



Standard Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight¹

This standard is issued under the fixed designation G 90; 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 Fresnel-reflecting concentrators using the sun as source are utilized in the accelerated outdoor exposure testing of nonmetallic materials.

1.2 This practice covers a procedure for performing accelerated outdoor exposure testing of nonmetallic materials using a Fresnel-reflector accelerated outdoor weathering test machine. The apparatus (see Fig. 1 and Fig. 2) and guidelines are described herein to minimize the variables encountered during outdoor accelerated exposure testing.

1.3 This practice does not specify the exposure conditions best suited for the materials to be tested but is limited to the method of obtaining, measuring, and controlling the procedures and certain conditions of the exposure. Sample preparation, test conditions, and evaluation of results are covered in existing methods or specifications for specific materials.

1.4 The Fresnel-reflector accelerated outdoor exposure test machines described may be suitable for the determination of the relative durability of materials exposed to sunlight, heat, and moisture, provided the mechanisms of chemical or physical change, or both, which control the rates of acceleration factors for the materials do not differ significantly.

1.5 This practice establishes uniform sample mounting and in-test maintenance procedures. Also included in the practice are standard provisions for maintenance of the machine and Fresnel-reflector mirrors to ensure cleanliness and durability.

1.6 This practice shall apply to specimens whose size meets the dimensions of the target board as described in 8.2.

1.7 For test machines currently in use, this practice may not apply to specimens exceeding 13 mm (¹/₂ in.) in thickness because cooling may be questionable.

1.8 Values stated in SI units are to be regarded as the standard. The inch-pound units in parentheses are provided for information only.

1.9 *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:

D 859 Test Method for Silica in Water²

D 1014 Practice for Conducting Exterior Exposure Tests of Paints on Steel³

D 1435 Practice for Outdoor Weathering of Plastics⁴

D 1898 Practice for Sampling of Plastics⁴

D 4141 Practice for Conducting Accelerated Outdoor Exposure Tests of Coatings³

D 4517 Test Method for Low-Level Total Silica in High-Purity Water by Flameless Atomic Absorption Spectroscopy⁵

E 772 Terminology Relating to Solar Energy Conversion⁶

E 824 Test Method for Transfer of Calibration from Reference to Field Radiometers⁷

E 891 Tables for Terrestrial Direct Normal Solar Spectral Irradiance for Air Mass 1.5⁷

E 903 Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrated Spheres⁶

G 7 Practice for Atmospheric Environmental Exposure Testing of Nonmetallic Materials⁷

G 24 Practice for Conducting Exposures to Daylight Filtered through Glass⁷

G 113 Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials⁷

2.2 Other Standards:

SAE J576 Plastic Materials for Use in Optical Parts Such as Lenses and Reflectors of Motor Vehicle Lighting Devices

SAE J1961 Accelerated Exposure of Automotive Exterior Materials Using a Solar Fresnel-Reflector Apparatus

3. Terminology

3.1 **Definitions**—Definitions of terms common to G 3 durability standards can be found in Terminology G 113.

4. Significance and Use

4.1 Results obtained from this practice can be used to compare the relative durability of materials subjected to the

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

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² Annual Book of ASTM Standards, Vol 11.01.

³ Annual Book of ASTM Standards, Vol 06.01.

⁴ Annual Book of ASTM Standards, Vol 08.01.

⁵ Annual Book of ASTM Standards, Vol 11.02.

⁶ Annual Book of ASTM Standards, Vol 12.02.

⁷ Annual Book of ASTM Standards, Vol 14.02.