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METHOD OF TEST FOR ANTI-GRAFFITI MATERIALS ON RETROREFLECTIVE SHEETING FOR HIGHWAY SIGNS

CAUTION: Prior to handling test materials, performing equipment setups, and/or conducting this method, testers are required to read "**SAFETY AND HEALTH**" in Part 9 of this method. It is the responsibility of the user of this method to consult and use departmental safety and health practices and determine the applicability of regulatory limitations before any testing is performed.

SCOPE

Anti-graffiti materials are products used to prevent the adhesion of unwanted coatings or to facilitate the removal of applied graffiti. These materials are typically liquid-applied coatings or preformed films applied over the surface to be protected. This method covers procedures for determining the durability, functionality, material property and graffiti removal characteristics of anti-graffiti materials applied to retroreflective sheeting used for highway signs. This test method is divided into the following parts:

1. Panel Preparation
2. Artificial Weathering
3. Specular Gloss
4. Retroreflectivity
5. Luminance Factor and Color
6. Solvent Resistance
7. Hardness
8. Graffiti Resistance Test
9. Safety and Health

1. PANEL PREPARATION

A. Apparatus

A sheet metal shear to cut the 300 by 300-mm panels after they have been coated and cured.

B. Procedure

1. Manufacture four 300 by 300-mm, 1.6 mm thick aluminum panels with Type III white reflective sheeting applied to the surface. The sheeting shall conform to the requirements of ASTM Designation: D 4956.
2. The four panels shall be prepared as follows: coat the lower half of one panel with red screened ink, the lower half of the second with green screened ink, the lower half of the third with blue screened ink, and the lower half of the fourth with yellow screened ink. The finished, screened surfaces are required to comply with Caltrans requirements for color and retroreflectivity. Conformance with the requirements of ASTM Designation: D 4956 will satisfy this requirement.
3. Each of the inked panels shall then be half coated with the anti-graffiti coating on the right half of each panel. The anti-graffiti coating shall coat half of the inked portion of the panel and half of the non-inked portion.

4. Cut each of the 300 by 300-mm panels into quarters and then cut again to yield four pairs of identical 150 by 75-mm panels. Each pair will represent the following combinations, non-inked white sheeting, white sheeting coated with the anti-graffiti material, screened ink on white sheeting and anti-graffiti material over screened ink. One panel will be the control and the other will be placed in the light exposure apparatus described in Part 2, Artificial Weathering.

2. ARTIFICIAL WEATHERING

A. Apparatus

Light- exposure apparatus (Xenon-Arc type) as described is ASTM Designation: G 155 with daylight filters. The cycle of water spray and light is described in Table X3.1, Cycle 1.

B. Procedure

On the test panels prepared in Part 1 measure specular gloss, retroreflectivity, luminance factor and color initially, then place in the light exposure apparatus. Perform the same tests at each of the following exposure intervals, 500, 1000, 2000 and 2200 hours.

3. SPECULAR GLOSS

A. Apparatus

1. Instrument meeting the requirements of ASTM Designation: D 523, with an 85-degree geometry.
2. Light exposure apparatus described in Part 2, Artificial Weathering.

B. Procedure

1. Measure the specular gloss of the test panel according to ASTM Designation: D 523.

2. Place the 150 by 75-mm panel in the light exposure apparatus and measure the specular gloss at 500, 1000, 2000 and 2200 hours of exposure.

4. RETROREFLECTIVITY

A. Apparatus

1. The apparatus shall conform to the requirements in ASTM Designation: E 810 and California Test Method 642.
2. Light exposure apparatus described in Part 2, Artificial Weathering.

B. Procedure

1. Measure retroreflectivity of each panel initially using 0.2 and 0.5 degree observation angles, and -4 and +30 degree entrance angles.
2. Place the 150 by 75-mm panel in the light exposure apparatus and measure the retroreflectivity at 500, 1000, 2000 and 2200 hours of exposure.

5. LUMINANCE FACTOR AND COLOR (DAYTIME)

A. Apparatus

1. Instrument that meets the requirements of ASTM Designation: D 4956, with 45/0 geometry. Use 1931 CIE 2-degree standard observer and CIE illuminant C.
2. Light exposure apparatus described in Part 2, Artificial Weathering.

B. Procedure

1. Measure the luminance factor, Y (%), and chromaticity in accordance with ASTM Designation: D 4956, section 7.4.

2. Place the 150 by 75-mm panel in the light exposure apparatus and measure the luminance factor and chromaticity at 500, 1000, 2000 and 2200 hours of exposure.

6. SOLVENT RESISTANCE

A. Apparatus

1. Reagent grade methyl ethyl ketone.
2. Nonferrous electronic film thickness gauge.

B. Procedure

1. Measure the film thickness of the anti-graffiti coating after it has cured on the panel with the electronic film thickness gauge.
2. Perform 25 double rubs in accordance with ASTM Designation: ASTM D 5402.
3. Measure the film thickness and record the amount of film lost during the scrub test.

7. PENCIL HARDNESS

A. Apparatus

Set of calibrated pencils to meet the requirements of ASTM Designation: D 3363

B. Procedure

Determine pencil hardness of the anti-graffiti coating as directed in ASTM Designation: D 3363.

8. GRAFFITI RESISTANCE TEST

A. Apparatus

1. Assorted acrylic, polyurethane and epoxy aerosol paints. Various types of red marking pens and lipsticks.

2. Light exposure apparatus described in Part 2, Artificial Weathering.
3. Two identical 150 by 75 mm panels; one that has been exposed for 2200 hours in the light exposure apparatus and one that has not.

B. Procedure

1. Apply different marks on the two test panels with the assorted markers and spray paints. Allow these to cure a minimum of 72 hours at ambient temperature before removal is attempted.
2. Attempt to remove graffiti with a graffiti removal product that has been approved by Caltrans. Determine luminance factor, chromaticity coordinates, specular gloss, and retroreflectivity on the panels after removal of the graffiti.

9. SAFETY AND HEALTH

Anti-Graffiti materials shall conform to the regulations of the Occupational Safety and Health Administration, all requirements of the Environmental Protection Agency, and the requirements of the air pollution control district where the material will be applied. Refer to the Caltrans Laboratory Safety Manual and the manufacturer's datasheet on the proper use and disposal of the chemicals and solvents used in this method.

REFERENCES:

ASTM Designations: D 4956, G 155, D 3363, D 5402, E 810, D 523.

Caltrans Laboratory Safety Manual and California Test Method 642.

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(California Test 684 contains 3 pages)