



Standard Practice for Atmospheric Environmental Exposure Testing of Nonmetallic Materials¹

This standard is issued under the fixed designation G 7; 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 reappraisal. A superscript epsilon (ε) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This practice covers procedures to be followed for direct exposure of nonmetallic materials to the environment. When originators of a weathering test have the actual exposure conducted by a separate agency, the specific conditions for the exposure of test and control specimens should be clearly defined and mutually agreed upon between all parties.

1.2 For exposures behind glass, refer to Practice G 24.

1.3 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are for information only.

1.4 This practice is technically equivalent to the parts of ISO 877 that describe direct exposures of specimens to the environment.

1.5 *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:

E 41 Terminology Relating to Conditioning²

E 824 Test Method for Transfer of Calibration from Reference to Field Pyranometers³

E 913 Test Method for Calibration of Reference Pyranometers with Axis Vertical by the Shading Method³

E 941 Test Method for Calibration of Reference Pyranometers with Axis Tilted by the Shading Method³

G 24 Practice for Conducting Exposures to Daylight Filtered Through Glass²

G 113 Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials²

2.2 ASTM Adjunct:

Adjunct No. 12-700070-00 A Test Rack⁴

¹ This practice is under the jurisdiction of ASTM Committee G-3 on Durability of Nonmetallic Materials and is the direct responsibility of Subcommittee G03.02 on Natural Environmental Testing.

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² Annual Book of ASTM Standards, Vol 14.02.

³ Annual Book of ASTM Standards, Vol 12.02.

⁴ Available from ASTM Headquarters, 100 Barr Harbor Dr., West Conshohocken, PA 19428. Request ADJG0007.

2.3 ISO Standards:

ISO 877 Plastics—Methods of Exposure to Direct Weathering; to Weathering Using Glass-Filtered Daylight, and to Intensified Weathering by Daylight Using Fresnel Mirrors⁵

3. Terminology

3.1 *Definitions*—The definitions given in Terminology E 41 and Terminology G 113 are applicable to this practice.

4. Significance and Use

4.1 The relative durability of materials in natural exposures can be very different depending on the location of the exposure because of differences in ultraviolet (UV) radiation, time of wetness, temperature, pollutants, and other factors. Therefore, it cannot be assumed that results from one exposure in a single location will be useful for determining relative durability in a different location. Exposures in several locations with different climates which represent a broad range of anticipated service conditions are recommended.

4.2 Because of year-to-year climatological variations, results from a single exposure test cannot be used to predict the absolute rate at which a material degrades. Several years of repeat exposures are needed to get an “average” test result for a given location.

4.3 Solar ultraviolet radiation varies considerably as a function of time of year. This can cause large differences in the apparent rate of degradation in many polymers. Comparing results for materials exposed for short periods (less than one year) is not recommended unless materials are exposed at the same time in the same location.

4.4 Defining exposure periods in terms of total solar or solar-ultraviolet radiant energy can reduce variability in results from separate exposures. Solar ultraviolet measurements may be made using instruments which record broadband UV (e.g. 295 ± 385 nm) or narrow band UV, as defined in Sections 7.2.4 and 7.2.5. An inherent limitation in solar-radiation measurements is that they do not reflect the effects of temperature and moisture, which are often as important as solar radiation.

4.5 The design of the exposure rack, the location of the specimen on the exposure rack, and the type or color of

⁵ Available from the American National Standards Institute (ANSI), 1430 Broadway, New York, NY 10018.