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# **NTPEP Committee Work Plan for Evaluation of Sign Sheeting Materials**

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**NTPEP Designation: SSM-15-01**



**National Transportation Product Evaluation Program  
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## NTPEP Committee Work Plan for

# Evaluation of Sign Sheeting Materials



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## INTRODUCTION

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*The National Transportation Product Evaluation Program (NTPEP) was established to minimize the amount of duplicative testing of transportation materials performed by AASHTO member states by providing a process where manufacturer/suppliers submit their products to NTPEP for laboratory and field testing. The results of the testing are then shared with member Departments for their use in product quality verification.*

*This work plan provides the NTPEP member departments information on the sign sheeting material testing program. In keeping with the NTPEP philosophy of purely testing materials, no conclusions are provided with the test results. The evaluation of the test results is left up to each member department. The states that are involved in testing sign sheeting materials are Arizona, Louisiana, Minnesota, Missouri, and Virginia.*

*Virginia is the lead state and is responsible for the fabrication of the sign sheeting test panels and the oversight of the test result data entry into DataMine, the web-based data base program. Arizona, Louisiana, Minnesota, and Virginia each operate a test deck site for the collection of data on sign panels exposed to outdoor environmental conditions. Louisiana and Virginia initially conducts an evaluation of the base sign sheeting materials submitted. Missouri DOT performs a portion of the lab testing for the Arizona DOT.*

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### 1. SCOPE

- 1.1 This work plan covers the requirements and testing criteria for the National Transportation Product Evaluation Program (NTPEP) evaluation of sign sheeting materials. The National Transportation Product Evaluation Program (NTPEP) serves the member departments of the American Association of State Highway and Transportation Officials (AASHTO).
- 1.2 The results of this program may be used for product quality verification by individual member Departments. If used for quality verification, a letter of certification from the sign sheeting materials (SSMs) manufacturer indicating testing was conducted by NTPEP that supports published values may be required by member Departments.
- 1.3 *This work plan may involve hazardous materials, operations, and equipment. It does not purport to address all safety problems associated with its use. It is the responsibility of the user of this work plan to establish the appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

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## 2. REFERENCED DOCUMENTS

### 2.1 AASHTO Standards:

- AASHTO M 268, Standard Specification for Retroreflective Sheeting for Traffic Control

### 2.2 ASTM Standards:

- ASTM B 209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- ASTM D 4956, Standard Specification for Retroreflective Sheeting for Traffic Control
- ASTM E 991, Standard Test Method for Color Measurement of Fluorescent Specimens Using the One-Monochromator Method
- ASTM E 810 Test Method for Coefficient of Retroreflection of Retroreflective Sheeting Utilizing the Coplanar Geometry
- ASTM E 1709, Standard Test Method for Measurement of Retroreflective Signs Using a Portable Retroreflectometer at a 0.2 Degree Observation Angle
- ASTM G 7, Standard Practice for Atmospheric Environmental Exposure Testing of Nonmetallic Materials

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## 3. TERMINOLOGY

3.1 **Sheeting Type AASHTO M 268 or ASTM D 4956** – Sheeting classified in accordance with AASHTO M 268 and/or ASTM D 4956..

3.2 **Chromaticity Color Coordinates (x and y)** – The color of the sample is described through an x and y, CIE Color Coordinate System. The sample is assigned an x, y coordinate on a color graph diagram that defines the hue and saturation of that color. Chromaticity measurements on non-fluorescent and fluorescent sheeting are made using 2° observer and Illuminant D65.

3.3 **Luminance Factor (Y %)** – Ratio of the luminance of a specimen to that of a perfect white diffuser. (The lightness or darkness of a sample compared to an ideal white surface). Luminance measurements are made using 2° observer and Illuminant D65.

3.4 **Coefficient of Retroreflection (R<sub>A</sub>)** – Measure of the amount of light reflected by the sheeting material directly back to the source of light. Refer to ASTM E808.

3.5 **Observation Angle (0.2°, 0.5°, 1.0° OBS)** – The angle the observer or light measuring device is located relative to the incident light beam. Roadway example: The angle between the light from the vehicle headlamps striking the highway sign and the reflected light returning to the eye of the motorist.

3.6 **Entrance Angle (-4° or 30° ENT)** – The angle formed between the incident light beam and a line perpendicular to the surface of the sheeting. Highway example: The angle between the headlight beam and a line perpendicular to the sign surface.

- 3.7 **Rotational Angle (Orientation Angle, Epsilon) (0°, 45°, 90°, 120°)** – The angle a sample is rotated about the reference axis (datum mark). 0° orientation refers to the long edge vertically placed.
- 3.8 **NTPEP Manager** – The AASHTO/NTPEP administrative manager.
- 3.9 **VDOT Coordinator** – The Virginia DOT representative responsible for oversight of the program, including planning, fabrication, Data Mine Reviews, and Data Mine releases to the manufacturer.

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## 4. SUMMARY OF WORK PLAN

On a yearly basis (spring), sign sheeting manufacturers submit their products to be fabricated and tested. Sign sheeting samples are fabricated in a Virginia DOT sign shop. Fabricated samples are sent to the testing DOT states for outdoor weathering and testing. Sign sheeting samples are initially tested for retroreflectivity, color and visual appearance. Samples are then placed on outdoor weathering racks and exposed to environmental conditions for a total of three years. Samples are tested and evaluated at the 6 month, 1, 2 and 3 year time periods. Louisiana DOTD and Virginia DOT conducts an initial laboratory evaluation of the base sign sheeting material submitted. This testing includes Retroreflectivity, Color, Visual Evaluation, Shrinkage, Liner Removability, Adhesive Peel Strength, Flexibility, and Impact Resistance. Test result data is entered into the web-based DataMine program initially after sample fabrication and after each test period.

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## 5. SIGNIFICANCE AND USE

- 5.1 This work plan utilizes laboratory and field testing to determine sign sheeting, ink, and overlay film properties and evaluate the performance (new and weathered) of sign sheeting materials. This work plan is intended to only determine the physical properties and performance of sign sheeting materials. Acceptability of each material based upon the data generated as a result of the testing and evaluation in this work plan is the responsibility of the user.

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## 6. APPLICATION FOR PRODUCT TESTING

- 6.1 Submittal of Product Evaluation Form(s) and other information.

The manufacturer will submit electronically to the NTPEP Manager the Product Evaluation Form (PEF), Rank Order List, product literature, MSDS information, and program payment for each product submitted for testing. (See Note 2 below for submittal deadline). After review of the PEF(s) for completeness and accuracy, the NTPEP Manager will work with the VDOT Coordinator to decide on the products to be tested. The decision will be based upon the number of total products submitted for testing by all the manufacturers and their rank order lists. The NTPEP Manager will then advise the manufacturer within two weeks of receipt of the PEF the products approved for testing.

- 6.2 Assignment of Test Number

A test number shall be assigned to each product approved for testing. The test number shall indicate the Sign Sheeting Material designation (SSM), the year of submission, and a sequential sample number (SSM-Year-01-Sample No.) For example, SSM-2011-01-025.

**Note 1** - Sign Sheeting Material (SSM) numbers that are assigned to a Manufacturer's product will

not change for the life of the test. The Product Name and Number that the manufacturer gives the product at the time of application will be allowed to change until the first data is issued to the manufacturer for review. Once this report is submitted to the manufacturer for review, no changes to the product name will be allowed.

**Note 2 – Product Evaluation Form(s) Submittal Deadlines** - Product Evaluation Forms (PEF) shall be submitted online to the NTPEP Manager by February 1<sup>st</sup> of the year in which evaluation is to begin.

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## **7. FABRICATION PLANNING AND SCHEDULING**

- 7.1 The VDOT Coordinator will work with the manufacturers to coordinate the fabrication of their test products. This will include providing requirements for the shipment of sheeting and other necessary materials and equipment to the designated fabrication facility (VDOT Sign Shop).
- 7.2 Materials and equipment supplied by the manufacturer may include:
- Base Sheeting
  - Screened Inks and Overlay Films
  - Sheeting with digitally printed inks and/or protective clear overlays or coatings
  - Thinners, Surfactants, Cleaners
  - Mixing containers and equipment
  - Towels, waste containers
  - Ink application screens (if different from sign shop screens)
  - Ink squeegee (if different from sign shop squeegee)
  - Hand applicator rollers
  - Trimming knives
  - Test equipment (Retroreflectivity, Color)
- 7.3 All test products shall be shipped by and at the manufacturer's expense via a carrier with a freight tracking system.
- 7.4 Manufacturers submit to the assigned sign shop one roll of sign sheeting material (approximately 3 feet in width by 50 feet in length) of each color to be fabricated and tested. If roll widths are not standard, other lengths may be required in order to provide an adequate amount of material for testing.
- 7.5 The sheeting, inks and films shipped to the sign shop must be clearly labeled (on the outside of the box) with the following information:
- NTPEP TESTING MATERIAL**  
**SSM-Year**

**Product Name**  
**Product Number**  
**Batch and /or Lot Number**

- 7.6 The sheeting, inks, films and other necessary equipment should be shipped to the sign shop by a predetermined date agreed upon by the VDOT coordinator and the manufacturer. This normally will be several weeks prior to the fabrication date.
- 7.7 The VDOT coordinator will perform a material inventory at the sign shop prior to the fabrication week to ensure all material has been shipped and is available for fabrication.
- 7.8 Fabrication will be performed each year in April. The exact dates will be determined by the work schedule and the availability of the sign shop.
- 7.9 Representatives of the manufacturers are requested to be present to provide guidance and expertise in the handling of their materials and the fabrication of their specific products. If ink is submitted, it is particularly important that the representative be completely familiar with the ink application process. Manufacturers will normally be expected to arrange for disposal of leftover ink if it is not compatible with the Sign Shop waste stream. The VDOT coordinator retains the right to recover from the manufacturer any extra cost that results from disposal of surplus material.

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**8. SIGN SHOP FABRICATION PROCEDURE**

- 8.1 The VDOT coordinator meets with the sign shop supervisor and the manufacturer's representative to plan the fabrication of the products.
- 8.2 The VDOT Coordinator and sign shop personnel will work with the manufacturer's representative to ensure that their directives and recommendations on product fabrication are carried out.
- 8.3 The sign panels / samples are fabricated on aluminum sign blanks (4" x 12" x 0.1"). The aluminum alloy shall meet the 5052-H38 alloy requirements in accordance with ASTM B209-07.
- 8.4 Aluminum sign blanks shall be prepared in accordance with AASHTO M 268 before application of sheeting.
- 8.5 Aluminum sign blanks may have some defects from the manufacturing, packaging and shipping processes.
- 8.6 The manufacturer's representative, VDOT Coordinator, and the sign shop personnel may reject any panels they deem unacceptable.
- 8.7 Sheeting will be applied according to manufacturer's recommendation using equipment available in the sign shop.
- 8.7.1 Pressure-Sensitive sheeting and films may be applied by placing the 4" x 12" panels on a large aluminum sign blank. The sign blank will then run through a pressure sensitive applicator.
- 8.7.2 Alternately, Pressure-Sensitive sheeting and films may also be applied by small hand applicators.

If hand application or small sheeting rolls are required, the manufacturer should communicate this to the NTPEP and VDOT coordinators at the time of sample submittal.

8.8 Inks shall be applied according to the manufacturer's recommendation. The ink covers an area 3" x 11" leaving approximately 1/2" border around the edge of the panel for handling purposes.

8.9 Screen size used with the ink: Monofilament White Mesh No.158 HITECH thread diameter 64 microns (0.0025"), mesh opening 90 microns (0.0035"), open areas 32%, 2 meter width.

8.10 Note 3- The manufacturer may pre-apply to the base sheeting digitally printed inks and/or protective clear overlays or coatings. In this case, the digitally printed products will not have any base sheeting borders. The manufacturer's representative will be allowed to select the panels that will be sent to the state DOT test sites. Extra panels will be fabricated as replacements for the state DOT test site, if they are needed and for the manufacturers and as requested.

8.11 The VDOT coordinator records information on the fabrication of all products including:

- Application of sheeting to the aluminum
- Screening of ink to the sheeting
- Application of overlay films
  
- pre-application of digitally printed inks and/or protective clear overlays or borders
- Any problems associated with fabrication

**Note 4** - Fabrication information for each manufacturer is documented in the NTPEP web site under SSM Submittal Reference Information (See Section 16).

8.12 Per the assignment by the AASHTO/NTPEP Manager, the completed panels are labeled (and etched) with a tracking number as follows:

- SSM-XXXX-01-N A, B, C
- SSM-XXXX-01- N+1 A, B, C
- SSM-XXXX-01-N+2 A, B, C

Where XXXX is the submittal year.

Where 01 is a non-designated place holder.

Where N is the next sequential number for each submitted sample.

**Note 5** - In the case of barricade or other striped sheeting, the different colored areas will be labeled separately with their own sample number.

*For Example:*

*The White area will be labeled SSM-2013-01-025*

*The Orange area will be labeled SSM-2013-01-026*

8.13 Once the panels have been selected for the test decks, a sample of sheeting (approximately 36 square feet) will be collected and shipped to Louisiana DOTD for the laboratory evaluation of sign sheeting as designated in Section 12.

- 8.14 Panels that are selected for testing are packaged by the VDOT coordinator and shipped to the designated state DOT labs – AZDOT, LADOTD, MNDOT and VDOT.
- 8.15 Sample Packaging for Shipment
- 8.15.1 Samples A, B, and C are packed with slip sheeting paper (shiny side next to sheeting) and shipping foam sheets between each sample. This packet is wrapped in paper towels, taped, and labeled.
- 8.15.2 Upon receipt each state will unpack and inspect all samples for any damage from shipping.
- 8.15.3 Once all states confirm receipt of all samples, VDOT coordinator will notify manufacturers to arrange for the return shipment of their unused material within 14 days. The manufacturers are required to pay for all shipping costs. No billing invoices are to be sent to any VDOT facility.

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## **9. TEST DECK PROCEDURES**

- 9.1 *General*
- 9.1.1 State DOT labs will inspect the test deck panels received and record the initial condition in a notebook. Initial sample panel testing will be carried out as outlined in Section 11.
- 9.1.2 After initial testing, panels labeled xA and xB will be placed on the outdoor exposure racks on June 1 of the submittal year or as soon as possible thereafter. A test deck consists of a number of outdoor exposure racks facing south and inclined at an angle of 45° from the horizontal as stated in ASTM G7.
- 9.1.3 Panels labeled xC (the control or file specimen) will be stored in a file cabinet or other suitable indoor storage place protected from the sunlight and weather and temperature extremes. Panels should not be stored in vertical stacks of more than 10 panels. Horizontal stacking is preferred. Panels should be stacked face to face and should be separated by slip sheeting and foam packing material.
- 9.1.4 Per the Sample Testing Schedule in Section 11.8, panels xA and xB are removed from the outdoor exposure racks for evaluation. They will be returned to the outdoor exposure racks within four weeks for continued exposure per the schedule. Records will be maintained indicating the length of time the panels were not exposed due to testing or for any other reason.
- 9.1.5 Weather information from the National Weather Service station nearest each test deck will be summarized and recorded.

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## **10. TEST DECK LOCATIONS**

- 10.1.1 *Arizona test deck* is located at the AZDOT facility in Phoenix, AZ
- 10.1.2 *Louisiana test deck* is located in Baton Rouge at the Louisiana DOTD, Traffic Services Section on Tom Drive.
- 10.1.3 *Minnesota test deck* is located near the Maplewood test laboratory north of St. Paul, Minnesota.



- 10.1.4 *Virginia test deck* is located at its McDowell Area Headquarters on Route 250 between the Shenandoah Mountains and the Allegheny Mountains near the Virginia-West Virginia border.

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## 11. SAMPLE TESTING

- 11.1 *General* – The following tests will be performed on each panel (A, B, C) at testing intervals as indicated in the Sample Testing Schedule. Weathered panels will be washed with water and dried per AASHTO M 268 prior to measurement of retroreflectivity, color and visual evaluation.
- Note 6** - Weathered samples may be tested and evaluated while mounted on the weathering racks or after being transported to the lab.
- 11.2 *Coefficient of Retroreflection – (Light Tunnel Analysis)* Values will be measured in a 50 ft. (15 m) or 100 ft. (30m) Light Tunnel in accordance with ASTM E 810 using an Illuminant A light source. The Coefficient of Retroreflection value will be recorded at an observation angle of  $0.2^\circ$  and an entrance angle of  $-4^\circ$  and  $+30^\circ$ . The rotational angle (Epsilon) will be  $0^\circ$  and  $90^\circ$ . The rotational or orientation angle of  $0^\circ$  refers to the long edge vertically placed. Panels with ink should be masked in such a way as to exclude the non-inked borders from the reading area.
- Note 7** - *In the case of barricade or other striped sheeting, the different colored areas will be tested and reported separately (See Section 8.12). The Light Tunnel retroreflectivity and portable retroreflectivity analysis is carried out on new sheeting. Weathered sheeting is analyzed for portable retroreflectivity only.*
- Note 8** - MODOT performs light tunnel testing for AZDOT.
- 11.3 *Lab and Portable Color (chromaticity including luminance Y)* – Values will be measured in accordance with AASHTO M 268 (CIE, Illuminant D65 and  $2^\circ$  observer) or ASTM E 991 for fluorescent materials and recorded for panels A, B and C. Color values for panels A and B will be averaged and reported.
- Note 9** - MODOT performs lab color testing for AZDOT.
- 11.4 *Portable Retroreflectivity* - When making measurements with the portable retroreflectometer, the precautions with respect to angular positioning, as cited in ASTM E 1709 should be observed. Refer to 11.4.1 and 11.4.2 below.
- 11.4.1 *Annular Instrument (Portable Retroreflectometer)* - When reading with an annular instrument, each panel will be measured on the top, middle, and bottom, with the panel positioned at the  $0^\circ$  rotational angle as described in Section 11.2. The average of these readings on each panel will be recorded in the report.
- 11.4.2 *Point Instrument (Portable Retroreflectometer)* - When reading with a point instrument, each panel will be positioned at the  $0^\circ$  and  $90^\circ$  rotational angles, as described in Section 11.2. Readings will be taken at the top, middle and bottom of the panel, and two separate averages ( $0^\circ$  and  $90^\circ$  rotation) will be reported. The control panel (File Specimen - Panel C) will be read at the same time the test panels are read. When readings are taken in the field, the air temperature shall be recorded
- 11.5 *Visual Evaluation* – Visual comparison with the control sample (file specimen) will be made at the time intervals indicated in the Sample Testing Schedule in Section 11.8. Samples will be evaluated as follows: (See examples and guidelines in Section 11.5.4 below)

11.5.1 *Shrinkage / Expansion* – Shrinkage will be reported in accordance with AASHTO M 268 as the number of mm between edge of the sheeting and the edge of the aluminum panel . Expansion will also be noted in this category. Additional observations can be noted in the “Appearance” fields.

11.5.2 *Cracking* – The sheeting, ink, or film will be evaluated for cracking, crazing or scaling. Observations should be noted in the “Appearance” fields.

11.5.3 *Blistering* – The sheeting, ink, or film will be evaluated for blisters, delamination, or edge lifting. Observations should be noted in the “Appearance” fields.

11.5.4 *White Spots* – Noticeable white or lighter spots within the sheeting will be noted in the “Appearance” fields.

If NO Shrinkage/Expansion, Cracking, Blistering, or White Spots are observed, enter “NONE” or “NO CHANGE” in these fields (including Initial field). If Shrinkage, Expansion, Cracking, Blistering, or White Spots are noted, this change should be carefully followed and noted in future time periods.

11.5.5. *Appearance* –This field should be used to describe any Shrinkage/Expansion, Cracking, Blistering, or White Spots issues. For Example:

“Sheeting is delaminating” = layers in the sheeting are separating.

“Sheeting is cracking” = cracks in the sheeting, film or ink are observed.

”Sheeting is chipping” = chips of sheeting, film, or ink are missing on edges or in other areas.

“Sheeting adhesive loss” = Adhesion between sheeting and aluminum is failing.

This field can also be used to describe any other appearance changes. For Example:

If a color change is observed, the following note should be entered:

“Color Change Observed – Refer to Color Data”

DO NOT describe color change by noting “Color Faded.”

11.6 *Comments Field* – *This field is located under, ” Raw Sheeting Data ” – This field is used to note any information on the ”Raw Sheeting”(new sheeting that has not been inked or coated with any film or other surface treatment).*

11.7 Table 1 – State DOT Test Equipment Utilized

Instrument	Arizona	Louisiana	Minnesota	Virginia
Light Tunnel	<i>None:</i> MODOT uses Gamma 940	ART Model 940	Gamma 940	Gamma Model 940
Portable Retrometer	RetroSign 4500	ART 920L	Gamma 922	RetroSign 4500

Lab (bench) Colorimeter *	<i>None:</i> MODOT uses Hunterlab, Labscan XE	Hunterlab Labscan XE	Hunterlab LabScan XE	Hunterlab Colorflex
Portable Colorimeter *	Hunterlab Miniscan	Hunterlab Miniscan	Hunterlab Miniscan	Hunterlab Miniscan

\*Color Instrumentation Specifications

Hunterlab Instruments	Geometry	Observer	ILL	Detector	Port size	Light Source
Labscan XE	0°/45°	2°	D65	Circum.	50 mm	Xenon
Colorquest	45°/0°	2°	D65	Point	25 mm	Tungsten
Colorflex	45°/0°	2°	D65	Circum.	31 mm	Xenon
Miniscan	45°/0°	2°	D65	Circum.	31 mm	Xenon

11.8

Table 2 – Sample Testing Schedule

Test	Initial	6 months	1 year	2 years	3 years
Light tunnel Retroreflectivity ASTM E 810	X		Work Zone grade only <sup>1</sup>	X	X
Lab Daytime Color AASHTO M 268	X		Work Zone grade only <sup>1</sup>	X	X
Portable Retroreflectivity ASTM E-1709	X	X	X	X	X
Portable Daytime Color AASHTO M 268	X	X	X	X	X
Visual evaluation <sup>2</sup>	X	X	X	X	X

<sup>1</sup>White, yellow and orange sheeting, if designated as Construction Grade or Work Zone by the manufacturer, will require full evaluation after one year of exposure.

<sup>2</sup>Panels with black ink or black film will undergo visual evaluation only. Retroreflectivity and color measurements will not be made.

11.9

All material submitted for testing (fabricated samples and sheeting material) will remain the property of AASHTO/NTPEP. At the end of the 3 year test period, the panels will be retained by the test site state.

## 12. LABORATORY EVALUATION OF SIGN SHEETING BY LOUISIANA DOTD AND VIRGINIA DOT

The new sign sheeting material is known as “Raw Sheeting” and is defined as sheeting that has not been inked or coated with any film or other surface treatment. The test results are listed under “**Raw Sheeting Data.**”

12.1

During the fabrication of the sample panels, a sample of each of the submitted sheeting materials (approximately 36 square feet) will be shipped from the Virginia DOT sign shop to the Louisiana DOTD Materials and Testing Section.

12.1.1 Coefficient of Retroreflection – This testing is conducted in accordance with ASTM E 810 by VDOT on their 4 x 12 inch new field panel and will include measurements at the geometries described in Table 3.

12.1.1.1 Table 3 – Coefficient of Retroreflection – Measurement Geometries

OBS / ENT ANGLE	ORIENTATION ANGLE			
0.2° / -4°	0°	---	90°	---
0.2° / 30°	0°	---	90°	---
0.5° / -4°	0°	45°	90°	120°
0.5° / 30°	0°	---	90°	---
1.0° / -4°	0°	---	90°	---
1.0° / 30°	0°	---	90°	---

**Note 10** - The testing at 1.0° OBS will be carried out if requested by the manufacturer.

12.1.2 Daytime Color and Luminance Factor (Y %) for non-Fluorescent Colors –in accordance with AASHTO M 268 by LADOTD

12.1.3 Daytime Color and Luminance Factor (Y %) for Fluorescent Colors – This testing is conducted in accordance with ASTM E991 by LADOTD

12.1.4 Adhesive Properties – This testing is conducted in accordance with M 268 by LADOTD.

12.1.5 Flexibility – This testing is conducted in accordance with ASTM D 4956 by LADOTD.

12.1.6 Impact Resistance – This testing is conducted in accordance with ASTM D 4956 by LADOTD.

12.1.7 Shrinkage – This testing is conducted in accordance with AASHTO M 268 LADOTD.

12.1.8 Liner Removal Properties – This testing is conducted in accordance with AASHTO M 268 by LADOTD.

12.2 Results will be reported in the NTPEP web-based program – DataMine -under Raw Sheeting Data within the first year test period.

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## 13. REPORTING OF TEST DATA

13.1 Test result data will be compiled and made available to all participating states and testing

companies through the AASHTO/NTPEP, web-based program, DataMine. This program only displays test result data. No judgment as to a product's acceptability will be made within DataMine. End user participants will establish individual criteria for product acceptability.

- 13.2 Test results will be reported to the NTPEP Manager in the web-based program – DataMine as noted below. Once the data is reviewed by the Virginia DOT coordinator, he will release the data to each manufacturer for their review. The manufacturers are required to review and release the data to the public within 30 calendar days. Manufacturers can download their data into an Export File for their review. When the manufacturer reviews and accepts the data, the manufacturer will release the data to the public.

<b>DATAMINE EVENTS</b>	<b>Completion Dates</b>
<b>Initial, 1, 2, and 3 year Data</b>	
Initial, 1, 2 and 3 year data entered by AZDOT, LADOTD, MNDOT, VDOT. Raw Sheeting data entered by VDOT and LADOTD.	August 1 <sup>st</sup>
Data reviewed by VDOT and released to industry. 30 Day clock starts.	October 1 <sup>st</sup>
Data reviewed by industry and VDOT notified if data is accepted or needs correction.	October 1 <sup>st</sup> - November 1 <sup>st</sup>
Industry releases data to public	October 1 <sup>st</sup> - November 1 <sup>st</sup>
Note: Once data is released from VDOT to industry, the data is auto released to public after 30 days, if the clock is not stopped.	November 1 <sup>st</sup>
<b>6 Month Data</b>	
6 Month Data- data entered by AZDOT, LADOTD, MNDOT, VDOT	January 1 <sup>st</sup>
Data reviewed by VDOT and released to industry. 30 Day clock starts.	March 1 <sup>st</sup>
Data reviewed by industry and VDOT notified if data is accepted or needs correction.	March 1 <sup>st</sup> -April 1 <sup>st</sup>
Industry - releases data to public.	March 1 <sup>st</sup> -April 1 <sup>st</sup>
Note: Once data is released from VDOT to industry, the data is auto released to the public after 30 days, if the clock is not stopped.	April 1 <sup>st</sup>

- 13.3 *Data Mine* – This web-based program can be accessed through the AASHTO-NTPEP web site

link at [www.ntpep.org](http://www.ntpep.org). Refer to the *Sign Sheeting Materials Module Users Guide* under the Reference section for instructions on using the data base.

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## **14. SSM STATE DOT TEST LAB – QUALITY CONTROL PROGRAM**

- 14.1 To ensure accuracy and precision in test data, each lab is required to maintain and follow an in-house Quality Control Program. This should include the proper use, calibration, verification, and documentation of test instruments per the instrument manufacturer's recommendations. Quality control standards should also be maintained and tested. It is recommended that these standards be measured and the results recorded in conjunction with each sign sheeting testing period.
- 14.2 Any test results or trends that indicate a deviation from established guidelines are investigated by the lab and corrected prior to testing the submitted samples.
- 14.3 Contingency Plan – If normal testing or data reporting is not possible per the established schedule, the NTPEP manager will work with the VDOT Coordinator and Industry to resolve the problem. This could include using alternate labs for testing. This event would fall under the Out-Of-Ordinary Event (Refer to Section 16.1.2)

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## **15. ROUND ROBIN SAMPLE EVALUATION**

- 15.1 In addition to the lab (in-house) quality control program, each lab participates in a yearly evaluation of Round Robin samples distributed by the lead state (VDOT).
- 15.2 A set of approximately 10 sign sheeting samples are tested by each state lab with the same instruments used to test the sign sheeting samples. Results are collected by VDOT, reviewed and made available to each state. Any test results or trends that indicate a deviation from established guidelines are investigated by VDOT and corrected. Cursory results may also be presented at the annual NTPEP meeting. Sheeting manufacturers may also test the Round Robin samples for comparison purposes.
- 15.3 The Sign Sheeting Oversight Committee is currently working with industry to establish statistical handling and reporting of the Round Robin data.

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## **16. SSM SUBMITTAL REFERENCE INFORMATION**

- 16.1 The SSM Submittal Reference Information provides information on the fabrication of the samples for each submittal year and any out-of-ordinary events that took place while the submitted samples were being tested during the 3 year cycle.

This information is located in the box labeled SSM/RUP on the right side of the Sign Sheeting Material/Roll Up Signs (SSM/RUP) window. This window is listed under the Technical Committees box on the left side of the NTPEP Web Site.

**Note 11 - This information for submittal years 2010 and newer is available on the NTPEP Web Site. Information for older submittals is maintained by the VDOT Coordinator.**

- 16.1.1 **Sign Sheeting Material Fabrication Information** - Information will include notes on the fabrication of the submitted products including the application of specific sheeting, film, or inks. Information on any problems and resolutions will be included. Information will be listed by sheeting manufacturer.

- 16.1.2 **Out-Of-Ordinary Event Information** - If an event occurs that may have a significant impact on the fabrication, weathering, testing or data reporting of the sign sheeting samples during the 3-year field testing cycle, the event will be documented in this section. If an out-of-ordinary event occurs, the following guidelines will be followed:
- 16.1.2.1 Testing state where event occurs notifies the VDOT Coordinator and Technical Committee Chair within two business days of discovering the event.
- 16.1.2.2 VDOT Coordinator and Technical Committee Chair investigate options for remedy then notify NTPEP Manager within two business days of original notification by testing state.
- 16.1.2.3 NTPEP Manager notifies affected industry within two business days of notification by lead state.
- 16.1.2.4 NTPEP Manager will develop an agreeable resolution with industry.
- 16.1.2.5 Technical Committee Chair produces an incident report to distribute among the state members of the technical committee.
- 16.1.2.6 The out-of-ordinary event will be documented (by manufacturer and date) in the SSM Submittal Reference Information.

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## **17. TEST DATA REVIEW, TEST RESULT APPEALS, PRODUCT WITHDRAWAL**

Each DOT testing lab will enter their data into Data Mine and contact the VDOT Coordinator in accordance with the schedule in Section 13.2. The VDOT Coordinator will review the data from each state to ensure data is accurate. Once the review is complete, the data will be released to the manufacturer for their review. Each manufacturer will receive data on their specific products. Once approved, the manufacturer will release their data for public use. The manufacturer will have 30 days to review and release the data to the public per the NTPEP, SOP.

### **17.1 TEST DATA REVIEW**

If a manufacturer has a concern about the DM data, they should follow the guidelines below:

- 17.1.1 Contact the lead state (VDOT) via an email and phone call and advise them of the concern.
- AASHTO should be copied on the email. The lead state will review the concern and work with the manufacturer to resolve the concern. If the concern can't be resolved immediately or if the 30 day time limit is about to end, the lead state will change the product status from "Private" to "On Hold" while the concern is resolved.
- Changing the status to "On Hold" will stop the 30 day clock. Once the product is "On Hold", the data will not be viewable by the manufacturer. Once the issue is resolved, the manufacturer will be given the option of releasing the data to the "Public" or withdrawing the product. Releasing the data will involve the lead state releasing the data back to the manufacturer (this will change the status back to "Private" and the 30 day clock will reset). The manufacturer will then release the data to "Public" following the standard process.

## **17.2 TEST RESULT APPEALS**

The manufacturer may appeal the results of the testing program in accordance with the AASHTO/NTPEP appeals procedures and the following guidelines:

- 17.2.1 If the manufacturer requests a full review or a retest of the sample, the Data Review/Retest Request Form should be filled out and forwarded to AASHTO and the lead state (VDOT). AASHTO and the lead state (VDOT) will review the request and arrange for the review/retest. Retesting of the material will only be performed by the specific test DOT lab and only for the parameter being questioned. If the original data was erroneous, the data will be corrected and the manufacturer will not be billed. If the original data was found to be reasonably accurate \*, the data will remain and manufacturer will be billed by AASHTO for \$500 per sample.

\*AASHTO has the final say as to the accuracy of the data. Additional weathering or storage of samples may affect the retesting results.

## **17.3 WITHDRAWAL OF PRODUCT**

- 17.3.1 If a manufacturer chooses to withdraw a product in DataMine, they shall submit a written request (email) to both the chair and vice-chair of the technical committee and the AASHTO liaison. If the written request is approved, the data collected up to and including the data recently released to the manufacturer, will be placed to restricted status and the product will be listed as withdrawn in DataMine. The data is put to restricted status because this allows the data to still be viewable to

the registered state DOT users of DataMine. The restricted data will not be available to the manufacturers.

The generic information on these three processes is provided in the Information and Operations Guide on the NTPEP web site.

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## **18. RESUBMITTAL TESTING FREQUENCY**

Resubmittal of sign sheeting material is recommended after 7 years.



Manufacturers may resubmit sign sheeting material before the 7 year recommendation.

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**19. TESTING FEES**

PRODUCT SUBMITTALS - Product submittal testing fees are to be paid at time of application.

RE-TESTING FEES FOR APPEALS - A retest fee for challenged results shall be paid by the manufacturer. This fee is refundable if retesting upholds the challenge. This fee is to be retained by NTPEP only if the original test results are found to be accurate .

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**20. DISPOSITION OF OLD SAMPLES**

Retained samples from each test state may be discarded 10 years after the original submittal year. Panels to be discarded must not be shared with a third party.

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**21. KEYWORDS**

Chromaticity; Color; DataMine; NTPEP; Field Test Decks; Luminance; Retroreflectivity;

Sign Sheeting Materials; Weathering.