

Impartial Quality Tests of Compact Fluorescent Lamps

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ABSTRACT

CFLs are marketed as a reasonable and energy-efficient replacement for incandescent lamps. Due to consumer complaints the Danish Electric Utilities have carried out several quality tests of CFLs on the Danish market at the accredited laboratory DELTA Light & Optics. The Danish IES has taken care of project coordination and communication with the suppliers of CFLs.

Tests have been performed according to IEC Publication 969 concerning lifetime, light output, efficiency and colour qualities. According to IEC Publication 969: 'Self-ballasted lamps for general lighting services - Performance requirements' the test conditions have been:

Test quantity: 20 lamps, supply voltage: 230 V, 50 Hz stabilized, ambient temperature 25 °C, relative humidity 65 % maximum, 100 hours continuous burn in, followed by an automatic switching cycle: 2 hours and 45 minutes ON / 15 minutes OFF.

Tests have been carried out since 1991, and revealed significant quality differences among CFLs on the Danish market. Though the results show a group of high quality CFLs with average life hours exceeding the promised 8.000 hours, some lamps, typically manufactured in the Far East, but also in Germany, and sold in discount stores, supermarkets, and timber merchants, do not fulfil the promised life hours.

A life test according to IEC Publication 969 only proves that at least 50% of the CFLs are able to manage about 3000 ignitions, which is not sufficient for many applications in the domestic sector. We are concerned about what happens with the lifetime of the CFL if the average ON-time per ignition is less than 2 hours and 45 minutes, as in the normal test conditions. From consumer complaints we

know that some of the CFL's on the market do not fulfil the promised life hours if the ON-time per ignition is short. Due to the consumer complaints an additional ignition test was set up. It is a switching test where the CFLs are ON for 3 minutes and OFF for 5 minutes, up to 20,000 ignitions. The additional ignition test has shown that the high quality lamps can be used almost in the same way as traditional incandescent lamps: they can be switched on and off frequently without any particular influence on the lamp life, whereas the so-called "no-name" products cannot manage the necessary number of ignitions.

The tests, especially the new ignition test, have called attention to a much needed revision of the present IEC Publication 969. There has been some discussion about the test cycle and the number of ignitions in the ignition test. For practical reasons the duration of the test should be as short as possible. On the other hand the ON-time should be long enough to heat up the electrodes to include electrode wear in the test. An extremely short ON-time (half a minute or less) would mainly test the electronics in the ignition circuit, only a minor part of our concern. The consumer is interested in the lifetime of the CFL, because the purpose is to have light for normal use. The compromise has been that the Danish ignition test is performed with 3 minutes ON and 5 minutes OFF. The OFF-time allows the starting device to cool down so that it can work as intended.

Alltogether 48 different products were put in an ignition test in 1996. Figure 1+2 shows the results. For 22 products 100 % of the samples of 20 survived 20,000 cycles. For 11 products between 50% and 95% survived 20,000 cycles (survival curves are shown in figure 1). And for 15 prod-

Figure 1. Some results from ignition test 1996

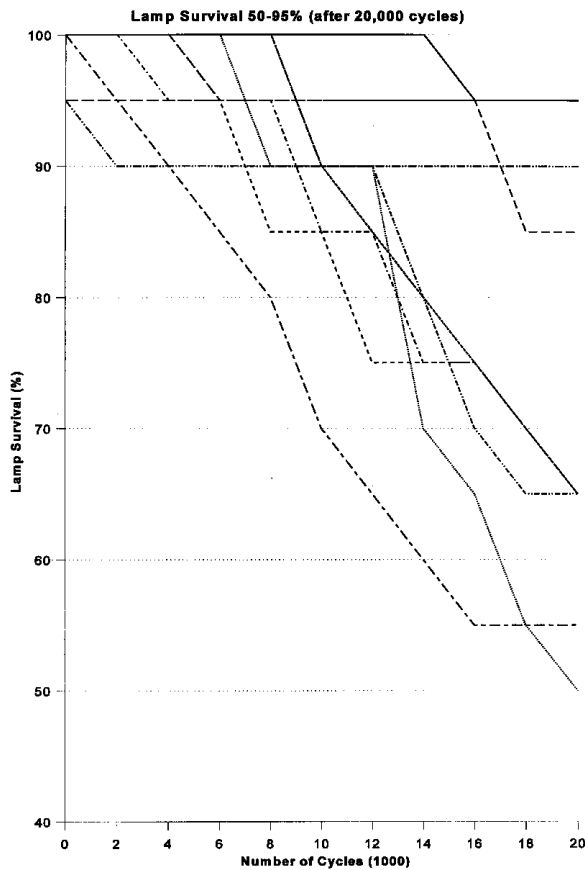
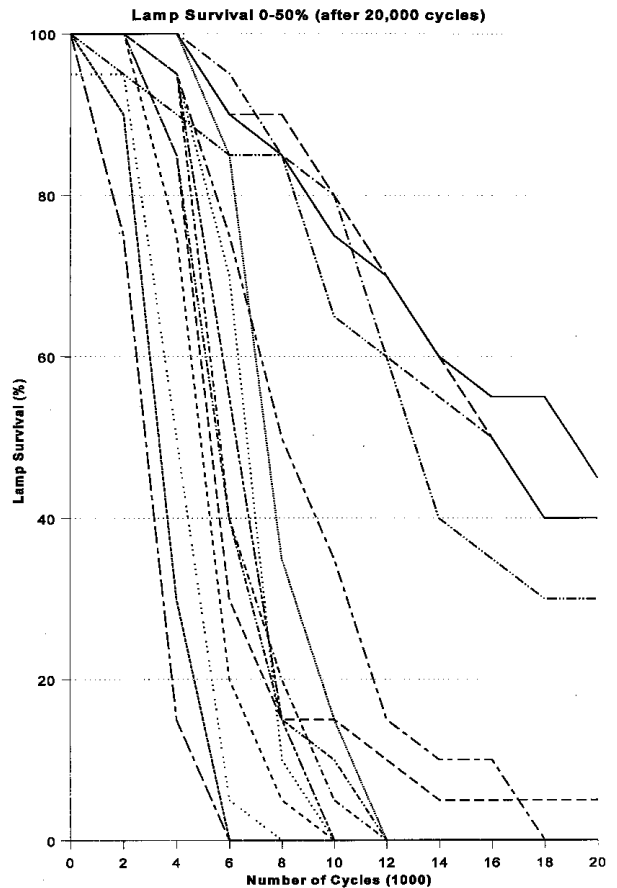


Figure 2. Some results from ignition test 1996



ucts between 0% and 45% survived 20,000 cycles (survival curves are shown in figure 2). (Please note that the OFF-time was only 2 and a half minutes in the 1996 ignition test).

Consumers are guided in their choices of CFLs by a positive list (Sparepære®listen from the Danish Electric Utilities) containing only the quality CFLs that passed both tests.

Cheaper and poorer quality lamps are bad for the reputation of all CFLs. The results of the performed tests and publishing of the positive list by the Danish Electric Utilities have eliminated the poor quality CFLs in Denmark, according to a new report (supported by the EU SAVE programme) "Market Research on the Use of Energy Saving Lamps in the Domestic Sector", published by DEFU, the Research Association of Danish Electric Utilities.

The fifth test is in progress now and will be finished in September 1997. The results of the test will be presented at the Right Light Conference. ●

REFERENCES

IEC Publication 969: 'Self-ballasted lamps for general lighting services - Performance requirements'. International Electrotechnical Commission.

"Market Research on the Use of Energy Saving Lamps in the Domestic Sector", DEFU, the Research Association of Danish Electric Utilities, DEFU TR 366, June 1996.

Workshop 3

Performance Assessment of Daylit Buildings

