COLD CATHODE FLUORESCENT TUBES

Brightness Decay Curve

OVERVIEW

In the cold cathode fluorescent (CCF) lamp manufacturing process, deactivated gas and a minute amount of mercury are sealed inside a glass tube coated with a fluorescent material. When a high frequency electric field is applied, a glow discharge occurs thorugh the low mercury vapor pressure between the two electrodes on both ends of the tube. The 253.7nm ultraviolet rays of the mercury which have been excited by the discharge in turn excite the fluorescent material. When the excited atoms return to low energy levels, light of a wavelength corresponding to the difference in energy and characteristic of the composition of the fluorescent material is emitted.

There are many factors that affect how bright a given backlight design will be such as lamp current, temperature, tube diameter, gas mixture and the partial pressures of its components. Over time, the luminous output of a lamp will decay, depending largely on how much mercury remains in the tube in vapor form. Additionally, the reflector behind the lamps can also degrade depending on the average operating temperature. At 80°C, the reflectance may drop to 70% after 10k hours, and after only 4k hours at 100°C, it may be as low as 20%. At 70°C, however, there is virtually no change in the reflector efficiency. The follow semi-log plot shows the relationship between lamp brightness and time. As can be seen from the chart, a large percentage of the brightness is lost during the first few hundred hours of operation.
PLEASE NOTE: The curve shown is approximate. The brightness of a particular backlight system may vary, depending on the color temperature setting that has been maintained over the majority of its operating history.