



SURFACE VEHICLE STANDARD

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Accelerated Exposure of Automotive Exterior Materials Using a Fluorescent UV and Condensation Apparatus

RATIONALE

Updated references including CIE 241; clarifications on black panel thermometers; specimen repositioning guidelines; and various grammatical and wording changes.

1. SCOPE

- 1.1 This test method specifies the operating conditions for a fluorescent ultraviolet (UV) and condensation apparatus used for the accelerated exposure of various automotive exterior components.
- 1.2 Specimen preparation, test duration, and performance evaluation procedures are addressed by each automotive manufacturer's material specifications.
- 1.3 This SAE Standard may involve hazardous materials, operations, and equipment. This document does not purport to address all of the safety problems associated with its use.

It is the responsibility of whoever uses this document to consult and establish appropriate and health practices and determine the applicability of regulatory limitations prior to use.

1.4 Significance and Use

This test method is designed to simulate extreme environmental conditions encountered on the outside of an automobile due to sunlight, heat, and moisture, and to provide an acceleration of exposure for the purpose of predicting the performance of exterior automotive materials.

- 1.5 Unless otherwise specified, all dimensions reported in this method are nominal.

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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 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E207 Standard Test Method for Thermal EMF Test of Single Thermoelement Materials by Comparison with a Reference Thermoelement of Similar EMF-Temperature Properties

ASTM E220 Method for Calibration of Thermocouples by Comparison Techniques

ASTM G113 Standard Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials

ASTM G154 Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

2.1.2 CIE Publications

Available from CIE Central Bureau, Babenbergerstrasse 9/9A, 1010 Vienna, Austria, Tel: +43 1 714 31 87, www.cie.co.at.

CIE Pub No. 241 Recommended Reference Solar Spectra for Industrial Applications

2.1.3 ISO Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ISO 9370 Plastics - Instrumental Determination of Radiant Exposure in Weathering Tests - General Guidance and Basic Test Method

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 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM G151 Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources

2.2.2 ISO Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ISO 4892-1 Plastics - Methods of Exposure to Laboratory Light Sources - Part 1: General Guidance

ISO 16474-1 Plastics - Instrumental Determination of Radiant Exposure in Weathering Tests - General Guidance and Basic Test Method

ISO 16474-3 Paints and Varnishes - Methods of Exposure to Laboratory Light Sources - Part 3: Fluorescent UV Lamps

3. DEFINITIONS

The terminology found in ASTM G113 may be appropriate to this procedure.

3.1 BLACK PANEL THERMOMETER, n

A temperature measuring device used to control an artificial weathering device and to provide an estimate of the maximum temperature of specimens exposed to a radiant energy source.

3.2 IRRADIANCE, n

The radiant power per unit area incident on a receiver, typically reported in watts per square meter (W/m^2).

3.3 IRRADIANCE, SPECTRAL, n

The distribution of irradiance as a function of wavelength ($\text{W/m}^2/\text{nm}$).

3.4 SPECTRAL POWER DISTRIBUTION (SPD), n

The absolute or relative radiant power emitted by a source, or incident upon a receiver as a function of wavelength.

3.5 FLUORESCENT UV LAMP, n

A lamp in which the irradiance from a low-pressure mercury arc is transformed to a higher wavelength UV by a phosphor. The spectral power distribution of a fluorescent lamp is determined by the emission spectrum of the phosphor and the UV transmittance of the glass tube.

3.6 APPARATUS

A more complete description of the apparatus may be found in ASTM G154.

3.6.1 Test chamber, constructed of corrosion-resistant materials enclosing eight fluorescent UV lamps, a heated water pan, test specimen racks, and provisions for controlling and indicating operating times and temperatures.

3.7 Lamps shall be rapid-start, medium bi-pin fluorescent UV type with a length of 1200 mm, and a nominal rating of 40 W.

3.7.1 The lamps shall be one of the following types:

a. UVB lamps with a peak emission of 313 nm as described in Table 3 of ASTM G154. A representative spectral power distribution of this lamp is shown in Figure 1.

NOTE: In devices that do not automatically control irradiance, "FS-40" or "F40UVB" type lamps have historically been used. In devices that automatically control irradiance, UVB-313 lamps may be used.

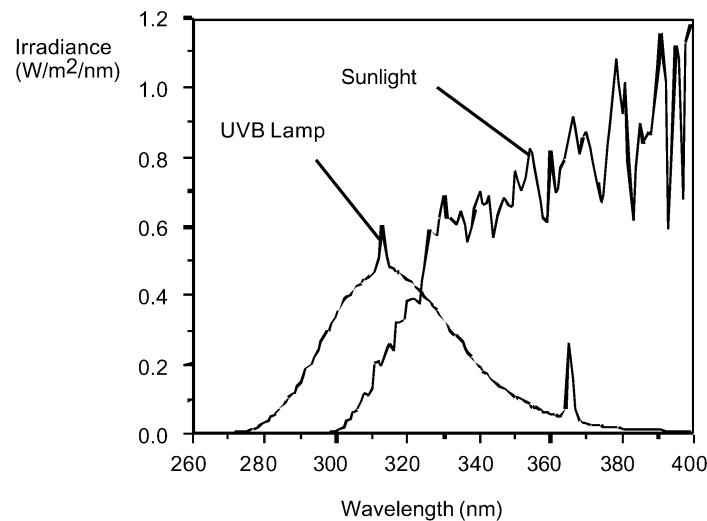


Figure 1 - UVB lamps representative spectral power distribution

3.7.2 Other fluorescent UV lamps meeting the size and electrical characteristics in 3.7 may be used by prior agreement, provided that the lamp and spectral power distribution are reported in conformance with the report section. Use of lamps other than those specified in 3.7 may result in significant differences in test results.

- a. UVA lamps with a peak emission of 340 nm as described in Table 1 of ASTM G154. A representative spectral power distribution of this lamp is shown in Figure 2.

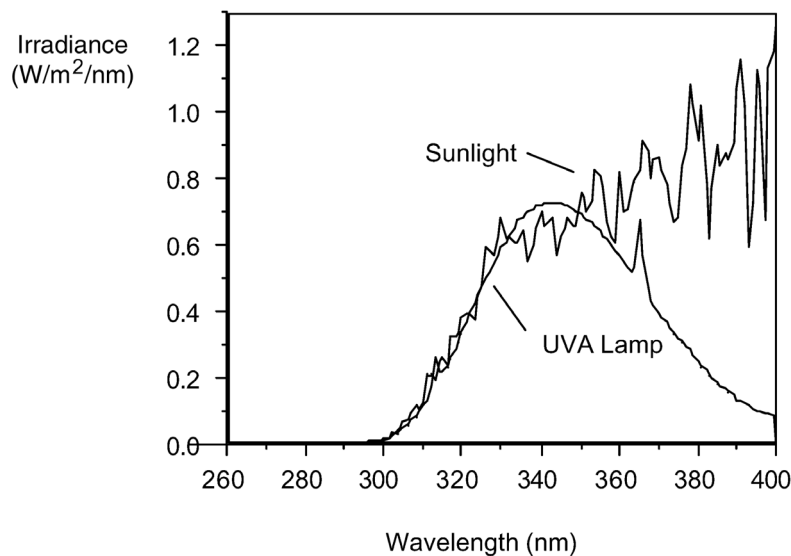


Figure 2 - UVA lamps representative spectral power distribution

3.8 LAMP SPACING AND ARRANGEMENT

The lamps shall be mounted in two banks of four lamps each. The lamps in each bank shall be mounted in a flat plane on 70 mm centers.

- 3.8.1 Lamp manufacturing techniques typically result in a slight gradient in light output from one end of a lamp to the other end. To compensate for this, see Figure 3.