Standard Practice for-

NTPEP Evaluation of Sign Sheeting Materials

AASHTO Designation: [Number]
Revised - August 2012
INTRODUCTION

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/or field testing. The results of the testing are then shared with member Departments for their use in product quality verification.

This practice 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, 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 initially conducts an extensive laboratory evaluation of all sign sheeting materials submitted. Missouri DOT performs a portion of the lab testing for the Arizona DOT.

1. SCOPE

1.1 This standard practice 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 standard practice 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 standard practice to establish the appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. REFERENCED DOCUMENTS
2.1 AASHTO Standards:
- AASHTO M 268, Standard Specification for Retroreflective Sheeting for Traffic Control

2.2 ASTM Standards:
- ASTM D 4956, Standard Specification for Retroreflective Sheeting for Traffic Control
- ASTM E 808, Standard Practice for Describing Retroreflection
- 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
- ASTM B 209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

3. TERMINOLOGY

3.1 Sheeting Type ASTM D4956 – Sheeting classified in accordance with ASTM D4956.

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,) – 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) – 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 AAHTO/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.

4. SUMMARY OF PRACTICE

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 conducts an initial laboratory evaluation of all sign sheeting material submitted. Test result data is entered into the web-based DataMine program initially after sample fabrication and after each test period.

5. SIGNIFICANCE AND USE

5.1 This standard practice utilizes laboratory and field testing to determine properties and evaluate the performance of sign sheeting materials. This practice is intended to only determine the properties of sign sheeting materials. Acceptability of each material based upon the data generated as a result of the testing and evaluation in this practice is the responsibility of the user.

6. APPLICATION FOR PRODUCT TESTING

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

The manufacturer will submit 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. 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-2011-01-1318.

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 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 to the NTPEP Manager by February 1st of the year in which evaluation is to began.
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 shipping sheeting and other necessary materials and equipment to the designated fabrication facility (VDOT Sign Shop).

7.2 Other materials and equipment supplied by the manufacturer may include:

- Ink and Overlay Films
- 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 lead state 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.

8. SIGN SHOP FABRICATION PROCEDURE

8.1 The VDOT coordinator meets with 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 ASTM D4956 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 Sheetng 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.

Note 3 - 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 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 for the manufacturers and as replacements if needed.

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

- Application of sheeting to the aluminum
8.12 Per the assignment by the AASHTO/NTPEP Coordinator, 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.

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 30 days. The manufactures are required to pay for all shipping costs. No billing invoices are to be sent to any VDOT facility.

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 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 When panels xA and xB are removed from the outdoor exposure racks for full evaluation, they will be returned to the outdoor exposure racks within four weeks for continued exposure per the Sample Testing Schedule in Section 11.8. 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.

10. TEST DECK LOCATIONS

10.1.1 Arizona test deck is located at the AZDOT facility in Phoenix, AZ

10.1.2 Missouri DOT performs light tunnel and lab color analysis for AZDOT.

10.1.3 Louisiana test deck is located in Baton Rouge at the Louisiana DOTD, Traffic Services Section on Tom Drive.

10.1.4 Minnesota test deck is located near the Maplewood test laboratory north of St. Paul, Minnesota.

10.1.5 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.

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. Field-exposed panels will be washed with water and dried prior to measurement of retroreflectivity and color and visual evaluation.

11.2 Coefficient of Retroreflection – Values will be measured in a 50 ft. (15 m) or 100 ft. (30m) Light Tunnel in accordance with ASTM D4956 (ASTM E 808) using an Illuminant A light source. The Coefficient of Retroreflection value will be recorded at an observation angle of 0.2° and an entrance angle of -4° and +30°. The rotational angle (Epsilon) will be 0° and 90°. The rotational or orientation angle of 0° 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: MODOT performs light tunnel testing for AZDOT.

11.3 Lab and Portable Color (chromaticity including luminance Y) – Values will be measured in accordance with ASTM D4956 (CIE, Illuminant D65 and 2° observer) and recorded for panels A, B and C. Color values for panels A and B will be averaged and reported.

Note: 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° 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° and 90° 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° and 90° rotation) will be reported. In the case of barricade or other preprinted sheeting, the different colored areas will be read separately. The control panel (File Specimen - Panel C) will be read at the test deck site at the same time the test panels are read. When readings are taken in the field, the air temperature shall be recorded. If weather conditions are extreme, samples may be tested in the laboratory.

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:

11.5.1 *Shrinkage / Expansion* – Shrinkage will be reported in accordance with ASTM D4956 as the number of mm between edge of the sheeting and the edge of the aluminum panel at the specified time interval. Expansion will also be noted in this category. Additional observations can be noted in the “Appearance” fields.

11.5.1.1 *Cracking* – This category will evaluate sheeting or the ink or film on the sheeting for cracking, crazing or scaling. Observations should be noted in the “Appearance” fields.

11.5.2 *Blistering* – This category will evaluate sheeting or the ink or film on the sheeting for blisters, delamination or edge lifting. Observations should be noted in the “Appearance” fields.

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

11.5.3 *Appearance* – This field should be used to further describe any Shrinkage, Expansion, Cracking, or Blistering issues. For Example:

Sheeting is delaminating or Sheetling is cracking.

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 State DOT Test Equipment Utilized

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Arizona</th>
<th>Louisiana</th>
<th>Minnesota</th>
<th>Virginia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Tunnel</td>
<td>None: MODOT uses Gamma 940</td>
<td>ART Model 940</td>
<td>Gamma 940</td>
<td>Gamma Model 940</td>
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<tr>
<td>Portable Retrometer</td>
<td>RetroSign 4500</td>
<td>ART 920L</td>
<td>Gamma 922</td>
<td>RetroSign 4500</td>
</tr>
<tr>
<td>Lab (bench) Colorimeter *</td>
<td>None: MODOT uses Hunterlab, Labscan XE</td>
<td>Hunterlab Labscan XE</td>
<td>Hunterlab LabScan XE</td>
<td>Hunterlab Colorflex</td>
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<tr>
<td>Portable Colorimeter *</td>
<td>Hunterlab Miniscan</td>
<td>Hunterlab Miniscan</td>
<td>Hunterlab Miniscan</td>
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</tr>
</tbody>
</table>

*Color Instrumentation Specifications

<table>
<thead>
<tr>
<th>Hunterlab Instruments</th>
<th>Geometry</th>
<th>Observer</th>
<th>I.L.L</th>
<th>Detector</th>
<th>Port size</th>
<th>Light Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labscan XE</td>
<td>0°/45°</td>
<td>2°</td>
<td>D65</td>
<td>Circum.</td>
<td>50 mm</td>
<td>Xenon</td>
</tr>
<tr>
<td>Colorquest</td>
<td>45°/0°</td>
<td>2°</td>
<td>D65</td>
<td>Point</td>
<td>25 mm</td>
<td>Tungsten</td>
</tr>
<tr>
<td>Colorflex</td>
<td>45°/0°</td>
<td>2°</td>
<td>D65</td>
<td>Circum.</td>
<td>31 mm</td>
<td>Xenon</td>
</tr>
<tr>
<td>Miniscan</td>
<td>45°/0°</td>
<td>2°</td>
<td>D65</td>
<td>Circum.</td>
<td>31 mm</td>
<td>Xenon</td>
</tr>
</tbody>
</table>

11.8 Sample Testing Schedule

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Initial</th>
<th>6 months</th>
<th>1 year</th>
<th>2 years</th>
<th>3 years</th>
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</thead>
<tbody>
<tr>
<td>Light tunnel ASTM D4956</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lab Daytime Color ASTM D4956</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portable Retroreflectometer ASTM E-1709</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Portable Daytime Color ASTM D 4956</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Visual evaluation^2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

^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.

^Panels with black ink will not be tested except for visual evaluation.
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 LADOTD

This sign sheeting material is known as “Raw Sheeting” and is defined as new sign 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. Each sheeting material will be evaluated in accordance with ASTM D4956 for the parameters listed as follows except as noted:

12.1.1 Coefficient of Retrorereflection

Note 4 - This testing will include measurement at 0.50 OBS. Additional testing at 1.00 OBS will be carried out if requested by the manufacturer.

12.1.2 Daytime Color and Luminance Factor (Y %) for non-Fluorescent Colors

12.1.3 Daytime Color and Luminance Factor (Y %) for Fluorescent Colors – will be measured in accordance with ASTM E991.

12.1.4 Adhesive Peel Strength

12.1.5 Flexibility

12.1.6 Impact Resistance

12.1.7 Shrinkage

12.1.8 Protective Liner Removability

12.1.9 Impact Resistance for Reboundable Sheeting

12.1.10 Flexibility for Reboundable Sheeting

12.1.11 Adhesion for Reboundable Sheeting

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

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 DataMine. This report will include data only. No judgment as to a product’s acceptability will be made in this report. End user participants will establish individual criteria for product acceptability.
Test results will be reported to the NTPEP Manager in the web-based data base – DataMine as follows. Once the data is reported to the manager, he will forward each manufacture’s data for their review. When the manufacturer reviews and accepts the data, the manufacturer will release the data to the public.

<table>
<thead>
<tr>
<th>DATAMINE EVENTS</th>
<th>Completion Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial, 1, 2, and 3 year Data</strong></td>
<td></td>
</tr>
<tr>
<td>Initial, 1, 2 and 3 year data entered by AZDOT, LADOTD, MNDOT, VDOT</td>
<td>August 1st</td>
</tr>
<tr>
<td>Data reviewed by VDOT and sent to industry</td>
<td>October 1st</td>
</tr>
<tr>
<td>Data reviewed by industry and VDOT notified if data is accepted or needs correction.</td>
<td>November 1st</td>
</tr>
<tr>
<td>Industry releases data to public</td>
<td>December 1st</td>
</tr>
<tr>
<td><strong>6 Month Data</strong></td>
<td></td>
</tr>
<tr>
<td>6 Month Data- data entered by AZDOT, LADOTD, MNDOT, VDOT</td>
<td>January 1st</td>
</tr>
<tr>
<td>Data reviewed by VDOT and sent to industry</td>
<td>March 1st</td>
</tr>
<tr>
<td>Data reviewed by industry and VDOT notified if data is accepted or needs correction.</td>
<td>April 1st</td>
</tr>
<tr>
<td>Industry - releases data to public</td>
<td>May 1st</td>
</tr>
</tbody>
</table>

3 Data Mine – This web-based data base can be accessed through the AASHTO-NTPEP web site link at www.ntpep.org. Refer to the Sign Sheeting Materials Module Users Guide under the Reference section for instructions on using the data base.

13.3

14. SIGN SHEETING MATERIALS – 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 storage, measurement and documentation of quality control standards. 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 significant deviation from established guidelines are investigated by the lab and corrected prior to testing the submitted samples.

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 significant 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 precision statements for all sign sheeting materials per ASTM guidelines.

16. **DATA MINE - REFERENCE SECTION**

16.1 The Data Mine Reference Section is currently being developed and will contain the information listed below:

**Note:** This information is currently maintained by the Lead State Coordinator.

16.1.1 **Sign Sheeting Material Fabrication Information** - Information on the fabrication of all products will be available for each submittal year.

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 lead state coordinator and Technical Committee Chair within two business days of discovering the event.

16.1.2.2 Lead state coordinator and Technical Committee Chair investigate options for remedy then notify NTPEP coordinator within two business days of original notification by testing state.

16.1.2.3 NTPEP coordinator notifies affected industry within two business days of notification by lead state.

16.1.2.4 Develop a resolution with industry input as deemed appropriate.

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 Document out-of-ordinary event in Data Mine Reference Section.

17. **TEST REPORT REVIEW AND TEST RESULT APPEALS**

Each DOT lab will submit the Data Mine data to the VDOT Coordinator and the NTPEP Manager within 20 business days after completion of all testing. 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 may appeal the results of the testing program in accordance with the AASHTO/NTPEP appeals procedures. Retesting of the materials will be performed by the DOT lab, and only on the relevant sample and parameter being questioned. Prior to retest, the manufacturer making the appeal shall submit a fee to NTPEP to cover the costs of retesting. If the results of the retesting indicates error in the initial data, the fee shall be reimbursed to the manufacturer. Upon agreement between the manufacturer appealing the test results and the NTPEP Manager, either the original data or retest data shall be published.

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.

19. **TESTING FEES**

Testing fees are to be paid at time of application.

*Note 6* - A retest fee for challenged results shall paid by the manufacturer. This fee is refundable if retesting upholds the challenge. Fee is to be paid only if the original test results are found to be accurate.

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.

21. **KEYWORDS**

Chromaticity; Color; DataMine; NTPEP; Field Test Decks; Luminance; Retroreflectivity; Sign Sheeting Materials; Weathering.