



SURFACE VEHICLE RECOMMENDED PRACTICE	J1889	MAR2015
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Superseding J1889 JUN2011		
(R) L.E.D. Signal and Marking Lighting Devices		

RATIONALE

Current definition of photometric stability and commonly used procedure for testing LED functions greatly penalizes LED lamps in a production environment. Changes recommended to J1889 will expedite production testing without compromising accuracy. This version will describe a procedure to expedite testing but will allow testing to former J1889 methods.

Section 2 updated to meet SAE standards

Section 3.2 – LED definition changed to match J387

Section 3.7 – Removed

Section 3.8 - Clarified Photometric Stability definition and harmonized with J2650. New definition allows photometric data to be taken within the 15 minute stability box, instead of after. To maintain good accuracy during photometry the allowed stability drift is set at $\pm 3\%$. Since section 3.7 was removed, photometric stability will be re-numbered to section 3.7

Section 5.1.1 - Removed extra performance requirement of photometric check for lamps not fully functional. This is covered in J575 and J2139

Section 5.1.5 Renumbered to accommodate changes. Clarified test point to use for ratio measurement because some functions do not have significant intensity at H-V

Section 5.1.5.1 - Clarifies use of SAE J1330

Section 5.1.5.2 - Adds statement lamps must be stabilized for test

Section 5.1.5.3 - Was added to provide procedure for testing all lamps at stabilization.

Section 5.1.6 - Removed warpage as it is covered in lamp level testing

Section 6.1.1 Removed extra performance requirement of photometric check for lamps not fully functional. This is covered in J575 and J2139

Section 6.1.5 Simplified requirement definition and included the option to flash function that flash during operation.

Section 6.1.5.1 Removed steady burning language, included in 6.1.5

Section 6.1.5.2 Removed intermittent burning language, included in 6.1.5

Section 6.1.5.3 Re-numbered to 6.1.5.1

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Section 6.1.6 Removed warpage requirement as it is covered in lamp level testing

Section 7.2 was added to provide a method for predetermining photometric stability.

Section 7.2.1 Reference to section 3.8 was changed to Section 3.7 to reflect numbering change

Section 8.1 - Removed

Section 8.2 - Numbering changed to 8.1

1. SCOPE

This SAE Recommended Practice applies to functions of motor vehicle signaling and marking lighting devices which use light emitting diodes (L.E.D.'s) as light sources. This report provides test methods, requirements, and guidelines applicable to the special characteristics of L.E.D. lighting devices. This Recommended Practice is in addition to those required for devices designed with incandescent light sources. This report is intended to be a guide to standard practice and is subject to change to reflect additional experience and technical advances.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J575 Test Methods and Equipment for Lighting Devices for Use on Vehicles Less than 2032 mm in Overall Width

SAE J759 Lighting Identification Code

SAE J1330 Photometry Laboratory Accuracy Guidelines

SAE J2139 Test for Signal and Marking Devices Used on Vehicles 2032 mm or More in Overall Width

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J387 Terminology - Motor Vehicle Lighting

SAE J578 Color Specification

3. DEFINITIONS

3.1 SEMICONDUCTOR

A material whose resistivity lies in the broad range between conductors and insulators.

3.2 L.E.D.

A pn junction semiconductor device that emits incoherent optical radiation when forward biased. The optical emission may be in the ultraviolet, visible, or infrared wavelength regions. (ANSI definition).

3.3 L.E.D. Lighting Device

A device in which light is produced by a single or an array of L.E.D. light source unit(s).

3.4 INCANDESCENT LIGHT SOURCE

Device in which light is produced by means of one or more filaments heated to incandescence by the passage of an electric current.

3.5 L.E.D Light Source Center

For a single L.E.D. light source unit, the point that is located at the geometric center of the junction where the luminescence takes place, or the surface from which luminescence appears to originate.

3.6 L.E.D. Lighting Device Light Center

The geometric center of all the single L.E.D. light source centers within the L.E.D. array(s) used to illuminate the device function, or the geometric center of the illuminated area if the light output is produced indirectly.

3.7 PHOTOMETRIC STABILITY

The point at which the photometry value is stable to within $\pm 3\%$ within any 15 minute period.

4. LIGHTING IDENTIFICATION CODE

4.1 The device may be marked in accordance with SAE J759. Refer to specific device standards for possible additional marking requirements at the discretion of the manufacturer.

5. TESTS

The following section describes individual tests which need not be performed in any particular sequence. Testing may be expedited by performing two or more tests simultaneously on separate samples.

5.1 SAE J575 or J2139 is a part of this document. Unless otherwise specified, the following tests are applicable with modifications as indicated.

5.1.1 Vibration Test

The evaluation of the sample at the completion of the test shall also include a functional lighting check. If a partial outage is observed, a photometry test (see 5.1.5) shall be performed and the results recorded.

5.1.2 Moisture Test

5.1.3 Dust Test

If dust is found on the inside of the lens, the change in the maximum photometric intensity of the sample shall be determined by using the photometric procedures in 5.1.5.

5.1.4 Corrosion Test

5.1.5 Photometry Test

5.1.5.1 All photometry tests should be performed in accordance with SAE J1330.

5.1.5.2 Energize the applicable test device function and record the H-V photometric value after 1 minute (or the test point with the highest required minimum candela value). Continue to energize the test device until photometric stability has been achieved. Record the photometric values at all the required test points. Calculate the ratio between the 1 minute H-V reading and the photometric stability H-V reading and apply it to all of the required test points. Lamps that flash during operation may be stabilized and/or photometrically evaluated in flashing mode. Section 7.2 provides a method for predetermining photometric stability.

5.2 Color Test

The color shall be tested as specified in the SAE report of the applicable device function.

5.3 Thermal Cycle Test

5.3.1 Scope

This test evaluates the ability of the sample device to resist optical, electrical, or physical malfunctions due to exposures to repeated changes from hot to cold temperature extremes. Devices installed in vehicle locations that could produce temperatures outside the test range specified may necessitate special test requirements.

5.3.2 Test Equipment

A thermal cycle chamber capable of providing the temperature extremes and rates of change of temperature in the temperature-time profile specified in Figure 1.

5.3.3 Test Procedure

The sample device, mounted on a test fixture shall be subjected to thermal cycles as follows:

5.3.3.1 Thermal Cycle

The device shall be tested to the thermal cycle profile shown in Figure 1. The minimum temperature shall be -30°C , and the maximum temperature shall be 50°C .

5.3.3.2 Device Operation

The device shall be energized at design voltage commencing at point "A" of Figure 1 and de-energized at point "B" of each cycle. When energized, the lighting function(s) shall be cycled as specified by the cycle times in SAE J575, Warpage Test.

5.3.3.3 Test Duration

Eight complete cycles of the thermal cycle profile shown in Figure 1 shall be completed.

5.3.3.4 Sample Evaluation

During the final thermal cycle, the sample lighting function(s) shall be continuously checked for permanent or intermittent outages while energized from Point "A" (cold temperature) to Point "B" (hot temperature) in Figure 1 and the results recorded. If partial outage occurred, a photometry test (5.1.5) with the remaining functional L.E.D. segments lighted shall be performed and the results recorded. Upon completion of the thermal cycle exposure the sample device shall be visually examined for any cracking, rupture, or warpage of parts and the results recorded. If changes are observed that could result in failure of the other tests contained in Section 5, those test(s) shall be performed on the same sample used for the thermal cycle test and the results recorded.

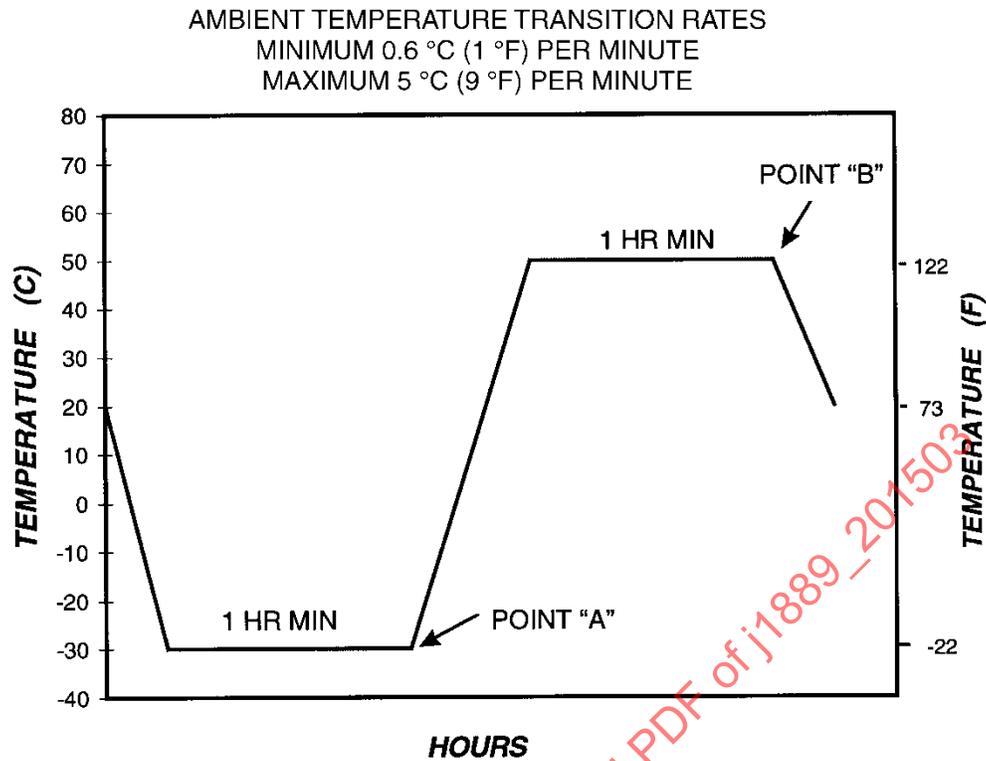


Figure 1 - Thermal cycle profile

6. REQUIREMENTS

6.1 Performance Requirements

A L.E.D. lighting device, when tested in accordance with the test procedures specified in Section 5, shall meet the following requirements.

6.1.1 Vibration

SAE J575 or J2139.

6.1.2 Moisture

SAE J575 or J2139.

6.1.3 Dust

SAE J575 or J2139.

6.1.4 Corrosion

SAE J575 or J2139.

6.1.5 Photometry

The photometric performance requirements in the applicable SAE technical report for the lighting function being tested shall be met after the photometric stability time and at the 1 minute time, applying the 1 minute/photometric stability H-V ratio.