Contribution submitted by the "UK Cold Cathode Lighting Association" on 28 September 2012, concerning exemption No. 8:

Questions

1. The applicant claims that CCFLs are used for general lighting purposes. Do you agree with the scope of the exemption as proposed by the applicant? Please suggest an alternative wording and explain your proposal, if you do not agree with the proposed exemption wording.

The scope is not wide enough. These types of lamps form a subset of the HLDT lamps cited in the ongoing Exemption Request 19 from the previous consultation requested by the European Sign Federation (ESF) and supported by the Cold Cathode Lighting Association (CCLA). Both this Exemption 8 and Exemption 9 should be incorporated into the aforesaid Exemption 19 from the previous consultation.

2. Furthermore, the applicant suggests 1mg mercury per 100mm length in CCFLs for general lighting purposes. Please state whether you either support the applicant's request or whether you would like to provide argumentation against the applicant's request. In both cases please provide detailed technical argumentation / evidence to support your statement. What could be the pro and cons between a mercury limit per 100 mm length and a maximum mercury content for these lamps.

The members of ESF and CCLA do not support the 1 mg per 100 mm length for the maximum mercury content. The mercury is needed for the lamp to function correctly and it is slowly absorbed or reacted with materials in the lamp during life (particularly in the first few thousands of hours). The mercury reacts with the glass of the tube and any impurities in the lamp such as water vapour. It also is absorbed by the metal of the electrodes.
It is the experience of the global industry that attempts at reducing the mercury content of lamps below certain levels dramatically reduces lamp life. A number of reduced mercury content products have been sold around the world in the last ten years and many lamps made with them have prematurely failed. I understand some litigation is in progress in some countries. 1 mg per 100 mm would be equivalent to 20 mg in a 2 metre long lamp. This is less than that used in the above products. The result of using too little mercury in the lamps would devastate the industry.

3. What is the influence of the application production technology on the amount of mercury needed for the lamp?

Lamps of this type are hand crafted and as such there are wide variations in production technology. However, all the lamps are individually bent to shape and the electrodes sealed on using gas flames which can put various amounts of impurities in the lamp which consume mercury during lamp life. Clearly this is difficult to control or quantify.

How does the amount of mercury used in lamp production compare with the amount of mercury in the final product (lamp).

They are effectively the same. An amount of mercury is placed in each lamp after assembly, but before processing, and no more than a minute trace of mercury is consumed or lost during processing. Any minute trace mercury which is produced is trapped. Advances are being made in this area.

4. Please describe the different technical and performance characteristic between the

lamps according to the existing exemptions 2(b)(4), 3(a), 3(b) and especially for 3(c) of Annex III and the lamps for general lighting purposes.

Until recently we had considered these CCFLs to come under exemption 4(f). However, the introduction of Exemption 3, which specifically mention CCFL, meant that 4(f) could no longer apply. However Exemption 3 was clearly designed for CCFL and EEFL of small diameter, low current lamps used for backlighting displays etc. Lamps of say up to 5 mm outside diameter and running at less than 10 mA. However this was not clearly stated in the scope.

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

The limit is too low for our CCFL to function correctly. Induction lamps, for example are mass produced whereas our lamps are hand crafted and operate using cold cathode electrode – not induction.

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

As explained above these limits can be applied to small diameter lamps for use in backlighting applications. (Lamps of say up to 5 mm outside diameter and running at less than 10 mA.) Our lamps range from 6 mm to 38 mm outside diameter and can be run at 25 to 250 mA depending on the diameter and electrodes used. They can also be up to 3 metres long. Substantially more mercury is required to compensate for the much larger surface areas of the glass, phosphor coating and electrodes, and the much larger quantities of impurities in the increased volume of the lamps absorbing/reacting with mercury. Note that the area goes up in proportion to the diameter, and the volume by the square of the diameter. So a 25 mm diameter lamp will have 5 times the area and 25 times the volume of the same length of 5 mm diameter lamp. Electrodes are several orders of magnitude bigger in our CCFL compared to CCFL for backlighting displays. Note that if you take the 3(c) limit for displays of 13 mg, allow for 5 times the area, this is equivalent to 65 mg for a 25 mm diameter lamp. Add additional mercury to allow for the volume and electrodes and higher current, and 100 mg per lamp is not unreasonable.

5. Please provide test results/protocols that clearly indicate that CCFLs containing mercury deliver significant technical advantages over LEDs.

Unfortunately, test results tend to be proprietary and therefore not freely available. However, we can draw some conclusions from applying logical thinking, as follows:-

1) As individual objects, modern LEDs tend to have comparable or better efficacy than fluorescence based lamps, on paper (in terms of lumens per Watt).
2) However, LEDs are point sources and our lamps are linear sources. To convert the point source LED to a linear source requires the use of complex lenses and/or diffusers. The application of these greatly reduces the efficacy of the LED to below that of fluorescence based lamps. This results in lower lumen per metre per Watt figures for LEDs versus CCFL or similar technologies.

If an architect or lighting designer wishes to use a linear lamp (for lighting a coving in an hotel, or delineating a buildings geometry, or the curved handrail of an escalator), cold cathode lighting or HLDTs provide the most efficacious way to achieve this effect.

6. Could you please elaborate more in detail the efforts which have been made to reduce mercury and/or respectively to manage the performance with the existing exemptions in CCFLs for the general lighting purposes during the last three years?

The industry is continually trying to reduce/control the use of mercury. The above mentioned products (some of which have failed) demonstrate this. However, recent progress has slowed as we approach the practical limits. Further work has been initiated recently by the CCLA to better define the requirements. Unfortunately, owing to the extreme lifetime of CCFL, it is very difficult to make fast progress. It takes 10 years to test a lamp with a ten year life span as no method of carrying out accelerated life test has yet been satisfactorily devised.