Crosslinking AB	UV-LED:	AMS Baldwin
	Energy Sciences Inc.		Efsen
	PCT		Heraeus
			Hoenle
			IST Metz
			Phoseon
			Uviterno

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?
   b. What are the volumes of additional waste to be generated should the requested ex-emption not be renewed or not be renewed for the requested duration?
   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? 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.
   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).

Answer

Our company has a strong focus on environmental friendly coatings materials. For that reason UV-coatings, as very efficient and emission-free materials have a share of >50% of our portfolio.

A decreasing demand for UV-coatings due to the ban of Hg-lamps, is therefore a serious threat for our employment situation.

Of course companies could evade the ban of Hg-lamps by moving production facilities outside the EU. Nevertheless we could hardly supply them in a successful way without having the possiblity to use Hg-lamps in R&D and QC. This will result in a severe loss of business.

From an ecological point of view the approach to fully replace Hg-lamps by UV-LED is questionable. For used Hg-bulbs a recycling system is established, whereas the change to UV-LED might lead to increasing amounts of electronic waste.

A ban on Hg-lamps will results in huge rebuilding efforts for existing finishing lines. The curing units have to be exchanged completely including electrical cabinets, as a simple exchange of only the UV-source is not possible. Considering 10-20 Hg-lamps in a finishing line this will mean a significant amount of electronic waste.

Furthermore the actual developement towards more sustainable UV-coatings based on renewable raw materials is strongly offended by the demand for LED suitability.

5. Any additional information which you would like to provide?

   Remmers Industrielacke GmbH is a producer of wood-coating materials for the furniture, board and flooring industry. As a technology driven partner we supply our customers with tailor made surface solutions.

   Our product range contains solventborne laquers, wb-stains and laquers and radiation curable laquers. (UV, UV-LED, EBC) With 200 employees we produce appr.12.000 tons per year, of which UV-coatings are a major part.

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.