



Fraunhofer Institut Zuverlässigkeit und Mikrointegration

Adaption to scientific and technical progress under Directive 2002/95/EC

Results previous evaluation Exemption No. 3

"Mercury in straight fluorescent lamps for special purposes"

(Excerpt from ERA report 2004)

Öko-Institut e.V.

Freiburg Head Office

P.O. Box 50 02 40 79028 Freiburg, Germany **Street Address** Merzhauser Str. 173 D-79100 Freiburg **Tel.** +49 (0)761 – 4 52 95-0 **Fax** +49 (0)761 – 4 52 95-88

Darmstadt Office

Rheinstraße 95 64295 Darmstadt, Germany **Tel.** +49 (0)6151 - 81 91-0 **Fax** +49 (0)6151 - 81 91-33

Berlin Office

Novalisstraße 10 10115 Berlin, Germany **Tel.** +49 (0)30 – 28 04 86-80 **Fax** +49 (0)30 – 28 04 86-88

2. Review of the proposed exemptions

2.1 Mercury in straight fluorescent lamps for special purposes

2.1.1 Definition of "special purposes"

Special purpose indicates lamps used for other than general illumination such as the purpose of the lamps covered by items 1 and 2 of the RoHS Directive Annex.

Examples include:

- LCD backlights
- Light sources in scanners, printers, photocopiers and fax machines
- Disinfection lamps
- Medical/therapy lamps
- Pet care lamps (such as those used within aquaria)
- Lamps for use at low temperature
- Extra long lamps which contain > 10mg of mercury
- Amalgam lamps

2.1.2 Alternative lamp types

The Annex includes four exemptions for different types of mercury lamps but only "mercury in straight fluorescent lamps for special purposes" is to be reviewed. This review will establish what are "special purpose lamps", whether this exemption is required and should there be a limit on the quantity of mercury in individual lamps? It is worth noting that if a mercury lamp is not within the scope of items 1 - 3 of the Annex, it will be covered by item 4 as this applies to "Mercury in other lamps not specifically mentioned in this Annex".

Various alternative types of lamps are available but all have different characteristics. Examples, including some newly developed lamps, are listed in Table 1.

There is no equivalent substitute for straight fluorescent lamps for some applications as all of the alternatives are different in one or more ways.



	Lamp type	Lamp size	Light output efficiency (Lm/W)	Useful life (hours)	Characteristics	
Existing	Straight mercury	From 2.4 mm diameter	90 – 100	18,000 (economical) 24,000 (average)	Can be made very thin	
Potential alternatives	High pressure sodium (most contain mercury)	>30 mm	95 - 150	~40,000 hours	Light colour not equivalent to straight fluorescent but mercury free version available	
	Low pressure sodium	>30mm	170		Yellow colour	
	Planon ² flat (xenon) lamp	10 mm thick	25 – 27	100,000 (maximum)	Proposed LCD backlight replacement but runs too hot. Not RoHS compliant as it contains lead solder	
	Linex ³ (type of xenon lamp)	10 mm diameter	~30 – 50	2,000	10 mm diameter straight	
	Short xenon lamps	>10 mm diameter	10 – 50 Perkin-Elmer Cermax = 19	Perkin-Elmer Cermax = 4,000 (average)	Long xenon (>20 cm) uncommon and low efficiency	
	LED (white)	Very small	20 (50 by 2005) ⁴	>50,000 (30% degradati on)	Not straight lamp but possible LCD backlight replacement	

Table 1.	Characteristics of	existing straight	fluorescent lamps	and possible	alternatives
I dole I.	characteristics of	calsting straight	nuoi escent lamps	and possible	areer matrix co

Most alternative types of lamp (including filament lamps) are less energy efficient so their use as alternatives to mercury fluorescent lamps would increase global warming. Mercury is emitted during power generation by oil and coal combustion and an EPA study⁵ found that the quantity of mercury emitted during the life cycle of a CRT monitor was more than the mercury emitted and used in the equivalent life cycle of an LCD monitor.

Most xenon lamps also have much shorter lives (except for the new Planon lamp), they run too hot for some applications, are too large and are currently over 7 times more expensive. The performance and energy efficiency of LEDs are improving and are now used in some scanners and printers and for illumination of small LCDs. These applications require gradient index lenses (see section 2.6) which use a glass containing lead. At present LEDs are less energy efficient and more expensive than straight fluorescent lamps and, as they are point sources, they cannot be used for higher quality scanners, copiers and for large LCDs. Less energy efficient lamps are also unsuitable in battery powered products such as mobile phones and laptop computers.

Organic light emitting diode displays have recently been developed⁶. These can be used as an alternative to Liquid Crystal Displays (LCD) with mercury lamp backlights but currently are available only in small sizes suitable for mobile phone displays, etc.



2.1.3 Summary of the case for an exemption

There are alternatives to straight mercury lamps for special purposes for some applications but they have certain uses where there are currently no alternatives. Also, where alternative lamps such as Xenon lamps could be used, these are less energy efficient and so would have a negative impact on the environment.



4. Proposed guidelines to define the scope of exemptions

The following sections provide clarification of the scope of each exemption.

4.1 Mercury in straight fluorescent lamps for special purposes

Straight fluorescent lamps not intended for general illumination. Examples include:

- □ LCD backlights
- □ Light sources in scanners, printers, photocopiers and fax machines
- □ Disinfection lamps
- □ Medical/therapy lamps
- □ Pet care lamps (such as those used within aquaria)
- □ Lamps for use at low temperature
- \Box Extra long lamps which contain > 10mg of mercury
- □ Amalgam lamps

4.2 Lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signalling, transmission as well as network management for telecommunications

A proposed definition of the scope has been produced by equipment manufacturers with input and some amendments by ERA. This is given in Appendix 1. Equipment that is covered by this exemption is of the type which is intended for continuous use for at least 10 years and has a high reliability. Personal computers, laptops, telephones, etc. are not covered by this exemption.

4.3 Light bulbs

This refers to filament or incandescent light bulbs. These can be included in the scope of the RoHS Directive. An exemption for one type of filament lamp has been reviewed. These are straight filament lamps that use lead to attach a silicate coating to the interior of the glass tube.

4.4 Compliant pin connector systems

This title has been rewritten since "VHDM" is a trade mark and this exemption request is for all types of compliant pin and press-fit connectors. Compliant-pins are used as connections in multi-way connectors. The compliant pins are of various designs and have electroplated tin or tin/lead coatings which are inserted into a matching array of plated through holes in printed circuit boards to make an electrical and mechanical connection. These connectors are designed to make multiple reliable

