

## **Stakeholder consultation on exemptions from the substance restrictions in electrical and electronic equipment (RoHS Directive) running from 26.06.2012 to 04.09.2012**

Results from previous evaluation for exemption request 7 “Mercury in single capped (compact) fluorescent lamps not exceeding (per burner) - for long-life lamps <30W (specified with a lifetime of >15 khrs)”

(Excerpt from Öko-Institut Report 2009)

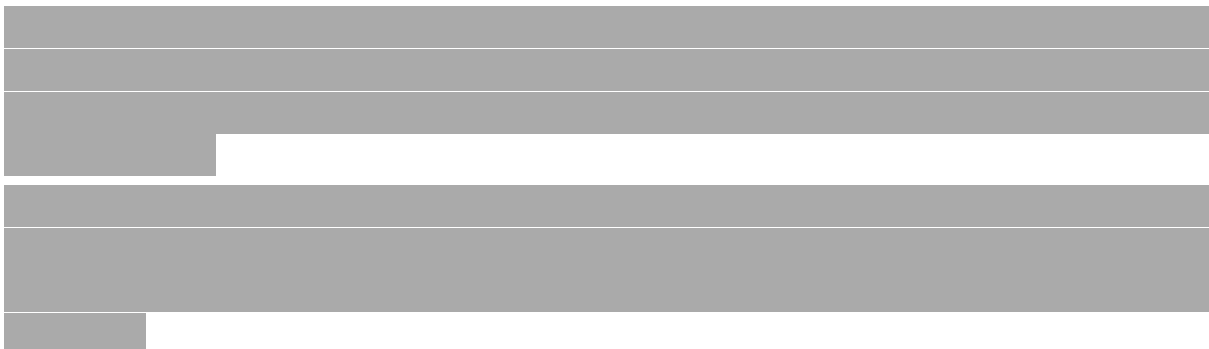
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## 4.2 Exemption 1

### “Mercury in compact fluorescent lamps not exceeding 5 mg per lamp”

#### 4.2.1 Summary of contributions

ELC has provided a proposal on single capped fluorescent lamps depending on wattage, on general and special lighting purpose and on shape for smaller diameters (T4 and T5):

- General lighting purpose < 50 W: 3,5 mg;
- General lighting purpose  $\geq 50$  and < 150 W: 5 mg;
- General lighting with circular or square structural shape and tube diameter  $\leq 17$  mm (e.g. T4, T5): 7 mg;
- For special purpose: 5 mg.

In the Annex of their 15 October contribution [1] ELC has stated that single capped fluorescent lamp classification according to standard EN 60901 does not fit the current RoHS classification and that thus the wording “compact fluorescent lamp” (CFL) should not be used. Rather the CFL category should be referred to as “single capped fluorescent lamp”. The following picture has been added as illustration of a subdivision by topology and cap:

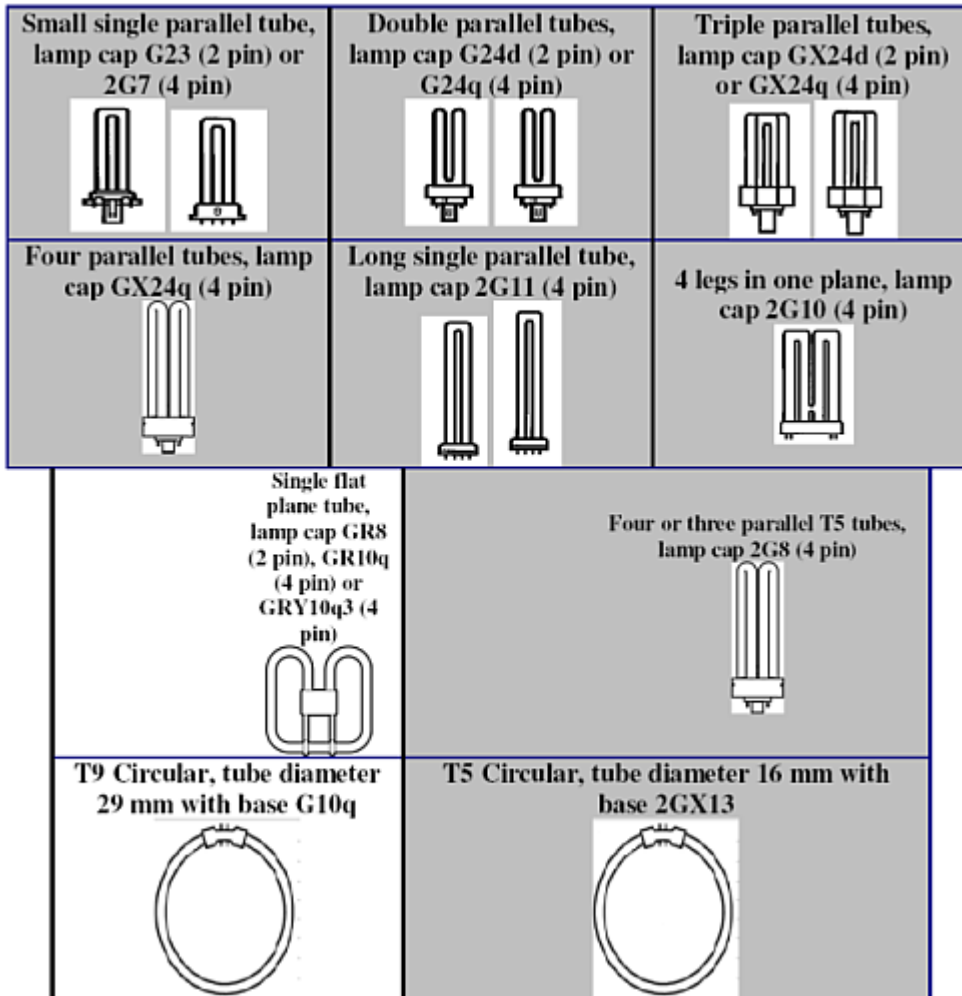


Figure 3 Overview on single capped fluorescent lamps [1]

Single capped fluorescent lamps with a wattage  $\geq 150$  W have not been included here since they are said to be newly entering the market without clear necessary mercury amount. ELC thus proposes to include them into another exemption with a limitation of 15 mg.

The lamp manufacturer Megaman (producing such high wattage single capped fluorescent lamps) has stated that their “Clusterlite” model cannot be considered as single-capped fluorescent lamp since they are not covered by the relevant standard (IEC 61199) and are thus currently covered by exemption 4 without any mercury limit [2].

Based on the extract of findings from the US and EU market, environmental NGOs have proposed the following limits for CFLs [3]:

- CFL for general purpose: 2 mg;
- CFL for special purpose: 3 mg.

These proposals are based on a different classification than the one provided by ELC and which is based on US technology analysis:

- CFL models that have an integrated ballast;
- CFL models that have a separate ballast.

Furthermore, environmental NGOs request their proposed values to enter into force by 2010 when the expected EU ban on incandescent lamps will take effect in order to ensure availability of low mercury CFLs. Also, they claim that ELC has not provided data to support the proposed limits.

The report on Mercury in lamps commissioned by the Swedish Chemical Agency (KEMI) [4] claims that “several source from the industry has expressed that technology is available to produce lamps with a mercury content of below 1 mg. [...] A number of manufacturers declare it may be possible in the time perspective of 1-3 years to comply with a lower limit of 2 mg or even 1mg for many fluorescent and metal halide applications without significant reduction of lifetime and efficacy. For other manufacturers, which today have no access to the best technology, it may not be possible.”

An additional comment sent by KEMI [5] states the following:

“The fluorescent tubes need very small amounts of mercury in the lamp to ignite and then sustain the discharge producing enough UV-photons for the light creating process. In the T5 25 W tube the specific needed amount is 0.01 to 0.05 mg mercury and it is comparatively about the same in the other tubes and CFLs. The tube also consumes mercury during life. It is mostly the glass envelope and the phosphors which absorbs mercury during the discharge. The light source companies have developed methods declining the absorptions of mercury. For example special sheltering layers have been attached on the glass and phosphors decreasing the mercury consumption. Also some problems is connected to the dosing of the mercury stuff but as we have been told the best methods here make it possible to limit the uncertainty to about 0.2 mg of mercury. Probably Philips and some other stakeholders already have the technology to delimit the necessary amount to 1 mg. Concerning the time for the new legacy 2012 it should be possible for the producers to meet the new proposals when they have three years extra from now<sup>14</sup>.”

Under the corresponding EuP Lot 19 an indicative benchmark is given for non-directional household lamps: “the energy efficient compact fluorescent lamps with the lowest mercury content include not more than 1 mg mercury.”<sup>15</sup> In this context the lamp mercury content is the mercury contained in the lamp and is measured according to the Annex of Commission Decision 2002/747/EC<sup>16</sup>.

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<sup>14</sup> I.e. until 2012

<sup>15</sup> Working document on a possible commission regulation implementing directive 2005/32/ec with regard to non-directional household lamps.

<sup>16</sup> In this regulation the mercury content is the average content of 8 lamps out of a 10 lamps sample and where the highest and lowest value have been deleted.

The EuP proposal for requirements on mercury content in CFLi lamps is included in the table below. It is the current value in the RoHS Directive for Tier 1 and on the value of the Community Decision (2002/747/EC) for Tier 2. For Tier 3, it is based on measurements made by VITO on CFLi's that are currently available on the market and confirmed by the statement of ELC at the stakeholder meeting in Brussels on 23rd November 2007 that 'a maximum of 1mg of mercury for CFLi's is possible'.<sup>17</sup>

Tier 1 <sup>18</sup>	Tier 2	Tier 3	Benchmark
Hg ≤ 5,0 mg	Hg ≤ 4,0 mg	Hg ≤ 2,0 mg (or 3,0 mg if lamp life > 15000 h or 4,0 mg if lamp life > 20000 h)	Hg ≤ 1,0 mg

This is contradictory to what ELC has requested in [1]. ELC has been confronted with this contradiction and stated the following [13]:

“The wattage differentiation in the ELC contribution takes into account that high wattage CFL, which are normally not used for domestic lighting, need more mercury than those with lower wattages. [...] Our ELC Working Group ET is not aware of this confirmation [referring to the above citation in the EuP report] and where the citation comes from. If this confirmation has been given, it was not correct from technical point of view. If there are really such lamps on the EU market this value addresses the average value per lamp (vs. a limit value) and does not take the variances within single mercury doses into account. Even if this value can be realized for some of the above mentioned lamp types/wattages this value can not be regarded as THE ONE general BAT regarding mercury amount [...]”

#### 4.2.2 Critical review

From the above it can be seen that many different stakeholders argue from many different point of views and that many different limit values are proposed. A comparison and the finding of a compromise are hindered due to the fact that hard fact data is lacking in most of the cases. Only environmental NGOs have done extensive data research, however not being able to trace back the specific technical requirements for the use of mercury in depth. Data provided in the context of the EuP preparatory study and forming the basis of the recommended limit values is not publicly available and can thus not be traced-back. Same accounts for the proposed limits by ELC which are not based on publicly available data. In [4] it is clearly stated that “an overall problem during this study has been to obtain unanimous

<sup>17</sup> Vito 2008: Lot 19: Domestic lighting, Final Task Report, Task 8: scenario- policy- impact and sensitivity analysis, October 2008.

<sup>18</sup> The working document includes the following dates: stage 1: 1st October 2009, Stage 2: 1st October 2011, Stage 3: 1st October 2013.

information about the situation of the mercury containing lamps on the EU market and what is reasonable to accomplish.”

The overall environmental policy goal is to reduce energy consumption thus reducing GHG emissions from power generation. Energy efficient lamps can support this overall need. Even if mercury is contained in such lamps, mercury-related emissions through electricity generation are relatively higher. Scientific data has proven that mercury emissions are reduced more when the lamp itself consumes less electricity for the generation of light than when using mercury-free less efficient lamps<sup>19</sup>.

From an overall environmental perspective it is more important to satisfy market demand and reduce mercury emissions due to electricity generation than to reduce the mercury content of the lamps themselves. It should thus be a goal of mercury limits set under RoHS not to hinder meeting the increasing market demand on energy-efficient lamps.

Concerning high wattages, long lifetime, CCFL, special purpose and non-linear CFLs (square and circular) different values have been brought forward (see above). Most of them are not supported by market data. Environmental NGOs have questioned ELC’s statement that there is a correlation between lamp wattage and mercury content since their market data does not show such a correlation. However, it has to be stated that environmental NGOs have only looked at lamps up to 80 W. The correlation of long lifetime and mercury content as stated in the above EuP table is also not supported by market data.

Furthermore, ELC uses a different definition / classification than other stakeholders making a comparison between the different proposed values impossible. Also, the scope of the EuP values refers to domestic lighting only which is not necessarily equivalent to “general purpose” as used by ELC and environmental NGOs.

#### **4.2.3 Recommendation**

For general purpose CFLs a limit value of 2 mg – as proposed by environmental NGOs and by the EuP preparatory study on Lot 19 – is supported by market data. Environmental NGOs request this limit to be set by 2010, while EuP sets end 2013. However, the overall consequences on lamp market and its availability to meet increased demand are not known since currently only one lamp manufacturer is able to produce CFLs for general lighting purposes

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<sup>19</sup> This is described as follows in [5]: “Because mercury-containing lighting is more energy efficient than conventional incandescent lighting, less energy is needed to make the required electricity, thus translating to reduced mercury emissions from coal-burning power generating plants. The amount of mercury pollution that is offset using more efficient lighting depends on the type of lamps used and the fuel mix of the power plant generating the electricity. As analysed recently at the EEB conference, June 2008, by Peter Maxson, according to the US EPA, CFL is a “drop-in” substitute for incandescent, consumes up to 75% less electricity, causes the generation of substantially less CO<sub>2</sub>, has up to 10 times longer lifetime, is a quick return-on investment, according to some USA estimates only 11% of Hg content would be released when a CFL is landfilled, and the total Hg release may be far lower when using a CFL than when using equivalent incandescent.”

with a 2 mg Hg content. Additionally, CFLs for special purposes cover a very broad range of different lamps. These lamps with different range of performances can be classified by their wattage. Hence, the contractor recommends to follow the ELC proposals based on wattage classification in order to ensure the coverage of market demands.

For CFLs for general lighting purposes with a wattage higher than 150 W a mercury limit of 15 mg is recommended, following the ELC proposal and acknowledging that in this class development of CFLs is in an early stage. However, a revision of this limit in two years is strongly suggested as these lamps are newly entering the market.

For special shape CFLs smaller or equal to T5 a limit value of 7 mg as proposed by ELC is recommended. Market data cited by environmental NGOs supports a limit value of a maximum of 8 mg for any non-linear fluorescent lamp. The 7 mg limit value is thus considered to be feasible at least for those lamps smaller or equal to T5.

Concerning special purpose lamps environmental NGOs have proposed a 3 mg limit for those lamps that have been registered as being of special purpose. ELC requests a 5 mg limit and delivers a qualitative description of what is to be considered of special purpose (cf. section 4.5.10). For both limit values comprehensible market data is missing. It is recommended to request from manufacturers to clearly identify special purpose lamps together with a justification on why they cannot be covered by any of the existing limit values and to deliver according market data in order to allow setting an appropriate limit value.

Recommended wording exemption 1:

*Mercury in single capped fluorescent lamps not exceeding (per burner<sup>20</sup>)*

- *For general lighting purposes < 50W: 3,5 mg*  
*For general lighting purposes ≥ 50W and < 150: 5 mg*  
*For general lighting purposes > 150W: 15 mg*
- *For general lighting purposes with circular or square structural shape and tube diameter ≤ 17 mm: 7 mg*
- *For special purposes: 5 mg*

As the development of the market and of the technology for CFLs for general lighting purposes >150W within the next years is especially difficult to assess, a revision of the Hg limit value two years after publication is recommended (31. December 2012).

For all other lamps covered by exemption 1 “Mercury in compact fluorescent lamps“ the 31 July 2014 is recommended as expiry date. Furthermore, the contractor recommends notifications for special purpose CFLs in order to collect data and information for future revisions of the Annex.

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<sup>20</sup> This has been added by ELC in [12] and is explained as follows: “In case of one lamp containing more discharge vessels / burners (meaning the light giving unit, not yet assembled into a final product). [...] E.g. so-called 3-way lamps, where 2 fluorescent discharge vessels are contained in one lamp.”