



**Fraunhofer** Institut  
Zuverlässigkeit und  
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## Adaptation to scientific and technical progress under Directive 2002/95/EC

Final report

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## 4.24 Exemption No. 18

**“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) as well as when used as speciality lamps for diazo-printing reprography, lithography, insect traps, photochemical and curing processes containing phosphors such as SMS ((Sr,Ba)2MgSi2O7:Pb)”**

### 4.24.1 Description of exemption

Following a request of the European Lamp Companies Federation (ELC), an exemption had been granted for lead activated UV emitting phosphors as used in low pressure Hg based fluorescent lamps. The functionality of this substance can be described as follows: the lead containing solid phosphor matrix determines both effective UV-C absorption (from the low pressure mercury discharge) and effective generation of (mainly) UV-A emission.

Applications for lamps containing lead as activator in the fluorescent powder are:

- sun tanning lamps, containing phosphors such as BSP (BaSi2O5:Pb) with an emission peak of 350 nm (ELC quoted in [1]).
- certain specialty lamps (applications: diazo-printing reprography, lithography, insect traps, photochemical and curing processes), containing phosphors such as SMS ((Sr,Ba)2MgSi2O7:Pb) and generating a broad emission peak centred at 360 nm (ELC quoted in [1]).
- pet care fluorescent lamps (e.g. for reptiles and birds) [2].

The specific energy demand of these kinds of lamps ranges from 4 to 200 W.

According to the current information brought forward by ELC, the total annual amount of lead put on the EU market is less than 1 ton. In the previous review of the request for this exemption, ELC had numbered the total annual amount of lead in these applications being approx. 600 kg (total EU market, 2004 figures) [1].

### 4.24.2 Justification by stakeholders

ELC forwarded the only contributions within this review [2] [3]: according to the information provided by ELC, a powder without lead is currently under development, however, proof of functionality and performance for different applications is needed. Possible substitutes could be rare earth phosphates, activated by rare earth ions<sup>39</sup>. However, ELC comments that a simple material substitution was not feasible, since a broad lamp product range and applica-

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<sup>39</sup> YPO<sub>4</sub>:Ce as an example for a lead-free UV emitting phosphor, La(PO<sub>4</sub>):Ce as an example for a UV-B emitter.

tion range needed to be covered. A change to lead-free powder was not going to not change the energy efficiency.

The lamp industry (manufacturers and suppliers) searches for alternatives. Technical feasibility has not been demonstrated so far beyond development status. Especially in the case of sun tanning lamps there are specific requirements of safety standards which are explained by ELC as follows [2]:

*“In accordance with EN standard 61228 Ed.2 (2008-01) sun tanning lamps need to be marked with indicators for the erythemally-weighted UV radiation, so-called X and Y marking. In order to satisfy the requirements for new lamps and for retrofit lamps for existing sun beds, sun tanning lamps usually contain a mixture of two fluorescent powders, one emitting primarily UV-A and one primary emitting UV-B. When properly mixed, desired output spectrum arises. The lead-free phosphor however emits both UVA and B. In practice not all required spectra can be created. The abovementioned EN standard forms the basis of lamp marking, and is required. It clearly limits room for substitution by lead-free phosphors. The regulatory demands come from the LVD ADCO group.”<sup>40</sup>*

Against this background, ELC calls for a continuation of the existing exemption for sun tanning lamps. For other applications a feasible expiring date of the existing exemption should be 18 months after publication.

#### **4.24.3 Critical review**

According to the information provided by the branch association, substitution of lead in UV emitting phosphors seems to be feasible from a scientific point of view. The time frame for implementation of 18 months after publication would be considered technically as challenging but practicable.

Unlike all other applications, sun tanning lamps need to fulfil specific safety requirements, and corresponding standards make substitution more difficult. This does not eliminate the possibility that consumer safety benefits are outweighed through substitution of lead activated UV emitting phosphors. Taking this situation into account and against the background that the amounts of lead are relatively small, a continuation of the current exemption seems appropriate.

#### **4.24.4 Recommendation**

Taking the above-mentioned implications into account, the existing exemption covering a broad range of applications should not be continued. A transition period of 18 months after publication (mid 2011) should be granted in order to ensure the technical implementation of

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<sup>40</sup> [http://ec.europa.eu/enterprise/electr\\_equipment/lv/guides/index.htm](http://ec.europa.eu/enterprise/electr_equipment/lv/guides/index.htm)

substitutes. In order to ensure consumer safety in the case of sun tanning lamps, we recommend a revised wording of the current exemption as follows:

*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 ( $BaSi_2O_5:Pb$ ).*

The consultants propose 31 July 2014 as expiry date, which is beyond the next RoHS Annex Revision, giving stakeholders the opportunity to submit evidence for the further need of this exemption.

According to the stakeholder's contribution, it is not possible to appoint whether and to which extent applications being attributable to WEEE categories 8 and 9 are affected by this specific exemption.

#### 4.24.5 References

- [1] Gensch et al. 2005; Adaptation to scientific and technical progress under Directive 2002/95/EC. Monthly report 2, final version. Freiburg, 28 October 2005
- [2] ELC submission to RoHS exemption #18. Brussels, 31st March 2008
- [3] Further ELC input to RoHS Exemptions 5, 7a, 16, 17, 18, 19, 20, 26. Brussels, 8th August 2008

#### 4.25 Exemption No. 19

**“Lead with PbBiSn-Hg and PbInSn-Hg in specific compositions as main amalgam and with PbSn-Hg as auxiliary amalgam in very compact Energy Saving Lamps (ESL)”**

##### 4.25.1 Description of exemption

The current exemption was granted on request of the ELC for very compact Energy Saving Lamps (ESL) with PbBiSn-Hg and PbInSn-Hg in specific compositions as main amalgam and PbSn-Hg as auxiliary amalgam. According to the information provided by ELC to justify the exemption these substances control the Hg-vapour pressure inside small compact fluorescent lamps (especially the types with a closed cover) stabilizing the light output and lamp efficacy over a wide ambient temperature range, which would make it possible to replace incandescent lamps by energy saving lamps in a wide range of applications, both indoor and outdoor. Energy Saving Lamps would only be producible in GLS dimensions and shape when Pb-containing amalgam could be applied.

The current annual amount of lead is numbered by ELC as 200 kg/yr [2]; this value is corresponding to indication given in 2005 with about 300 kg (assuming that 15 Million out of 150 Million CFL-I lamps sold across Europe contain max. 20 mg Pb contained in amalgam (total EU market, 2004 figures, [1])).