
Florida Method of Test For SIGN SHEETING MATERIALS

Designation: FM 5-571

1. SCOPE

- 1.1 This method includes the laboratory and field test for non-retroreflective and retroreflective sheeting, transparent and opaque process inks for retroreflective sheeting materials and film overlays. The design use is for traffic control signs, delineators, barricades, and other devices. (ASTM 4956, 1.1)

2. REFERENCES

- 2.1 ASTM Standards
- D4956 Standard Specification for Retro reflective Sheeting for Traffic Control
 - G7 Atmospheric Environmental Exposure Testing of Non-metallic Materials
 - E308 Computing the Colors of Objects by using the CIE System
 - E809 Standard Practice for Measuring Photometric Characteristics for Retroreflectors
 - E810 Standard Test Method for Coefficient of Retroreflection of Retro reflective Sheeting
 - E1252 General Techniques for Obtaining Infrared Spectra for Qualitative Analysis

3. EQUIPMENT

- 3.1 Field inspection - Mild detergent, soft clean cloths, sponges, 3 large buckets, spray bottle, bolts, washers, nuts, set of open end wrenches, large and small crescent wrench, #2 Phillips screwdriver, slotted screwdriver, a knife, cordless drill, screws, washers, pliers, flashlights, and testing instruments*.
- A. BYK Gardner Colormeter
 - B. Hunter Lab Miniscan XE plus 45/0 portable
 - C. Delta Retro-sign Reflectometer
 - D. Micrometer
 - E. Magnifying glass
- 3.2 Laboratory Testing
- A. Spectrophotometer 940PR or approved equivalent
 - B. Fourier Transform Infra-red spectrometer
 - C. Hunter Lab LabScan XE colormeter

4. SAMPLE PREPARATION

- 4.1 Five (5) Panels shall be prepared in accordance to ASTM 4956 for field exposure tests.
- 4.2 For product evaluation, manufacturers seeking approval of reflective sheeting shall also submit two-2 foot x 2 foot (600mm x 600mm) unmounted samples of each color and adhesive type.
- 4.3 For product evaluation, manufacturers seeking approval of process color products shall submit to the Department's Material Office pre-screened sample on the sheeting on which it is to be used. These samples are to be mounted on five, 8 inch x 8-inch (200mm x 200mm) aluminum panels of a minimum thickness of 0.04 inches (1.0mm).

5. OUTDOOR WEATHERING

- 5.1 Outdoor weathering exposure and duration shall be in accordance with ASTM D4956 7.6. Outdoor weathering is required on retroreflective and non-retroreflective sheeting materials, transparent and opaque process inks applied on retroreflective sheeting materials and film overlays for traffic control devices.

-Note: Artificial weathering will not be accepted as a substitute for the outdoor weathering requirement. Outdoor weathering includes accelerated outdoor weathering requirements as per ASTM D4956.

- 5.2 Two panels shall be exposed per location. A minimum of two locations shall be used. At least one location shall be south of the North Latitude 26 degrees and north of the equator. At least one site shall be exposed to salt spray from seashore being no more than ½ mile from shore. The conditions may be combined at any of the two sites.
- 5.3 Wash panels after exposure in accordance with ASTM D4956 7.6.2. Inspect the panels in accordance to Section 7.6.

6. VISUAL INSPECTION

- 6.1 The sheeting shall show no appreciable Shrinking as in accordance to ASTM 4956 S2.1.4
- 6.2 More than a 1/32 inch (0.8mm) shrinkage or expansion constitutes a failure. (ASTM 4956, S2.1.4.)
- 6.3 Weathered signs and test panels will be inspected.

- 6.3.1 Bubbles or wrinkles on the sign face greater than 3 inches (75mm) in length (excluding minor defects around dents or mounting holes), or any crack, brakes, or stress cracks constitute a failure..
- 6.3.2 Bubbles or wrinkles within the legend or message area (Legend or message area shall be defined as the entire area with the limits of the legend or message template) constitute a failure.
- 6.3.3 A total shrinkage of more than 1/8 inch (3mm) in the reflective sheeting material in any dimension constitute a failure.
- 6.3.4 Delamination of the reflective sheeting between the outer surface, optical reflecting system or the adhesive backing constitutes a failure.
- 6.3.5 A lack of durable adhesive bond between the reflective sheeting and the sign blank constitutes a failure
- 6.3.6 A loss of the transparent or opaque ink, process and applied over the reflective sheeting, due to cracking, crazing, blistering, fading, flaking or chipping constitutes a failure.

7. REFLECTIVITY TESTING

- 7.1 The coefficient of retroreflection shall be measured and determined in accordance with ASTM E 810.
- 7.2 Equipment:
 - 7.2.1 Approved field retroreflectometers include: Delta RetroSign.
 - 7.2.2 Laboratory measurements shall be made using a Gamma 940PR or approved equivalent. Readings made with approved laboratory test equipment will be accepted over values made with hand held field instruments.
- 7.3 Three readings shall be made for each test panel. The readings will be averaged for each panel to obtain the final value. A final value denoting a failure on any one panel will constitute a failure for the product. After a failure is noted anytime during the course of the outdoor exposure or laboratory testing on the product, the product testing will be stopped and reported as a failure.

8. COLOR TESTING

- 8.1 The diffused daytime and nighttime color of the reflective sheeting, through instrumental color testing, shall conform to the requirements of ASTM 4956 7.4 and 7.12.
- 8.2 Three readings shall be made for each test panel. The readings will be averaged for each panel to obtain the final value. Initial and exposed sheeting color values that fall outside the ASTM D4956 Table 11 values constitute a failure. A final value denoting a failure on any one panel will constitute a failure for the product. After a failure is noted anytime during the course of the outdoor exposure or laboratory testing on the product, the product testing will be stopped and reported as a failure.

9. INFRARED ABSORPTION SPECTROSCOPY

- 9.1 Process inks used for the screen processing of sheeting materials shall be scanned to establish a reference curve indicating infrared absorption peaks.
- 9.2 The test method and technique shall be in accordance with ASTM E 1252 and shall be appropriate for the material being tested. A complete description of the test sample, preparation technique, test method and technique, apparatus, and calibration shall be documented in an accompanying report.
- 9.3 Each individual scan curve indicating wavelength and relative magnitude of absorption peaks shall be the reference used for comparison.