# Consultation Questionnaire Exemption No. 18b (renewal request)

## *Exemption for „Lead as activator in the fluorescent powder (1 % lead by weight or less) of discharge lamps when used as sun tanning lamps containing phosphors such as BSP (BaSi2O5:Pb")*

### Abbreviations and Definitions

| | |
|---|---|
| AlGaN | Aluminium gallium nitride |
| BSP | Barium silicate phosphor, BaSi2O5 :Pb also known as silicic acid ($H_2Si_2O_5$), barium salt (1:1), lead-doped |
| LEU | LightingEurope |
| LVD | The Low Voltage Directive (LVD) 2006/95/EC |
| NARVA | NARVA Lichtquellen GmbH + Co. KG |
| Pb | Lead |
| YPO | Yttrium phosphate phosphor |

### Background

The Oeko-Institut and Fraunhofer IZM have been appointed within a framework contract[1] for the evaluation of applications for the renewal of exemptions currently listed in Annexes III of the new RoHS Directive 2011/65/EU (RoHS 2) by the European Commission.[1]

LightingEurope and NARVA Lichtquellen GmbH + Co. KG have submitted requests for the renewal of the above mentioned exemption entries, which have been subject to a first completeness and plausibility check. The applicants were requested to answer additional questions and to provide additional information that shall be made available on the request webpage of the stakeholder consultation (http://rohs.exemptions.oeko.info/index.php?id=228).

Both applicants request the renewal of the Ex. 18b for the maximum possible duration and with the same wording that currently appears in Annex III.

According to LEU[2] the exemption covers indoor sun tanning discharge lamps containing lead as an activator in the fluorescent powder. Similar UV lamp types are produced for dermatological and phototherapeutic uses under medical supervision and are explained to be regulated through

[1] Contract is implemented through Framework Contract No. ENV.C.2/FRA/2011/0020 led by Eunomia

[2] LEU (2015), Request to renew Exemption 18b under the RoHS Directive 2011/65/EU Lead as activator in the fluorescent powder (1 % lead by weight or less) of discharge lamps when used as sun tanning lamps containing phosphors such as BSP (BaSi2O5 :Pb), submitted by Lighting Europe to the EU COM on 16.1.2015

exemptions in Annex IV of the RoHS Directive[3]. These lamps are produced in T12, T8 and T5 diameters and CFL (compact fluorescent lamp) configurations. The phosphors contained in these lamps are manufactured from the same components but can vary in spectral discharge across the UVA and UVB spectrum in respect of the specified proportional phosphor mix. The lamps are installed in various commercial- and residential indoor tanning equipment. This can be in the form of a sun tanning bed or booth or a table top appliance for facial tanning.

Such lamps and equipment are governed by EU regulations concerning the allowable output of ultraviolet radiation permitted within a determined exposure time. The EU regulates and enforces tanning equipment and the installed lamps which are marked on the lamps by a specific "X, Y" code system for the erythemally-weighed UV radiation in accordance with EN standard 61228 Ed.2 (2008-01). The above mentioned EN standard forms the basis of lamp marking, and limits possibilities of substitution by lead-free phosphors. The regulatory demands come from the Low Voltage Directive (LVD) 2006/95/EC Administrative Co-operation working group. LEU details that on the 18th meeting of this working group (14.11.2006, Brussels) among others it was agreed, that the maximum erythemal-weighted irradiance should not exceed 11 SED/h (0.3 W/m2). The consultants understand that this limitation is to apply to lamps falling under Ex. 18b, for the purpose of preventing biological effects of ultraviolet radiation relevant to health with particular reference to sun beds for cosmetic purposes.

LEU states that the typical lifetime of these lamps to range from 600 to 1000 hours with a session or usage time that ranges approximately from 5-30 minutes. These lamps are not used for the production of visible light so general lighting efficacy standards do not apply. UV output efficacy (UVA radiation out vs. electrical power in) is typically between 15% and 25%, but the real measure is with what power the desired effect is reached. This is governed by the equipment, lamp type, lamp power, UV output measured by standardized means, user skin type and other such factors. [4]

LEU explains that the intent of tanning lamps is to produce artificial sunlight to replicate sunlight exposure for the human body (similar to that as produced by the sun) yet applied in calculated doses as regulated by European regulations. These lamps use fluorescent materials (also named phosphors) in order to produce a specific light spectrum, important for the efficiency of treatment. Primary wavelengths of "light" produced by these lamps are in the UVA and UVB regions or 290- 400nm. Barium silicate (BaSi2O5:Pb) phosphors are used, containing 1% or less lead, which is an activator for these fluorescent powders. The lead activator is required to allow the barium silicate phosphor to fluoresce. It transforms the 254 nm radiation to the requested UV (290nm-400nm) radiation. Lighting Europe explains that the presence of lead is important for producing the specific spectrum of the light output to ensure the effectiveness of the various treatments. A reduction in the lead content would cause either a loss of output or not be sufficient to activate the phosphor. Using other phosphors that do not contain Pb would result in a change in the output spectrum, impacting the efficiency of the treatments. [5]

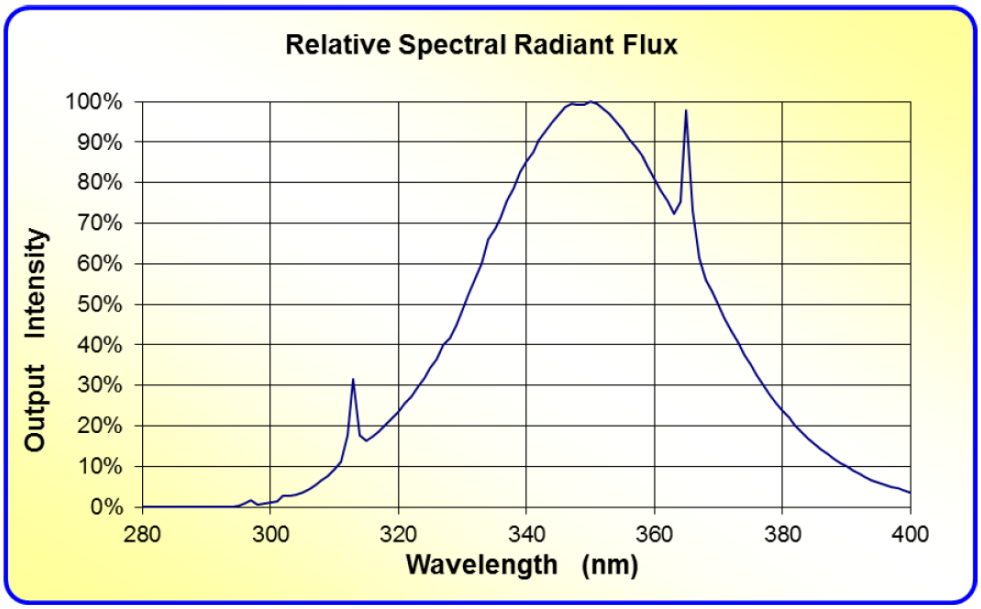
LEU provides the following figure to demonstrate the typical spectral output of lamps falling under Ex. 18b:

[3] Ex. 34 of Annex IV of the Directive allows the use of such lamps in extracorporeal photopheresis and a further eexemption for other medical uses has been applied for by Lighting Europe and is being evaluated – for further details see http://rohs.exemptions.oeko.info/index.php?id=223

[4] Op. cit. LEU (2015)

[5] Ibid.

**Figure 1: Example of Typical UVA/UVB spectrum of an indoor tanning lamp, Source: LEU, 2015**




LightingEurope claims that there are no alternative non-lead activated phosphors available today that provide the same or equivalent spectral radiation. It is explained that any possible alternative to Pb in BSP type of phosphor would need to fulfil following criteria:

- Lamp specification must be same with regard to:
  - UVA and UVB output, and with that Erythema
  - Spectral power distribution
- Compatibility (electrical/mechanical spec) must be OK
- Reliability must be OK
- Safety must be OK
- Lamp operation must be the same in the different equipment in the market
- Lamp start-up and time to peak intensity must be the same.
- Lamp intensity must be the same.
- Lamp maintenance/depreciation must be the same,
  - Tanning result on patients
  - Compliance with CE regulations (X/Y coding system for tanning lamps according to EN 60335-2-27)
  - No (negative) side effects
  - Economically feasible. Equipment in use today is calibrated and requires lamps to meet output limits using X/Y coding system. Different lamps would need revalidation.

According to LEU, only one alternative material currently comes close: Ce doped YPO phosphor, and provides a comparison of the spectrum of the two phosphors. LEU explains however that the spectral distribution shows differences and that the ratio of UVA and UVB output is different and would not comply with CE regulations for tanning lamps. A second problem for the Ce doped phosphors is

explained to be the variations of the UV output over the lamp length due to coating thickness, affecting the skin treatment effectiveness (i.e. with regard to erythema and non-melanoma skin cancer). LEU further explain that though alternative lighting technologies could be developed in the future to allow for replacing BSP lamps and equipment, these are yet to be developed, and would require recertification of both lamps and equipment. For example "there are materials available from which LEDs can be made that generate UV light (like AlGaN), however the efficiency (radiated power out / electrical power in) of LEDs with those materials is still very low. In the UVC (100-280nm) and UVB (280-315nm), the WPE (wall plug efficiency of LEDs are below 1%), where the wall-plug efficiency of fluorescent lamps are close to 20% or even higher."

Regarding possible substitutes, NARVA[6] states that "*Possible substitutes like YPO are significantly more expensive and require significant changes to the design of the lamp as well as a new certification process for all sun tanning beds caused by a completely different UV spectrum of YPO*".

For details, please check the applicant's exemption request at:
http://rohs.exemptions.oeko.info/index.php?id=251

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 (RoHS II), which can be found under:

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32011L0065:EN:NOT

If you would like to contribute to the stakeholder consultation, please answer the following questions:

**Questions**

1. The applicants have requested the renewal of Ex. 18b of Annex III, with the same wording formulation and for the maximum possible duration.
    a. Do you agree with the scope of the exemption as proposed by the applicant?
    b. Please suggest an alternative wording and explain your proposal, if you do not agree with the proposed exemption wording.
    c. Please explain why you either support the applicant's request or object to it. To support your views, please provide detailed technical argumentation / evidence in line with the criteria in Art. 5(1)(a).

2. LEU state "*It is estimated that over 90% of indoor tanning lamps produced and used throughout Europe are manufactured with BSP (BaSi2O5 :Pb) phosphors containing 1% or less lead as an activator*)".

    a. Please provide information to detail what lamps are used in the remaining 10% of indoor tanning applications.
    b. Do such lamps contain RoHS substances and if so how does the amount thereof compare with the amounts of RoHS substances contained in BSP based lamps?
    c. Assuming that the RoHS substance amounts of these alternatives are comparable or lower than their BSP- containing counterparts, why are these type of lamps insufficient for use for a wider range of tanning applications?

[6] NARVA (2014), Exemption Request for using Lead in Fluorescent Lamps for Tanning, submitted by NARVA Lichtquellen GmbH + Co. KG to the EU COM on 19.12.2014

3. The information provided by LEU clarifies that the spectral output of cerium based phosphors would not provide the required efficiency for various skin treatment applications. This is understood to be relevant for the use of Pb in BSP phosphors used for medical applications and is yet to be further explained in the context of tanning lamps.

    a. Please explain if you agree that the changes in spectral output would have a negative health impact in tanning applications;

    b. Please provided information to clarify what negative impacts could be expected in this regard or why such impacts are only relevant to medical applications;

4. Please provide information concerning possible substitutes or developments that may enable reduction, substitution or elimination, at present or in the future, of Pb used as an activator for BSP phosphors used in tanning lamps.

    a. In this regard, please provide information as to alternatives that may cover part or all of the applicability range of Pb used as an activator for BSP phosphors used in tanning lamps;

    b. Please provide quantitative data as to application specifications to support your view.

5. Please provide information as to research initiatives which are currently looking into the development of possible alternatives for some or all of the application range of Pb used as an activator for BSP phosphors used in tanning lamps. In particular please provide information as to possible developments of LED technology that could allow the manufacture of LED lamps of comparable spectral output and with sufficient output efficiency.

    a. Please explain what part of the application range is of relevance for such initiatives (in what applications substitution may be possible in the future).

    b. Please provide a roadmap of such on-going research (phases that are to be carried out), detailing the current status as well as the estimated time needed for further stages.

**Please note that answers to these questions are to be published as part of the available information relevant for the stakeholder consultation to be carried out as 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.**