Life-time of Electronic Control Gear (ECG)

The life of electronic control gear (ECG) is determined by three key factors:

- The life of each individual component
- Power as in operating voltage/ current
- Temperature

Electronic control gear (ECG) contains a wide range of components that perform a number of functions. Each component of an ECG has its own rated life and is subject to manufacturing tolerances. Tests are performed on raw components to ensure consistent quality during manufacture.

In order to calculate the failure rate of complete ECG's a method known as Mean Time between Failures (MTBF) is applied. This looks at individual components and calculates the potential failure rate of each component. Key to these calculations is the operating temperature of each component and the immediate surrounding ambient temperature of the whole ECG.

All calculations are based at the maximum designed operating temperature of the ECG to ensure optimum life. A temperature control (Tc) point on the ECG casing gives both the ECG and luminaire manufacturer a reference point to measure the efficiency of the circuit.

Unusual voltage surges or changes in supply voltage can also affect the operation of the ECG. Under these adverse conditions the internal protection device may switch off the ECG and, or possibly end its life. Some ECG's have a non-repairable internal fuse that further protects the circuit.

The term "average service life" is often quoted, and this refers to the time after which 10 percent of the ECG has failed. For most ECG's in normal operating conditions this equates to an average service life of 50,000 hours at the maximum ECG Tc. The Tc mark for the case maximum temperature must not be exceeded as this could lead to high and unpredictable failure rates. Increases of just 10 degrees on the ECG Tc will typically half the average service life. A reduction of 10 degrees could increase the average service life.

One of the reasons for the increased failure rate at higher temperatures is the temperature dependency of capacitors, especially the electrolytic capacitors.

If any component is defective within the ECG this will show itself as an early failure. This failure would normally occur during the so-called burn-in period.

After this initial period, failures are seldom seen until the ECG approaches the end of its service life. This is often referred to as the "bathtub curve" and explains the process of early component failure, a long period of stability and failure at end of life.

The better quality ECG's available also have additional features to ensure maximum lamp life. This is achieved by ensuring the lamp is started in a way that protects the starting components within the lamp. This is sometimes known as soft start.

Some ECG's also have a feature which recognizes the end of life of the lamp. This is known as end of life recognition (EOL), at which point the ECG will switch off. This protects the life of the ECG, which along with the other issues covered in this document, ensure maximum ECG life.

Members of the Lighting Industry Association, who manufacture electronic ECG's, undertake a stringent process of testing both raw component and finished product to ensure they meet, or exceed the exacting standards set. In fact, the majority now offer extended lifetime warranties on their product.

Lifetime tests are continuously ongoing and modern quality systems and exacting standards allow for batch identification and full traceability.