



Designation: D7869 – 17

Standard Practice for Xenon Arc Exposure Test with Enhanced Light and Water Exposure for Transportation Coatings¹

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1. Scope

1.1 This practice specifies the operating procedures for a controlled irradiance xenon arc light and water apparatus. The procedure uses one or more lamp(s) and optical filter(s) to produce irradiance similar to sunlight in the UV and visible range. It also simulates the water absorption and stress cycles experienced by automotive exterior coatings under natural weathering conditions. This practice has also been found applicable to coatings on other transportation vehicles, such as aircraft, trucks and rail cars.

1.2 This practice uses a xenon arc light source with specified optical filter(s). The spectral power distribution (SPD) for the lamp and special daylight filter(s) is as specified in **Annex A1**. The irradiance level used in this practice varies between 0.40 and 0.80 W/(m²·nm) at 340 nm. Water is sprayed on the specimens during portions of several dark steps. The application of water is such that the coatings will absorb and desorb substantial amounts of water during testing. In addition, the cycling between wet/dry and warm/cool will induce mechanical stresses into the materials. These test conditions are designed to simulate the physical and chemical stresses from environments in a subtropical climate, such as southern Florida.

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

D4517 Test Method for Low-Level Total Silica in High-Purity Water by Flameless Atomic Absorption Spectroscopy

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

G147 Practice for Conditioning and Handling of Nonmetallic Materials for Natural and Artificial Weathering Tests

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

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

3. Terminology

3.1 Definitions applicable to this standard can be found in Terminology **G113**.

3.2 *transportation coatings, n*—exterior coatings used for vehicles subjected to natural weathering conditions such as automobiles, aircraft, trucks, rail cars, etc.

4. Summary of Practice

4.1 Test specimens are exposed to specific test conditions designed to simulate the physical and chemical stresses from environments in a subtropical climate, such as southern Florida. The test conditions consist of a primary test cycle and a sub-cycle. The primary test cycle includes two long water exposures and a single, long light exposure with precise spectral match to daylight as described in **Annex A1**. It is designed to reproduce water penetration failures, such as adhesion, blistering and diffusion of small molecules (**1**).³ The sub-cycle consisting of shorter alternating water and light

¹ This practice is under the jurisdiction of ASTM Committee **D01** on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee **D01.27** on Accelerated Testing.

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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.

³ The boldface numbers in parentheses refer to the list of references at the end of this standard.