

The ELC Guidance Document on Market Surveillance for the RoHS Directive (2002/95/EC)

Sampling and testing issues in Category 5 "Lighting Equipment"

The scope 'lighting equipment' in the RoHS Directive 2002/95/EC is broader when compared to WEEE-Directive 2002/96/EC.

Category 5 "Lighting equipment" addresses:

- luminaires for fluorescent lamps;
- straight fluorescent lamps;
- compact fluorescent lamps;
- high intensity discharge lamps - including pressure sodium lamps and metal halide lamps, low pressure sodium lamps; and
- other lighting or equipment for the purpose of spreading or controlling light.

In addition the RoHS Directive additionally has electric light bulbs and luminaires in households within its scope.

Specific substances are necessary for the functionality of a lamp operation, these substances – lead and mercury are deemed hazardous. Several lamp-specific exemptions in Article 4(1) are defined in the Annex of RoHS. Mercury is allowed for all kind of lamps (see Exemption 4: *Mercury in other lamps not specifically mentioned in this Annex*).

We would like to raise attention to the importance of these exemptions when ensuring market surveillance of lamps. The Annex outlines **maximum limits for mercury** (limit amount per lamp) or lead (max. concentration in fluorescent powder) are set:

1. *Mercury in compact fluorescent lamps not exceeding 5 mg per lamp.*
2. *Mercury in straight fluorescent lamps for general purposes not exceeding:*
 - *halophosphate 10 mg*
 - *triphosphate with normal lifetime 5 mg*
 - *triphosphate with long lifetime 8 mg.*
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 diazoprinting reprography, lithography, insect*

traps, photochemical and curing processes containing phosphors such as SMS (Sr,Ba)2MgSi2O7:Pb).

Measurement of Mercury content:

The total mass of mercury per lamp, measured in mg, needs to be determined. XFR techniques are not applicable, detailed wet-chemical material analysis shall be applied instead. Best techniques are Cold-Vapour Atomic Absorption Spectroscopy (CV-AAS) and ICP Atomic Emission Spectroscopy (ICP-AES). Sample preparation and analytical determination of mercury content in a lamp needs specific attention to yield reliable measurement values. Depending on production process Mercury content in compact and straight fluorescent lamps can vary from lamp to lamp.

For mercury content measurement standard IEC **62321** Ed1 /CDV; "Determination of Mercury in Polymers, Metals and Electronics by CV-AAS, AFS, ICP-OES, and ICP-MS" has to be applied in order to get comparable measurements.

During sample preparation it has to be made sure, that mercury does not get lost due to evaporation. Unfortunately **sample preparation** according to **IEC 62321** Ed1 /CDV is not suitable for compact and straight fluorescent lamps. Other methods have to be used in order to get reliable results instead:

- Sample preparation is recommended according to Commission Decision **2002/747/EC** for **compact florescent lamps** (single ended florescent lamps)

and

- according to **JEL 303-2004** Standard of Japan Electric Lamp Manufacturers Association (*Practical quantitative analysis procedure for mercury containing in fluorescent lamps*) for **straight fluorescent lamps** (double ended fluorescent lamps).

Sample preparation may be dependent on the detailed way mercury is dosed into the lamp (example: dosed as fluid substance or in a solid amalgam material).

Table 1: Detailed recommendations on process steps for typical FL/CFL lamps

CFL/FL	Hg
Product sampling	Sample size: 5+5
Sample preparation	compact fluorescent lamps: 2002/747/EC straight fluorescent lamps: JEL 303-2004
Material analysis	IEC 62321 Ed1 /CDV Wet chemical analysis: CV-AAS; ICP-AES
Data analysis	Hg as mg/lamp
Verification	If 1 out of 5 gives higher Hg content than limit, repeat for next 5. If these 5 are lower than limit, compliancy is demonstrated. If another

	measurement is above the limit, the manufacturer's records shall be requested
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Measurement of Lead concentration in fluorescent powder of discharge lamps:

Measurement according **IEC 62321** Ed1 /CDV

Verification:

The results of the tests shall comply with the requirements.

If the test results do **not** comply with these requirements, the manufacturer's records shall be requested.

The following issues have to be regarded in case of Mercury contents exceeding limits:

- Consideration of **production date** - many lamps that have been put on the market before July 2006, are still in the sales channels. To be sure, that products to be analysed have been put on the market after July 1st 2006 the production date printed on many lamps in a coded way can be considered. Put on the EU market after July 1st can also be secured, if lamps are collected from warehouses of manufacturers or from customs.
- **Product piracy** is a severe problem for products in Category 5 compared to other equipment in the RoHS scope. Experts of the brand owner can only discover those products. Therefore in case of violation of limits in imported lamps not only the importer shall be contacted and informed, but also the brand-owner, if present in the EU and not identical with the importer.

Annex – 2002/95/EC – ROHS Directive

All lamp specific RoHS exemptions

1. Mercury in compact fluorescent lamps not exceeding 5 mg per lamp.
2. Mercury in straight fluorescent lamps for general purposes not exceeding:
 - halophosphate 10 mg
 - triphosphate with normal lifetime 5 mg
 - triphosphate with long lifetime 8 mg.
3. Mercury in straight fluorescent lamps for special purposes.
4. Mercury in other lamps not specifically mentioned in this Annex.
5. Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.
16. Lead in linear incandescent lamps with silicate coated tubes.
17. Lead halide as radiant agent in High Intensity Discharge (HID) lamps used for professional reprography applications.
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 diazoprinting reprography, lithography, insect traps, photochemical and curing processes containing phosphors such as SMS (Sr,Ba)2MgSi2O7:Pb).
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).
20. Lead oxide in glass used for bonding front and rear substrates of flat fluorescent lamps used for Liquid Crystal Displays (LCD).
21. Lead and cadmium in printing inks for the application of enamels on borosilicate glass.
26. Lead oxide in the glass envelope of Black Light Blue (BLB) lamps.

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