EUROPEAN LAMP COMPANIES FEDERATION

ELC Position Paper

Fast cycle testing of fluorescent self-ballasted lamps

The normal cause of end of life of fluorescent lamps (failure to start and remain alight) is depletion of the emitter on the electrodes. The rated average life (operating hours to 50% lamp survivals) of fluorescent lamps is a function of two independent factors: the total amount of operating hours and the number of starts or on/off cycles. Since in practice many different on/off cycles will be used, an average cycle has been standardized, i.e. 2hr 45min on / 15min off. Longer operating hours per cycle will increase lamp life; shorter operating hours per cycle will decrease lamp life.

For a rated average life of 8,000 hrs the standard cycle results in a total testing time of 12 months. In this time the lamp has experienced some 2,900 on/off cycles. Faster cycling, i.e. shorter ON times, will result in shorter testing times because the negative effect of the starting process will be more dominant. However, a well-defined relation between the standard cycle and a faster cycle has never been established. Moreover, the starting process is also dependent on the actual starter and ballast or circuit use in the testing. Because of this, increasing the influence of the starting process by faster cycling will increase the influence of the circuit used and thereby make the evaluation of the lamp less reliable.

However, for fluorescent self-ballasted lamps (CFL with integral ballast) lamp life is defined as the life of the total circuit and discharge tube together. In this case, fast cycle tests, in the order of minute's on/off, are sometimes used to see how many switches or starts the different components of the lamp can sustain. It is used to evaluate the influence of design changes of the components and the results are only relative. Under these conditions it is found that the failure of the discharge tube cathodes is caused by the breaking of the coil instead of emitter depletion. So compared to normal life testing a completely different mechanism plays a role. Because end of lamp life is normally determined by emitter depletion, the results of fast cycle testing have no correlation with lamp life under standard test conditions.

For this reason **fast cycle testing can only be used to evaluate how many switches a fluorescent self-ballasted lamp can sustain, not to obtain an indication about the useful lamp life under practical operating conditions.** If fast cycle testing is done to compare lamps regarding their ability to sustain on/off switching, a well-chosen test cycle has to be used. **To minimize the time for testing, the ON time should be as short as possible**, but long enough to go through the total starting process. **The OFF time should be just long enough to assure that all lamp components have cooled down again before starting the next cycle.** In order to arrive at comparable test results **the ELC recommendation for this purpose is for the switching cycle: 0.5min ON/ 4.5 min OFF.**

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