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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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# Standard Test Method for Light Stability of Clear Coatings[1]

This standard is issued under the fixed designation D 2620; 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.

ε[1] NOTE—Keywords and unit of measurement statement were added editorially in May 1995.

## 1. Scope

1.1 This test method covers the determination of the discoloration of clear coatings by sunlight through glass.

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

1.3 *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 1729 Practice for Visual Evaluation of Color Differences of Opaque Materials[2]

D 1925 Test Method for Yellowness Index of Plastics[3]

G 24 Practice for Conducting Exposures to Daylight Filtered Through Glass[4]

## 3. Summary of Test Method

3.1 The effect of sunlight on discoloration of clear coatings is determined by exposing under glass, coated panels masked at one end, to natural sunlight for a specified time. At the end of the exposure, the mask is removed and the panels evaluated for degree of discoloration.

## 4. Significance and Use

4.1 Color change, particularly yellowing, is not generally acceptable to users of coatings when it is readily noticeable. In designing clear coating systems for interior use on various substrates, it is of interest to know how well the clear coats will resist color change caused by ambient light. This test method permits the evaluation of the effect of natural indoor light on the color stability of clear coatings.

## 5. Apparatus

5.1 *Exposure Cabinet* as described in Practice G 24.

## 6. Test Specimens

6.1 For each clear coating under test, use one test panel approximately 3 by 5 in. (75 by 125 mm) of white carrara glass or other specified substrate material.

NOTE 1—Other materials that may be considered for this purpose include: (*1*) White ceramic tile. (*2*) A white pigmented, light-stable coating which would not be lifted by the clear topcoat. (A baking enamel with the composition of 30 % melamine formaldehyde resin and 70 % of the phthalic anhydride/coconut alkyd resin with 3 lb/gal (1.36 kg/L) of titanium dioxide per gallon has been found satisfactory.) (*3*) The substrate intended for use with the clear coating. The light stability of the substrate may be determined by including an extra test panel without a clear topcoat.

6.2 Prepare specimens of the test materials by applying the coatings on the test panels to a dry film thickness of 2 ± 0.2 mil (50 ± 5 µm).

6.3 Prepare a reference specimen, representing a material of known performance in this test, with each set of test specimens.

6.4 Record the panel preparation details: method of coating application, baking conditions, film thickness, etc. These details will be established by mutual agreement between purchaser and seller in accordance with the type of product and its intended use.

## 7. Conditioning

7.1 Unless otherwise specified, condition the coated panels at 73.5 ± 3.5°F (23 ± 2°C) and 50 ± 5 % relative humidity for 48 h if baked, or 7 days if air dried.

## 8. Procedure

8.1 Prior to exposure, mask one-half of each test panel with aluminum foil to exclude sunlight from the other half of the coating.

NOTE 2—The tape used to attach the mask to the panel should not extend over the edge of the mask but should extend beyond the ends of the mask and stick to the rear of the panel, thereby holding the mask in position. This will prevent contact between the tape and the finish and eliminate the possibility of staining from the tape.

8.2 Mount the test specimens in the glass-covered exposure cabinet continuously 24 h a day for the specified period of

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[2] *Annual Book of ASTM Standards*, Vol 06.01.

[3] *Annual Book of ASTM Standards*, Vol 08.01.

[4] *Annual Book of ASTM Standards*, Vol 14.02.

exposure. It is recommended this period should be approximately 5 weeks, since longer periods of exposure do not significantly change the results.

NOTE 3—In cooperative tests, exposure of nitrocellulose lacquers, cellulose acetate butyrate lacquer, and low-bake alkyd enamel for 22 weeks did not show significantly greater discoloration than after exposure for 5 weeks.

## 9. Interpretation of Results

9.1 Visual ratings of the degree of discoloration may be made. However, it is preferred that an instrumental method be used as described in Test Method D 1925, (see Test Method D 1729).

## 10. Color Changes Not Caused by Light

10.1 In many cases atmospheric conditions (temperature, humidity, reactive gases) may produce significant color changes even without the presence of light. An indication as to whether or not side effects are operating may be obtained by retaining unexposed a duplicate set of specimens in the laboratory. A difference in color between the unexposed specimens and the covered portion of the exposed specimens indicates that the material has been affected by some agent other than light.

10.2 Further clarification regarding atmospheric effects may be obtained by simultaneously exposing a duplicate set of test specimens in another cabinet of the same type used in the light exposures but with the glass covered with an opaque material so that the light is excluded.

## 11. Report

11.1 Report the following information:

11.1.1 Visual ratings or instrumental values for degree of discoloration of coatings or both,

11.1.2 Date and location of exposure,

11.1.3 Length of exposure,

11.1.4 Substrate used,

11.1.5 Details of panel preparation, and

11.1.6 Conditioning of panels prior to testing.

## 12. Precision

12.1 *Precision*—Because of the many variations in visual rating of discoloration, meaningful estimates of precision cannot be given. In cooperative tests, however, fairly good agreement was obtained by the various cooperators in the visual rating of the test panels.

## 13. Keywords

13.1 clear coatings; discoloration; light stability; sunlight