FEDERAZIONE NAZIONALE IMPRESE ELETTROTECNICHE ED ELETTRONICHE

CONFINDUSTRIA

DAL 1945 IL VALORE DELL'INNOVAZIONE

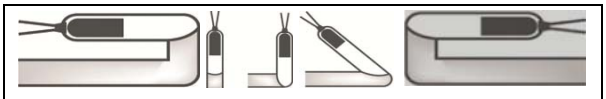
Proposal to amend the Decision of the Commission n. 2010/571: limits for mercury in Cold Cathode Fluorescent Lamps (CCFLs) to be used for general lighting purposes and for Luminous Sign for Adversting or decorative purposes

1. **Introduction** – CCFLs for General lighting purposes

Cold Cathode Fluorescent Lamps for general lighting purposes are very different, as per technical and constructional characteristics and electrical values from the CCFLs to which the Commission Decision n.571 of 24th September 2010 refers. Such differences are because of the applications and the users are different.

Specific constructional characteristics for CCFLs for General Lighting purposes:

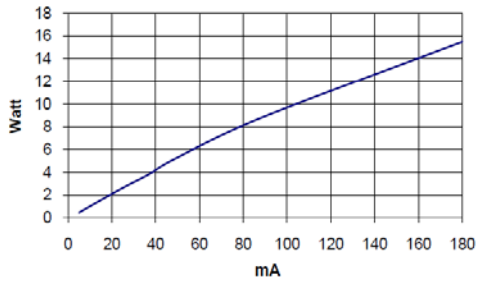
1. **Dimensions**: Lamps often are made to follow the profile of the building / room structure and this imply that lamps will have specific (and not standard) rounded curves (also with small radius) on every geometrical axe. Diameters and lengths varies a lot from case to case.

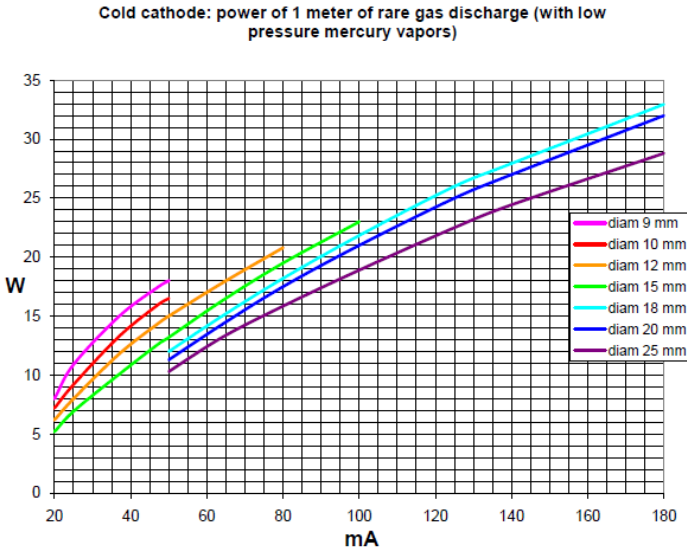


Examples for cathode geometries

In most cases, diameters vary from 5 to 38 mm and length from 0,5 to 3 m (and beyond).

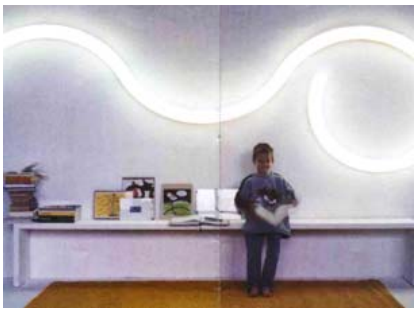
2. **Electricals**: Current intensity in-between 20 and 200 mA in order to emit the proper flux according to the intended use and the dimensions of the lamps. Operating voltage varies from 250 V to 1500 V. Lamp powers are mostly from 10 W to 140 W. Approximately, the lamp power is the sum of power absorbed by the two electrodes and by the discharge tube which it is related to the diameter and to the rare gas compound and its pressure. In the following graph, average values are reported.





3. **Operating**: The Colour of the light varies for different application needs. The luminous flux can easily be between 400 and 10000 lm per lamp (for three-phosphor lamps).
4. **Switchings** do not affect CCFLs electrodes so these lamps are suitable for applications having high rate for (automatic or manual) switchings as Corridors, Toilettes, Stores, Lifts, ..
5. **Lamp life** is longer than hot cathode fluorescent lamps and not less than 50000 h

Hereafter some common applications for CCFLs as general lighting purposes:



CCFLs require mercury vapours mixed in rare gasses of the tube in order to operate. The RoHs Directive and the TAC are considering similar items but the study carried out and the relevant exemptions are proper to similar technologies and not to the same. This means that the present exemptions and limited value for mercury is not feasible to avoid the phase-out for this technologies from the lighting scenario. The proposal for a limited amount of Mercury contents in CCFLs would be as much simple as possible and not too stringent because in many cases lamps are not straight.

Proposal – possible exemption with limited value for Mercury in CCFLs for General lighting purposes (amendment to the existing Annex of DIRECTIVE 2002/95/EC)

Cold Cathode Fluorescent Lamps for general lighting purposes are very different, as per technical and constructional characteristics and electrical values from the CCFLs to which the Commission Decision n. 571 of 24th September 2010 refers in id. 3(a), 3(b) and 3(c); such differences are because of applications (and users). The proposal would be in line with the already agreed concept as in 2(b)(3) "Non-linear tri-band phosphor lamps with tube diameter > 17 mm" and 2(b)(4) "Lamps for other general lighting and special purposes" having a limit up to 15 mg which would become not enough for lamp length above 1500 mm.

To add to the present items

	Exemption	Scope and dates of applicability
2(b)(3)	Non-linear tri-band phosphor lamps with tube diameter > 17 mm (e.g. T9)	No limitation of use until 31 December 2011; 15 mg may be used per lamp after 31 December 2011
2(b)(4)	Lamps for other general lighting and special purposes (e.g. induction lamps)	No limitation of use until 31 December 2011; 15 mg may be used per lamp after 31 December 2011
3	Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp):	
3(a)	Short length (≤ 500 mm)	No limitation of use until 31 December 2011; 3,5 mg may be used per lamp after 31 December 2011
3(b)	Medium length (> 500 mm and ≤ 1 500 mm)	No limitation of use until 31 December 2011; 5 mg may be used per lamp after 31 December 2011
3(c)	Long length (> 1 500 mm)	No limitation of use until 31 December 2011; 13 mg may be used per lamp after 31 December 2011

the following new item:

3 (d)	**Mercury in cold cathode fluorescent lamps for general lighting purposes**	**1,0 mg per 100 mm**

Case Studies – Comparison of the proposed exemption for Mercury in cold cathode fluorescent lamps for general lighting purposes with limits for most common lamps

Following examples are referred to most common lamps used in many applications. Comparisons with existing exemptions are made:

case	lamp voltage (V)	diameter (mm)	length (mm)	In (mA)	power (W)	luminous flux (lm)	Lifetime (h)	proposed limit Hg (mg)	existing limit for Tri-band phosphor lamps for general lighting	Remarks
1 CCFL	**460**	**20**	**1500**	100	46	**2700**	50000	**15**	**5** (3,5 mg from 2012) *rif. id. 2(a)(3)*	15 mg is equivalent to the limit for a 30 W lamp through its lifetime cycle (12.000 h x 4 cycles) and having comparable characteristics
1 CCFL	**730**	**20**	**3000**	100	73	**5400**	50000	**30**	**5** (3,0 mg from 2012) *rif. id. 2(a)(2)*	30 mg is almost equivalent to the limit for 3 x 21 W T5 lamps through their lifetime cycle (16.000 h x 3 cycles) and having comparable characteristics
1 CCFL	**1080**	**12**	**3000**	25	27	**2000**	50000	**30**	**5** (4,0 mg from 2012) *rif. id. 2(a)(1)*	30 mg is smaller to the limit for 4 x 8 W T2 lamps through their lifetime cycle (16.000 h x 3 cycles) and having comparable characteristics

Final considerations

Cold Cathode Fluorescent Lamps for general lighting purposes cannot be considered totally excluded from the RoHS Directive scope because many of them are designed to operate with a voltage rating not exceeding 1000 V (a.c.) and also when they are exceeding such limit, the final appliance in which they have to operate will be supplied by 230 V a.c., so the limitation for hazardous substances would be applied to the whole luminaire.

The existing exemptions seem have been issued after having studied the situation relevant to the traditional lighting sources (for general lighting) and for CCFLs proper to have backlight in specific application (e.g. LCD monitors). Such exemption does not allow to CCFLs to have long length anymore.

The present proposal for a new exemption would be proper for this kind of lamps which can contribute to optimize the energy balance in lighting systems by their high lumen output, long life and robustness with adding no mercury to the environment over than the traditional lighting sources (on some cases even less), when considering the issue by a LCA for the whole system.

2. **Introduction** – CCFLs for Luminous Sign for Adversting or decorative purposes

Cold Cathode Fluorescent Lamps for Luminous Sign for Adversting or decorative purposes are very different, as per technical and constructional characteristics and electrical values from the CCFLs to which the Commission Decision n.571 of 24th September 2010 refers in id. 3(a), 3(b) and 3(c). Such differences are because of the applications and the users are different. In fact the CCFLs which the Decision n.571 refers are lamps having diameter up to 5 mm and Current intensity up to 15 mA.

Hereafter, some picture to show typical applications for these CCFLs:

Cold Cathode Fluorescent Lamps for Adversting or decorative purposes are often made under commitment with specific lay-out, linear or curved tubes to create pictures or letters, mainly for outdoor installations under harsh conditions, also with very low ambient temperature (e.g. – 20° C).

Specific constructional characteristics for CCFLs for Adversting or decorative purposes:

1. **Dimensions**: Lamps often are curved tubes. Diameters and lengths varies a lot from case to case. In most cases, diameters vary from 6 to 38 mm and lengths are not definable in advance.
2. **Electricals**: Current intensity in-between 20 and 100 mA in order to emit the proper flux according to the intended use and the dimensions of the lamps. Operating voltage varies from 250 V to 1500 V.
3. **Switchings** do not affect CCFLs electrodes so these lamps are suitable for *unlimited* switches
4. **Lamp life** is longer than hot cathode fluorescent lamps and not less than 50000 h

Proposal – possible exemption with limited value for Mercury in CCFLs for Luminous Sign for Adversting or decorative purposes (amendment to the existing Annex of DIRECTIVE 2002/95/EC)

Cold Cathode Fluorescent Lamps for Luminous Sign for Adversting or decorative purposes are very different, as per technical and constructional characteristics and electrical values from the CCFLs to which the Commission Decision n. 571 of 24th September 2010 refers in id. 3(a), 3(b) and 3(c); such differences are because of applications (environmental harsh conditions).

To add to the present items

3	Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp):	
3(a)	Short length (≤ 500 mm)	No limitation of use until 31 December 2011; 3,5 mg may be used per lamp after 31 December 2011
3(b)	Medium length (> 500 mm and ≤ 1 500 mm)	No limitation of use until 31 December 2011; 5 mg may be used per lamp after 31 December 2011
3(c)	Long length (> 1 500 mm)	No limitation of use until 31 December 2011; 13 mg may be used per lamp after 31 December 2011

the following new item:

3 (d)	**Mercury in cold cathode fluorescent lamps for general lighting purposes**	**1,0 mg per 100 mm**
3 (e)	**Mercury in cold cathode fluorescent lamps for luminous sign for adversting or decorative purposes**	**1,3 mg per 100 mm**

Final considerations

Cold Cathode Fluorescent Lamps for Luminous Sign for Adversting or decorative purposes cannot be considered totally excluded from the RoHS Directive scope because many of them are designed to operate with a voltage rating not exceeding 1000 V (a.c.) and also when they are exceeding such limit, the final product or installation in which they have to operate will be supplied by 230 V a.c., so the limitation for hazardous substances maybe be applied to the whole system.

The existing exemptions seem have been issued after having studied the situation relevant to the CCFLs proper to have backlight in specific application (e.g. LCD monitors). Such exemption does not allow to CCFLs for Adversting or decorative purposes anymore.

The present proposal for a new exemption would be proper for this kind of lamps which can contribute to optimize and reduce the energy consumption in lighting systems for back lighted luminous signs or letter boxes; they operate at lowest current and have less maintance (and so less waste). The LCA for the whole system shows the high competitiveness with luminous signs provided with standard fluorescent lamps.