Designation: D904 – 99(Reapproved 2008)

Standard Practice for Exposure of Adhesive Specimens to Artificial Light[1]

This standard is issued under the fixed designation D904; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the basic principles and operating procedures for ultraviolet (UV) light aging (with or without water) of adhesive bonded joints having at least one glass or transparent adherend, using fluorescent UV (see Method A) or xenon-arc light sources (see Method B).

1.2 This practice is limited to the apparatus for obtaining, measuring, and controlling the aging conditions, and to the procedures for exposure. Sample preparation, strength, test conditions, and evaluation of the results are described in other ASTM test methods or specifications.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D907 Terminology of Adhesives

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

G154 Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

G155 Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

3. Terminology

3.1 *Definitions*—Many of the terms in this practice are defined in Terminology D907.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *irradiance, n*—(*1*) the rate at which light energy falls on a unit area of surface (W/m^2), or (*2*) the radiant power incident upon a unit area of surface.

3.2.2 *radiant exposure (or light dosage), n*—(*1*) the accumulated light energy which has fallen on a unit area over time (J/m^2), or (*2*) the irradiance integrated with respect to time.

3.2.3 *spectral irradiance, n*—the distribution of irradiance in accordance with wavelength.

3.2.3.1 *Discussion*—Spectral irradiance is usually shown as a curve relating irradiance (ordinate) and light wavelength (abscissa). Because shorter wavelength UV is usually more damaging than longer wavelength UV, lamps with different *spectral irradiance* curves can cause drastically different amounts of UV damage, even if they produce the same total *irradiance.*

3.2.4 *spectral power distribution (SPD), n*—the amount of radiation present at each wavelength.

3.2.4.1 *Discussion*—The SPD can be expressed by power in watts, irradiance in watts/square metre, or energy in joules. The shape of the SPD would be identical in all of these units. Fluorescent lamps are frequently described by relative SPD's which show the amount of radiation at each wavelength as a percentage of the amount of radiation at the peak wavelength.

3.2.5 *UV-A, n*—ultraviolet light in the wavelength band between 315 and 400 nm.

3.2.6 *UV-B, n*—ultraviolet light in the wavelength band between 280 and 315 nm.

4. Significance and Use

4.1 This practice is for determining the effects of UV light, or UV light and water, on adhesive bonded joints under controlled but artificial conditions. The results of this practice can be used for comparing the relative durability of several adhesives in a specific laboratory UV exposure.

4.2 This practice is not for determining a forecast of the life of an adhesive bond in service. It is only for determining the relative durability of different adhesives compared to each other.

4.3 The results obtained may vary between the different light sources (xenon-arc or fluorescent UV), because of the different spectral-irradiance of the lamps. Adhesives should not

[1] This practice is under the jurisdiction of ASTM Committee D14 on Adhesives and is the direct responsibility of Subcommittee D14.40 on Adhesives for Plastics.

Current edition approved April 1, 2008. Published April 2008. Originally approved in 1946. Last previous edition approved in 2005 as D904 – 99 (2005). DOI: 10.1520/D0904-99R08.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.