

Description of Recessed Fixture Testing Procedures

Objectives:

- Determination of a “thermal factor” corresponding to the reduction in delivered luminous flux by virtue of operation in a simulated insulated ceiling environment.
- Verification of steady state ballast case temperature when operated in a simulated insulated ceiling environment.
- Verification of steady state ambient air temperature surrounding the CFL lamp(s).
- Determination of product longevity and lumen maintenance under long-term cyclic operation when operated in a simulated insulated ceiling environment.

Short Term Test Procedure

Construct/utilize a thermal testing apparatus capable of performing the following:

- Maintain ambient temperature surrounding the apparatus to $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ ($77^{\circ}\text{F} \pm 2^{\circ}\text{F}$).
- Containment of loose-fill cellulose insulation to a minimum depth of 12".
- Fitted with an easily removable, tight closing lid gasketed for air-tightness.
- Supporting the luminaire at a distance of 36" above the illuminance measurement plane.
- Automatically sample and record the ballast case temperature in a minimum of two locations for duration of 12 hours. Prior to performing the test, localize the hottest point(s) of the ballast, attach thermal sensing probes in these locations. Sampling shall be conducted at a minimum interval of 1 minute for the first hour and a maximum interval of 5 minutes for the remaining 11 hours.
- Automatically sample and record the ambient temperature surrounding the lamp(s) for duration of 12 hours. Install temperature sensor at the midpoint between the centroid of the lamp(s) and the reflector in a direction perpendicular to the lamp. Protect the thermal sensor from direct/indirect radiant heat. Sampling shall be conducted at a minimum interval of 1 minute for the first hour and a maximum interval of 5 minutes for the remaining 11 hours.
- Automatically sample and record the lamp base temperature in a minimum of 2 locations for duration of 12 hours. Install one temperature sensor at the highest elevation of the lamp base in the location specified by the lamp manufacturer. Install the second temperature sensor at the lowest elevation of the lamp base in the location specified by the lamp manufacturer. Sampling shall be conducted at a minimum interval of 1 minute for the first hour and a maximum interval of 5 minutes for the remaining 11 hours.
- Automatic sampling equipment shall synchronize all temperature measurement devices
- Equipped with an array consisting of a minimum of five (5) illuminance meters located 36" below the thermal testing apparatus. One (1) meter shall be located directly below the center of the luminaire. The remaining four (4) meters shall be oriented 12" from the center meter and at 90° intervals from the center meter. Distances are to be measured from center to center of the meters.

Test Sequence:

1. Install the luminaire in the apparatus.
2. Clean the inside of the luminaire surfaces with isopropyl alcohol and a clean soft cloth.
3. With lid open, apply power to the fixture.
4. Allow system to reach steady-state illuminance.
5. Sample and record power readings and photometer measurements.
6. Remove power from the fixture.
7. Immerse the luminaire in 12 inches (measured from the base of the apparatus) with loose fill cellulose insulation.
8. With the lid closed, apply power to the luminaire.
9. Allow system to reach steady-state illuminance and temperature.
10. Sample and record power readings and photometer measurements.
11. Test completed.

Long Term Test Procedure

Construct/utilize a containment apparatus capable of performing the following:

- Capable of simultaneously testing a minimum of eight (8) fixtures while maintaining a minimum of 24" "center-to-center" between fixtures.
- Maintain ambient temperature surrounding the apparatus to $75^{\circ}\text{F} \pm 5^{\circ}\text{F}$.
- Containment of loose-fill cellulose insulation to a minimum depth of 12".
- Supporting the luminaire at a distance of 36" above the illuminance measurement plane.
- Automatically cycle power to all testing luminaries at a rate 3 hours "on" followed by 20 minutes "off" for a period of not less than twelve (12) months.
- Automatically sensing and recording the thermal/catastrophic failure of the lamp and/or ballast.

Test Sequence:

1. Install fixture in the apparatus.
2. Immerse the luminaire in 12 inches (measured from the base of the apparatus) with loose fill cellulose insulation.
3. Clean inside luminaries (including lamps) surfaces with isopropyl alcohol and a clean soft cloth.
4. Apply power to the luminaire.
5. After an "on" period of greater than 2 hours, but less than 2.5 hours, sample and average three (3) illuminance measurements from a point directly below the center of the luminaire at a height of 36". Precautions shall be taken during illuminance measurements so as to not expose the meter to illuminance from adjacent fixtures
6. Energize all luminaries for a continuous cycle of 3 hours "on" and 20 minutes "off".
7. At an interval of fourteen (14) days repeat steps 3 through 7.
8. Continue testing for duration of not less than 12 months.