

Accelerated Cycling, Thermal, and Voltage Stress Test Development

A review of the ENERGY STAR® Light Fixture Specification prompted the development of a new test to reveal inadequate circuit designs, manufacturing problems, defective materials or components, and products that may not perform well in residential lighting fixtures.

The U.S. Environmental Protection Agency (EPA) asked the LRC to develop an Accelerated Cycling, Thermal, and Voltage (ACTV) Stress Test for ballasts. A test previously known as “Accelerated Life Test” was never intended to predict life. The LRC worked with ENERGY STAR Partners to develop a proposed testing method that would be agreeable to all participants. LRC researchers then tested the method over a two-year period (2005-2007).

Experiments

The LRC purchased residential light fixtures from various manufacturers at local stores. These products were hardwired, modular GU24, and integral GU24 types. Researchers removed the ballasts from the fixtures and placed the ballasts in thermal chambers (gravity convection ovens). The ballasts were operated at two different ambient temperatures using two methods as follows:

Method	Long-term	Short-term
Ballast operation	204 hrs	51 hrs
Voltages	High: 132 V Low: 108 V	High: 132 V Low: 108 V
Ambient temperature	60°C	80°C
Cycles	2880 total: 1440 at high voltage 1440 at low voltage	720 total: 360 at high voltage 360 at low voltage

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Ballasts were operated inside a thermal chamber during the ACTV stress test. The ballasts operated fluorescent lamps placed outside the chamber.



Results

The testing showed that the proposed ACTV stress test is an appropriate test method. In most cases, the short-term testing method will produce results similar to the long-term testing method.

Some products that did not pass other, much longer-term testing conducted at the LRC also did not pass the ACTV stress test, indicating that accelerated testing methods can provide similar results as the other testing methods.

The testing procedure used in this project has been revised to include seasoning the test samples for 100 hours prior to initial electrical measurements. The revised procedure is:

1. Season system for 100 hours.
2. Perform initial electrical measurements.
3. Perform ACTV stress test.
4. Perform final electrical measurements.
5. Analyze results.