~~Designation:D3424–01~~

~~Standard Test Methods for~~ Designation: D 3424 – 09

Standard Practice for Evaluating the Relative Lightfastness and Weatherability of Printed Matter[1]

This standard is issued under the fixed designation D 3424; 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

~~1.1These test methods cover the determination of the relative lightfastness and weatherability of printed matter under the following seven conditions, of which two involve exposure to natural daylight and five involve accelerated procedures in the laboratory: *~~

1.1 This standard describes procedures for the determination of the relative lightfastness and weatherability of printed matter under the following conditions, which involve exposure to natural daylight or accelerated procedures in the laboratory:

1.1.1 ~~*Test Method 1*~~Method 1—Daylight behind window glass,

1.1.2 ~~*Test Method 2*~~Method 2—Outdoor weathering,

1.1.3 ~~*Test Method 3*~~Method 3—Xenon-arc apparatus with window glass filters to simulate daylight behind window glass,

1.1.4 ~~*Test Method 4*~~Method 4—Xenon-arc apparatus with water spray and daylight filters to simulate outdoor weathering,

1.1.5 ~~*Test Method 5*—Enclosed carbon-arc apparatus without water spray,~~

~~1.1.6*Test Method 6*—Enclosed carbon-arc apparatus with water spray, and~~

~~1.1.7*Test Method 7*~~Method 7—Fluorescent lamp apparatus to simulate indoor fluorescent lighting in combination with window-filtered daylight.

~~1.2These test methods require that a suitable print or other control (reference standard) be run along with the test sample. Color changes due to conditions of exposure may be evaluated by visual examination or instrumental measurement.~~

~~1.3These test methods are applicable to prints on any flat substrate including paper, paperboard, metallic foil, metal plate, and plastic film, and are produced by any printing process including letterpress, offset lithography, flexography, gravure, and silk screen.~~

~~1.4~~

1.1.6 *Method 8*—Fluorescent lamp apparatus operating with fluorescent cool white lamps to simulate indoor fluorescent lighting.

NOTE 1—Previous versions of this standard included Methods 5 and 6 that are based on enclosed carbon-arc exposures. These methods are described in Appendix X1. The spectral irradiance of the enclosed carbon-arc is a very poor simulation of solar radiation, window glass filtered solar radiation, or the emission of lamps used for interior lighting. In addition, enclosed carbon-arc devices are no longer readily available or commonly used.

1.2 These methods require that a suitable print or other control (reference standard) be run along with the test sample. Color changes due to conditions of exposure may be evaluated by visual examination or instrumental measurement.

1.3 These methods are applicable to prints on any flat substrate including paper, paperboard, metallic foil, metal plate, and plastic film, and are produced by any printing process including letterpress, offset lithography, flexography, gravure, and silk screen.

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

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.* For specific hazard statements, see Section 8.

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[1] ~~These test methods are under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and are the direct responsibility of Subcommittee D01.56 on Printing Inks.~~

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***A Summary of Changes section appears at the end of this standard.**

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D 1729 Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials

D 2244 ~~Test Method~~ Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

D 2616 Test Method for Evaluation of Visual Color ~~Differences with~~Difference With a Gray Scale

D 4302 Specification for Artists' ~~Oils, Resin~~ Oil, Resin-Oil, and Alkyd Paints

D 4674 ~~Test Method for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Fluorescent Lighting and Window-Filtered Daylight~~ Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments

D 5067 Specification for Artists' Watercolor Paints

D 5098 Specification for Artists' Acrylic ~~Emulsion~~Dispersion Paints

E 284 Terminology of Appearance

E 991 ~~Practice for Color Measurement of Fluorescent Specimens~~[2] Practice for Color Measurement of Fluorescent Specimens Using the One-Monochromator Method

E 1331 Test Method for Reflectance Factor and Color by Spectrophotometry Using Hemispherical Geometry

E 1347 ~~Test Method for Color and Color Difference Measurements by Tristimulus (Filter) Colorimetry~~[2] Test Method for Color and Color-Difference Measurement by Tristimulus Colorimetry

E 1349 ~~Test Method for Reflectance Factor and Color by Spectrophotometry Using Bidirectional Geometry~~[2] Test Method for Reflectance Factor and Color by Spectrophotometry Using Bidirectional (45:0 or 0:45) Geometry

G 7 ~~Practice for Atmospheric Environmental Exposure Testing of Nonmetallic Materials~~

~~G23Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials~~[5]

Practice for Atmospheric Environmental Exposure Testing of Nonmetallic Materials

G 24 ~~Practice for Conducting Exposures to Daylight Filtered Through Glass~~[5] Practice for Conducting Exposures to Daylight Filtered Through Glass

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

~~G26Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials~~[5]

~~G113Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials~~[5]

~~G~~ 151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices ~~That~~that Use Laboratory Light Sources

G 153 Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

G 154 Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

G 155 Practice for Operating Xenon Arc Light Apparatus for Exposure of Non~~m~~-Metallic Materials

2.2 *ANSI Standard:*

PH 2.30 for Graphic Arts and Photography—Color Prints, Transparencies and Photomechanical Reproductions, Viewing Conditions[3]

2.3 *ISO Standard:*

ISO 9370 Plastics — Instrumental determination of radiant exposure in weathering tests—General guidance and basic test method[3]

3. Terminology

3.1 Definitions relating to weathering tests are covered in Terminology G 113. Definitions relating to color attributes and color differences are covered in Practices D 1729 and ~~Test Method~~ D 2244. Other appearance terms used in these test methods are defined in Terminology E 284.

~~3.2*Definitions:*~~

~~3.2.1*radiant exposure, H, n*—time integral of the irradiance at a given point over a specified time interval.~~

~~3.2.2*Discussion*—Radiant exposure is usually a spectral quantity, with units of joules per square metre per unit wavelength [J/m^2·nm]. The wavelength region to be covered should be specified.~~

~~3.3*Definitions of Terms Specific to This Standard:*~~

~~3.3.1*ultraviolet radiant exposure*—an integration with respect to time of the ultraviolet irradiance on the exposed face of the specimen. UV irradiance (wavelengths below 400 nm) is believed largely responsible for degradation of organic materials. Units are J/m^2.~~

[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* ~~, Vol 06.01~~ volume information, refer to the standard's Document Summary page on the ASTM website.

~~[3] Annual Book of ASTM Standards, Vol 06.02.~~

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

4. Summary of ~~Test~~Exposure Methods

4.1 Printed specimens of the test and control are simultaneously exposed under conditions appropriate to the end-use application, or as agreed upon between the producer and the user.

4.2 The color changes of the exposed prints are periodically evaluated visually or instrumentally versus either an exposed control or an unexposed file specimen.

4.3 The endpoint is reached when it is established that the test print is equal to, better than, or worse than the control.

5. Significance and Use

5.1 Lightfastness or weatherability for specified periods of time is pertinent for certain types of printed matter such as magazine and book covers, posters and billboards, greeting cards and packages. Since the ability of printed matter to withstand color changes is a function of the spectral-power distribution of the light source to which it is exposed, it is important that lightfastness be assessed under conditions appropriate to the end-use application.

5.2 The accelerated procedures covered in these ~~test~~exposure methods provide means for the rapid evaluation of lightfastness or weatherability under laboratory conditions. Test results are useful for specification acceptance between producer and user and for quality control.

5.2.1 The xenon-arc lamp with an appropriate filter system exhibits a spectral-power distribution that corresponds more closely to that of daylight than the carbon-arc. In turn, accelerated tests using xenon-arc apparatus may be expected to correlate better with exposure to natural daylight than do those using carbon-arc apparatus.

~~5.2.2Exploratory studies demonstrated that the fluorescent-lamp apparatus ranked a series of 16 printed specimens in nearly the same order as did fluorescent lighting prevailing in cooperating laboratories.~~

5.3 To accommodate variations in light intensity among days, seasons, locations, or instruments, duration of exposure is preferably expressed as the ~~cumulative ultraviolet~~ radiant exposure in specific bandpasses rather than time. In either case, the inclusion of an appropriate control serves to minimize effects of variations in test conditions.

5.4 Color changes are not a linear function of duration of exposure. The preferred method of determining lightfastness or weatherability is to expose the prints for a number of intervals and to assess the time or radiant exposure required to obtain a specified color difference.

5.5 For a given printing ink, lightfastness and weatherability or both depend on the type of substrate, the film thickness ~~on~~of the print, and the area printed (solid versus screen). Therefore, it is important that the nature of the test and control specimens correspond to that expected under actual use conditions.

NOTE ~~1—Specifications D4302, D5067, and D5098~~ 2—Specifications D 4302, D 5067, and D 5098 provide useful guides to the lightfastness of pigments in several types of artists' paints after 1260 MJ/m^2 total window glass filtered solar radiant exposure (equivalent to about 2 or 3 months' exposure to ~~daylight behind glass).~~window glass filtered solar radiation in accordance with Practice G 24 at a tilt angle of 45 degrees). However, because of major differences between printing inks and artists' colors, especially in applied film thickness, it cannot be assumed that the lightfastness categories of printed ink films containing these pigments will be comparable to those indicated in the three specifications.

6. Apparatus

6.1 *Exposure Apparatus*:

~~6.1.1*Test Method 1Daylight Behind Window Glass*—Outdoor exposure cabinet conforming to Method A of Practice G24. The cabinet is covered with window glass that transmits typically less than 3.5% at wavelengths shorter than 310 nm. Accessories include a mutually agreeable radiometer (for example, 295 to 385 nm), and humidity and temperature recorders.~~

6.1.1 *Exposure Method 1 Daylight Behind Window Glass*—Outdoor exposure cabinet conforming to Method A of Practice G 24.

6.1.2 ~~*Test*~~*Exposure Method 2 Outdoor Weathering*—Outdoor exposure rack conforming to Practice G 7~~. Accessories are the same as in 6.1.1 with the addition of a wetness meter and rain gage.~~ .

6.1.3 Exposure Methods 1 and 2 require a broad band UV radiometer meeting the requirements of ISO 9370.

NOTE ~~2—All equipment must be calibrated in accordance with the manufacturer's instructions.~~

~~6.1.3*Test Method 3 Xenon-Arc with Window Glass Filters*—Xenon-arc apparatus equipped with a window glass filter system to simulate natural daylight filtered through window glass as specified in the Apparatus sections of Practices G151 and G155.~~ 3—In Method 1, the glass typically removes most short wavelength UV radiation up to about 310 nm. Commercial suppliers of exposures conducted according to Method 1 or Method 2 measure a variety of climate parameters including temperature and relative humidity during these exposures, and can provide this data upon request.

6.1.4 ~~*Test Method 4 Xenon-arc with Daylight Filters and Water Spray*—Xenon-arc apparatus equipped with a daylight filter system and water spray to simulate outdoor weathering as specified in the Apparatus sections of Practices G151 and G155.~~ Exposure Method 3 Xenon-Arc with Window Glass Filters—Xenon-arc apparatus equipped with a window glass filter to simulate solar radiation filtered through window glass as specified in the Apparatus sections of Practices G 151 and G 155.

6.1.5 ~~*Test Methods 5 and 6 Enclosed Carbon-Arc*—Enclosed carbon-arc apparatus conforming to the Apparatus sections of Practices G151 and G153.~~

NOTE ~~3—Previous versions of these test methods referenced Practice G23 for enclosed carbon-arc devices and Practice G26 for xenon-arc devices; both~~

~~practices describe very specific equipment designs. In the current version of these test methods, these practices have been replaced by Practice G151, which gives performance criteria for all exposure devices that use laboratory light sources, and by Practices G153 and G155, which give requirements for exposure in enclosed carbon-arc and xenon-arc devices, respectively.~~ Exposure Method 4 Xenon-arc with Daylight Filters and Water Spray—Xenon-arc apparatus equipped with a daylight filter and water spray to simulate outdoor weathering as specified in the Apparatus sections of Practices G 151 and G 155.

6.1.6 ~~*Test Method 7Fluorescent-Lamp Apparatus*—Exposure cabinet conforming to Test Method D4674. The cabinet is constructed of UV reflective aluminum with a clear chromatic conversion coating, and the light source is a combination of very high-output cool white fluorescent lamps and soda lime glass-filtered fluorescent UV sunlamps. Accessories include a broad-band detector (250 to 400 nm) and a temperature sensing device.~~ Exposure Method 7 Fluorescent UV/Cool White Lamp Apparatus—Exposure cabinet conforming to Practice D 4674, Method 1. This exposure uses soda lime glass filtered fluorescent UVA340 or UVB lamps in combination with very high output (VHO) cool white fluorescent lamps. Conditions are adjusted to produce a defined condition of UV exposure measured from 250 nm to 400 nm and are conducted to a time agreed upon by interested parties.

6.1.7 *Exposure Method 8 Fluorescent-Lamp Apparatus* conforming to the requirements of Practice G 154. Fluorescent cool white lamps to conform to the requirements of Practice D 4674, Annex A2.

6.2 *Apparatus for Print Evaluation* :

6.2.1 *Standard Daylight*, (for visual evaluation), preferably a D50 light source conforming to ANSI Standard PH 2.30.

6.2.2 *Gray Scale Chart and Masks* , (optional, for visual evaluation) conforming to Test Method D 2616.

6.2.3 *Color Measuring Instrument* , (for instrumental evaluation), such as a spectrophotometer conforming to Test Method E 1331 ~~or E1349~~ or E 1349, or a tristimulus colorimeter conforming to Test Method E 1347, or, if the specimens are fluorescent, to Practice E 991.

7. Materials

7.1 *Control (Reference Standard)* , preferably a printed specimen of known lightfastness or weatherability; alternatively, AATCC Blue Wool Lightfastness Standards in accordance with Practice G 151.

7.2 *Mounting Material*, such as light-weight card stock, on which to mount non-rigid specimens (paper, plastic, or foil) during exposure tests.

7.3 *Masking Material*, (optional), such as white card stock, aluminum foil, or other opaque material with a non-UV-reflecting surface.

7.4 *Unprinted Stock*, (optional), identical to that used for the printed specimens.

7.5 *Backing Material*, (for use during instrument measurements on nonopaque specimens), such as several sheets of the unprinted stock, a standard white (card) stock, or a spare calibration standard.

8. Hazards

8.1 **Precaution:** Never look directly at ~~sunlight~~ the sun or the operating light source of an accelerated aging apparatus unless wearing UV protective eyewear.

8.2 Newer accelerated apparatus are equipped with safety switches that turn the lamps off prior to gaining access. Users of very old carbon-arc apparatus must be certain to turn the switch off before opening the test chamber door.

8.3 Users of carbon-arc apparatus are cautioned that burning carbon rods become very hot. After the device is turned off, wait at least 15 min for the arcs to cool, and wear canvas or other protective work gloves when changing the rods. Avoid inhaling ash dust.

9. Test Specimens

9.1 These ~~test~~exposure methods do not cover preparation of printed specimens. The test print should match the control print in color, substrate, print area, and ink film thickness.

9.2 It may be useful to include the unprinted substrate and a vehicle print in exposure tests so as to determine the contribution of paper or vehicle yellowing to color changes.

9.3 Unless otherwise agreed upon, at least two specimens are to be exposed at each set of test conditions. The test specimens shall be of uniform color, gloss, and texture; clean and free of fingerprints.

9.3.1 **Warning:** When handling test specimens, be careful not to contaminate the surface by touching with fingers.

9.4 For visual evaluation, the specimen size indicated in Practice D 1729 is a minimum of 90 by 165 mm. For instrumental evaluation, the specimen must be large enough to cover the specimen port; a minimum size of 35 mm^2 is satisfactory for many instruments. In the case of samples intended for xenon-lamp or carbon-arc exposure, the specimens should be of sufficient dimensions to be accommodated in the specimen holders.

9.5 Prepare file specimens (unexposed controls) in the following manner:

(*1*) For visually evaluated tests, set aside a replicate print or cut off a segment of suitable size; store in a dark dry place.

(*2*) For instrumentally evaluated tests, make color measurements on the relevant specimen area(s) prior to exposure; see 11.3.1 and 11.3.2.

NOTE 4—The file specimen should not be a masked specimen. Even though shielded from radiation, some materials may undergo color changes due to the heat or moisture present during the test.

9.6 Mount nonrigid specimens onto cardstock. If masking is specified in order to obtain multiple exposures on a single specimen, make certain that the size of each exposed area conforms to 9.4. Place specimens intended for xenon-arc or carbon-arc exposure in specimen holders; provide a sufficient number of blanks so as to fill the specimen rack.

10. Procedures for Light and Weather Exposure

10.1 Expose the test specimens simultaneously with the control in the apparatus and under the conditions agreed upon between the producer and the user. When conditions have not been specified, use the following guidelines:

~~**TEST METHOD 1 DAYLIGHT BEHIND WINDOW GLASS**~~

~~10.1.1Common commercial exposure sites are southern Florida (a high humidity area) and Arizona (a low humidity area).~~

EXPOSURE METHOD 1 DAYLIGHT BEHIND WINDOW GLASS

10.1.1 Common commercial exposure sites are southern Florida (a high humidity area) and Arizona (a low humidity area). Table 1 shows the average daily solar ultraviolet radiation for exposures conducted in Miami and Phoenix.

TABLE 1 Average Daily Total Solar Ultraviolet Radiation (Mj/m², 295-385 nm, for 1996-2006) for Exposures Conducted in Accordance with Practice G 24, Method A, with Rack Tilted at 45° to Horizontal

Month	Miami	Phoenix
January	0.47	0.42
February	0.54	0.51
March	0.58	0.62
April	0.59	0.70
May	0.55	0.72
June	0.46	0.70
July	0.50	0.65
August	0.50	0.66
September	0.49	0.66
October	0.53	0.58
November	0.47	0.46
December	0.42	0.40
Average annual	0.47	0.59

~~NOTE5—Either site averages about 0.5 MJ/m² of total ultraviolet radiation under glass per day.~~ NOTE 5—Solar UV radiation data in Table 1 is for 1996 through 2006.

10.1.2 Mount the test and control specimens under glass on open racks at an angle of 45° facing the equator.

10.1.3 Monitor cumulative ultraviolet radiant exposure of the glass-filtered daylight (for example, 295 to 385 nm, little of which will be below 310 nm), relative humidity, and air temperature, in accordance with Practice G 24.

~~TEST~~EXPOSURE METHOD 2 OUTDOOR WEATHERING

10.1.4 Commercial sites are the same as in 10.1.1~~–~~. Table 2 shows average total ultraviolet radiation per day for exposures conducted in Miami or Phoenix at an angle of 45° to the horizontal.

TABLE 2 Average Daily Total Solar Ultraviolet Radiation (Mj/m², 295-385 nm) for Exposures Conducted in Miami or Phoenix at 45° to Horizontal

Month	Miami	Phoenix
January	0.72	0.61
February	0.84	0.76
March	0.92	0.93
April	0.95	1.06
May	0.89	1.09
June	0.76	1.10
July	0.77	1.05
August	0.77	1.06
September	0.78	1.04
October	0.80	0.89
November	0.70	0.70
December	0.63	0.58
Average annual	0.80	0.91

NOTE~~6—Either site averages about 1 MJ/m^2 of total ultraviolet radiation per day.~~ 6—Data for solar UV radiation data in Table 2 is for 1985 through 2006.

10.1.5 Mount the test and control specimens on a rack faced with unpainted plywood at an angle of 45° facing the equator.

10.1.6 Monitor ultraviolet radiation exposure (for example, 295 to 385 nm), relative humidity, air temperature, ~~hours of wetness,~~ and total rain fall in accordance with Practice G 7.

~~TEST~~EXPOSURE METHOD 3 XENON-ARC APPARATUS WITH WINDOW GLASS FILTERS TO SIMULATE DAYLIGHT BEHIND WINDOW GLASS

10.1.7 Set up the xenon-arc apparatus with the Window glass filter system and operate in accordance with ~~the Apparatus section of~~ Practices G 151 and G 155.

10.1.8 Unless otherwise specified, use the following exposure cycle:

10.1.8.1 Expose the specimens to 100 % light.

10.1.8.2 Set the irradiance level to ~~0.35~~1.2 watts ~~or higher~~ per square metre per unit wavelength (W/m^2·~~nm) at 340 nm, and maintain at ±0.02 W/m~~nm) at 420 nm. To achieve equivalent irradiance using 340 nm control set the irradiance to 0.35 W/(m^2·nm. ~~Consult the manufacturer for the equivalent 300 to 400 nm or 300 to 800 nm broad band irradiance setting and tolerance applicable to the specific equipment for which it is needed.~~

~~10.1.8.3Set the uninsulated black-panel temperature to 63 ± 3°C (145 ± 5°F), and, in apparatus capable of controlling humidity, the relative humidity to 40 ± 5%.~~

~~10.1.9Fill the rack with mounted test and control specimens making sure that the specimens face the lamp. Fill empty spaces, if any, with blanks.~~ ·nm) at 340 nm. To achieve equivalent irradiance using broad band UV (300-400 nm) control, set the 300-400 nm irradiance to 49 W/m^2. To achieve equivalent irradiance using UN/Visible (300-800 nm) control, set the 300-800 nm irradiance to 514 W/m^2. During equilibrium conditions, the allowable fluctuation of the irradiance meter about the set point is ±0.02 W/(m^2·nm) when irradiance is controlled at 420 nm or 340 nm, ±3 W/m^2 when irradiance is controlled at 300-400 nm or ±25 W/m^2 when 300-800 nm irradiance control is used.

10.1.8.3 Program the device to produce an uninsulated black panel temperature of 63°C. Unless otherwise specified, in devices capable of controlling relative humidity, program the device to produce a relative humidity of 40 %. During equilibrium conditions, the allowable fluctuation of the meter indicating uninsulated black panel temperature shall be a maximum of ±3°C, and when relative humidity is controlled, the allowable fluctuation of the meter indicating relative humidity shall be a maximum of ±5 %.

10.1.8.4 If the meter indicating the uninsulated black panel temperature or relative humidity (if controlled) drifts out of the ranges given above, stop the test and make any necessary repairs or adjustments.

10.1.9 Fill the rack with mounted test and control specimens making sure that the specimens face the lamp. In devices with rotating specimen racks, fill empty spaces, if any, with blanks.

10.1.10 Monitor the cumulative radiant exposure in either the narrow or broad band regions.

10.1.11 Reposition the specimens after specified intervals in accordance with the Procedure sections of Practices G 151 and G 155.

~~TEST METHOD 4XENON-ARC APPARATUS WITH WATER SPRAY AND DAYLIGHT FILTERS TO SIMULATE OUTDOOR WEATHERING~~

~~10.1.12Install the xenon-arc with the Daylight filter system in accordance with the Apparatus sections of Practices G151 and G155.~~

~~10.1.13Unless otherwise specified, use the following exposure cycle:~~

~~10.1.13.1Use a cycle of 102 min of light followed by 18 min of light and water spray.~~

~~10.1.13.2Set the irradiance level to a minimum of 0.40 W/m~~

EXPOSURE METHOD 4 XENON-ARC APPARATUS WITH WATER SPRAY AND DAYLIGHT FILTERS TO SIMULATE OUTDOOR WEATHERING

10.1.12 Operate the xenon-arc with the Daylight filter system in accordance with Practices G 151 and G 155.

10.1.13 Unless otherwise specified, use Cycle 1 (only in devices capable of controlling humidity) or 1a:

Cycle Number	Cycle Description	Parameter	Set Point	Operational Fluctuation
~~1~~	~~102 min of light followed by 18 min of light with water sprayed on front surface of specimens [repeat]~~	~~Irradiance~~	~~0.40 W/(m^2 nm) at 340 nm 47 W/m^2 ·nm at 340 nm and maintain at ±0.02 W/m 300 to 400 nm~~	~~±0.02 W/(m^2·nm. Consu equivalent 300 to 40 broad band irradianc plicable to the specif needed.~~

~~10.1.13.3 Set the uninsulated black-panel temperature to relative humidity to 40 ± 5 %.~~

~~10.1.14 Same as in nm)~~ ~~±2.5 W/m^2~~