

DMS - 8300

SIGN FACE MATERIALS

EFFECTIVE DATE: NOVEMBER 2013

8300.1. Description. This Specification governs the quality monitoring program (QMP) for sign face materials and describes the Material Producer List (MPL), pre-qualification procedures, quality monitoring (QM) requirements, warranty, and material and testing requirements for the following sign face materials:

- reflective sheeting,
- conformable reflective sheeting,
- screen inks, and
- colored transparent and black non-reflective electronically cuttable (EC) films.

8300.2. Units of Measurements. The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

8300.3. Definitions. The following definitions apply to this Specification.

- Rotational Sensitive Sheeting—reflective sheeting not meeting the 20% maximum rotational sensitivity requirement when measured as outlined in AASHTO M 268.

8300.4. Material Producer List. The Materials and Pavements Section of the Construction Division (CST/M&P) maintains the Material Producer List (MPL) of all materials that have been approved under this Specification. Materials appearing on the MPL, entitled “[Sign Face Materials](#),” do not require sampling and testing before use, but the Department may periodically sample materials to ensure conformance with this Specification and may also sample if material quality is suspect.

8300.5. National Transportation Product Evaluation Program (NTPEP) Requirement. Some of these sign face materials are evaluated by the American Association of State Highway and Transportation Officials (AASHTO) NTPEP program. For these sign face materials, the NTPEP evaluation is required prior to submittal for pre-qualification. If NTPEP has designated a re-evaluation schedule, the sign face materials must be resubmitted to NTPEP for evaluation when designated by that schedule.

8300.6. Bidders’ and Suppliers’ Requirements. The Department will only purchase or allow on projects those products listed by producer and product code or designation shown on the MPL. To obtain a place on the MPL, the producer must be accepted into the Quality Monitoring Program (QMP).

Use of pre-qualified materials does not relieve the Contractor of the responsibility to provide materials that meet the specifications.

8300.7. Pre-Qualification Procedure.

- A. Pre-Qualification Request.** Submit a written request for pre-qualification evaluation to the Texas Department of Transportation, Construction Division, Materials and Pavements Section (CP-51), 125 East 11th Street, Austin, Texas 78701-2483.

Include the following information in the request:

- company name;
- physical and mailing addresses;
- type of material,
- company material designation (product name, code number, etc.);
- contact person, telephone number, and email address;
- NTPEP test data, if applicable;
- AASTHO M 268 sheeting type and a test report with actual test data showing the material complies with the requirements of AASTHO M 268, as modified by this Specification, if applicable;
- fabrication guidelines outlining optimum rotation for rotational sensitive white reflective sheeting; and
- warranty statement required by this Specification.

- B. Pre-Qualification Sample.** For all proposed products, provide pre-qualification sample quantities in accordance with Tex-720-I at no cost to the Department.

The Department reserves the right to perform any or all tests in this Specification as a check on the tests reported by the producer. In the case of any variance, the Department's tests will govern.

The Department will charge suppliers for the cost of sampling and testing of materials that do not meet the requirements of this Specification.

C. Evaluation.

- 1. Qualification.** The Department will accept materials meeting the requirements of this Specification to the QMP and will list them on the MPL.

The Department may grant provisional pre-qualification approval for materials that have undergone a full evaluation by NTPEP and whose test results meet the minimum durability values required by this Specification.

The Department will grant full pre-qualification approval after successful completion of the accelerated weathering requirements. Failure to complete all exterior exposure requirements successfully is grounds for cancellation of pre-qualification.

Report changes in the composition or in the manufacturing process of any material to CST/M&P at the address used for pre-qualification. The Department will review significant changes reported, and the material may require a re-evaluation. The Department reserves the right to conduct whatever tests deemed necessary to identify

a pre-qualified material and determine if there is a change in the composition, manufacturing process, or quality that may affect its durability or performance.

2. **Failure.** Producers not qualified under this Specification may not furnish materials for Department projects and must show evidence of correction of all deficiencies before reconsideration for qualification.

Costs of sampling and testing are normally borne by the Department; however, the producer will bear the costs of sampling and testing materials failing to conform to the requirements of this Specification. The Director of CST/M&P will assess this cost at the time of testing.

8300.8. QM Requirements.

- A. **QM Sample.** To maintain QMP approval status, provide an annual QM sample in accordance with Tex-720-I for each product listed on the MPL. The annual QM cycle begins upon initial acceptance and approval and ends on the anniversary of that date. Submit samples at least 1 month before approval status expires to allow sufficient time for testing. Not submitting material on time may cause a delay in posting on the MPL. Provide QM sample quantities at no cost to the Department.

QM samples must meet all the minimum requirements of this Specification; however, the coefficient of retroreflection will be based on the process average of all samples tested within a minimum 1-year timeframe. Maintain the running process average of all samples for the coefficient of retroreflection above the minimums specified for each sheeting type.

- B. **Periodic Evaluation.** The Department reserves the right to randomly sample and evaluate pre-qualified materials for conformance with this Specification and to perform random audits of documentation. Department representatives may sample material from the manufacturing plant, the sign fabrication plant, the project site, and the warehouse.

Periodic samples must meet all the minimum requirements of this Specification; however, the Department will determine conformance for coefficient of retroreflection based on the process average of all samples tested within a minimum 1-year timeframe. Maintain the process average above the minimums specified for each sheeting type.

- C. **Disqualification.** The Department may disqualify and remove material from the QMP and MPL if any of the following infractions occurs:

- the material fails to meet or maintain the requirements stated in this Specification,
- the producer fails to report changes in the formulation or production process of the material to CST/M&P,
- the producer fails to properly submit annual QM samples to CST/M&P,
- the producer has unpaid charges for failing samples, or
- the producer has unresolved warranty issues.

Disqualified producers will not be allowed to supply the material to the Department for 1 year, or as determined by the Director of CST/M&P. After this period has expired, the

producer must re-qualify to regain QMP status. Disqualification will only apply to the material type corresponding to the infraction.

- D. Re-Qualification.** Producers may submit material for re-evaluation after 1 year has elapsed from the date of removal from the MPL or after documenting the problem and its resolution to the satisfaction of the Department. Submit documentation identifying the cause and corrective action taken.

8300.9. Comprehensive Producer's Warranty Requirements. Sign face material producers must comply with all requirements of the following warranty. Failure to comply with the requirements of this warranty is cause for removal from the QMP and MPL.

Submit a statement to the address used for pre-qualification indicating understanding and compliance with the provisions of the warranty and willingness to abide by the provisions. Include the name, address, telephone number, and email address of the person to contact regarding potential claims under the warranty provisions.

For producers of sign face materials, the warranty must include the use of one producer's sign face material directly applied to a different producer's sign face material. Screen inks must be recommended and warranted by the producer of the base sheeting. If a failure occurs, assignment of warranty responsibility is to the producer of the sign face material that fails. (For example, if the base sheeting, defined as the sheeting attached to the substrate, separates from the sign substrate, the producer of the base sheeting will be responsible. If the sheeting used for legend detaches from the base sheeting, the producer of the legend material will be responsible for the failure.)

- A. Certification.** Submit a certification with each lot or shipment that states that the material supplied meets the requirements listed. Show individual lot numbers on the certification.
- B. Field Performance.** Sign face materials processed, applied, stored, and handled according to the producer's recommendations (or as required in this Specification when there is an exception to the producer's recommendations) must perform satisfactorily for the number of years specified for that sign face material. The performance period begins at the time a sign is fabricated, as indicated by the "Fabrication Date" on the sign identification decal. The warranty requirements go into effect upon final acceptance by the Department. The Department will adjust the performance period to deduct the time between the sign fabrication date and Department acceptance.

The sign face material is unsatisfactory if:

- it deteriorates due to natural causes to the extent that the sign is ineffective for its intended purpose (e.g., being viewed from a moving vehicle under normal day and night driving conditions), or
- shows any of the following defects:
 - cracks discernible with the unaided eye from the driver's position while in an outside lane at a distance of 50 ft. (15 m) or greater from the sign;
 - peeling in excess of 1/4 in. (6.4 mm);
 - shrinkage in excess of 1/8 in. (3.2 mm) total per 48 in. (1.2 m) of sheeting width; or

- fading, loss of color, or loss of reflectivity to the extent that color or reflectivity fails to meet the requirements of AASHTO M 268, as modified by this Specification.

Provide the applicators with manuals, training videos, or both describing the proper application method. Submit, to the address used for pre-qualification, a copy of the current training materials provided with any updates as they occur. Include recommended procedures for the storage and handling of materials after application to the sign face until final installation.

The sign face material producer's warranty does not relieve the Contractor for unacceptable work or improper handling, storage, or installation. The Contractor is fully responsible for all materials and work until final acceptance by the Department.

- C. Minimum Performance Period.** All signs made with the type of sheeting indicated below and any other sign face materials used on each type of sheeting, except construction and maintenance work signs and barricades, must meet the minimum performance periods and replacement actions in Table 1.

Table 1
Warranty Period (yr.)

Sheeting Type	Period for Complete Sign Replacement and Installation	Additional Period for Sheeting Material Replacement Only
A, B, C	7	3
D	8	4
B _{FL} , C _{FL} , D _{FL} ¹	5	2

1. B_{FL}, C_{FL}, and D_{FL} indicate fluorescent sheeting products in the Type B, C, and D categories.

- D. Producer's Replacement Obligation.** Where and when shown that retroreflective traffic signs processed in conformance with the sign face material producer's recommendations (or as required in this Specification when there is an exception to the producer's recommendations) have not met the field performance requirements above, a producer's replacement obligation exists. The producer must cover the costs of replacement of the sign on the roadway or of restoring the sign surface to its original effectiveness as determined by and at no cost to the Department for materials or labor.

Replacement sign face materials must:

- be the same type originally specified unless otherwise approved or directed,
- meet all the requirements of this Specification, and
- be listed on the MPL.

Schedule with designated Department personnel, within 30 days of notification of potential replacement obligation, an on-site investigation to determine if the sign face material producer's obligation exists.

Fulfill all obligations within 120 days after determination of obligations. The Department may replace signs where uncompleted obligations occur and may bill the producer for all Department costs in performing the producer's replacement obligation.

When in the judgment of the Department deteriorated signs present a traffic hazard, the Department reserves the right to remove the signs from the roadway and place them in storage for the producer's inspection. Reimburse the Department for all costs, including labor for removal and replacement, when inspection reveals that a material producer's obligation exists.

The material producer may use an independent Contractor to fulfill obligations to replace or refurbish signs on the roadway.

Terms of the Contract must be in conformance with the provisions of Contracts used by the Department for this type work, be approved by the Department, and save harmless the Department from any liability that may arise out of the Contractor's operations.

The Department can provide a sample Contract to the producer upon the producer's request.

The Department reserves the right to place a representative on the job to ensure that the signs are replaced or refurbished in conformance with Department standards. The Department will test all sign face materials used to fulfill the producer's obligations to ensure compliance with this Specification.

Replacement material assumes the remaining warranty period of the material it replaces.

E. Sign Processors' Obligations. Submit the following with each shipment of signs or sign faces:

- Department Contract or purchase order number and
- a copy of the certification, as required in Section 8300.9.A, showing the lot number of all sign face materials from which the completed signs or sign faces were processed.

8300.10. Material Requirements for Reflective Sheeting. This Specification covers the general and specific requirements for the four types of reflective sheeting materials listed in AASHTO M 268—Types A, B, C, and D. The sheeting producer must furnish identification codes to the Department. Construction work zone grade sheeting used for temporary construction work zone applications must meet all requirements for the type specified except for the weathering requirements, for which it must meet a minimum of 60% of the minimum specified initial retroreflectivity values specified for that type after accelerated weathering of 500 hours and after 12 months of exterior exposure.

The Department conducts outdoor weathering at the Department's test site in Austin, Texas or at other locations as deemed necessary by the Director of CST/M&P.

Meet all requirements of AASHTO M 268, as modified by the following.

- A. Coefficient of Retroreflection.** For rotational sensitive white sheeting, the coefficient of retroreflection will be measured at the orientation identified by the producer as the optimum rotation.
- B. Chemical Resistance.** The surface of the sheeting or the face of a completed sign must be chemically resistant to the extent that there will be no surface change when wiped with a soft, clean cloth dampened with mild detergents or cleaners supplied by or recommended by the sheeting producer.

- C. Adhesive.** Pre-coat the backside of the reflective sheeting with either a heat-activated or a pressure-sensitive adhesive. No additional coats of adhesive must be required to affix the reflective sheeting to the sign blank. The adhesive and liner, when used, must meet the requirements of **AASHTO M 268**.

Suppliers of reflective sheeting using a porous, textured-backing paper to protect the adhesive layer that is not suitable for use as a slip-sheet for packaging of completed signs, sign panels, or both must supply rolls of slip-sheet paper in the various widths of reflective sheeting supplied. The area of slip-sheet paper, supplied in the various widths, must be the same as the area of reflective sheeting supplied in the various widths. Supplied slip-sheet paper is subsidiary to the reflective sheeting and any costs, direct or indirect, must be included in the bid price for reflective sheeting on State purchases.

The adhesive must have no staining effect on the reflective sheeting.

- D. Color.** Meet all the color requirements of **AASHTO M 268** except the **Delta E requirements**. Additionally, the reflected night color must be
- identifiable as the same color as the day color when observed at 50 ft. (15 m) and
 - uniform and free of streaks, mars, and other imperfections.
- E. Material Identification.** Mark each container, carton, or box containing reflective sheeting with the information listed in **AASHTO M 268**. The identification numbers must also appear on the inside of the sheeting roll core. The identification number on the outside of the box and on the inside of the core must match. The mismatch of these numbers may be cause for rejection.
- F. Sign Fabrication.** Follow the sign fabrication requirements of **AASHTO M 268**, as modified by this Specification. When using white sheeting identified as rotational sensitive on the MPL, fabricate signs as specified by **AASHTO M 268** and follow the sheeting producer's guidelines. Use screen inks as recommended and warranted by the base sheeting producer. Signs fabricated using any other sign face material may be fabricated using products from different producers.

8300.11. Material Requirements for Conformable Reflective Sheeting.

- A. General Requirements.** Conformable reflective sheeting is intended for use on both flat surfaces and round plastic or metal posts. Conformable reflective sheeting must meet all requirements of **AASHTO M 268**, as modified by this Specification, and the requirements of **Tex-843-B**.

8300.12. Material Requirements for Screen Inks.

- A. General Requirements.** Meet the requirements of **AASHTO M 268**, as modified by this Specification.
- B. Color.** Screen inks, when screened onto any pre-qualified white reflective sheeting, must produce a color meeting the color requirements specified for the various colors of reflective sheeting in **AASHTO M 268**.

Use the type of screen recommended by the producer.

Use screen inks as supplied or thinned according to the producer's recommendations. Color will be determined using ink from sealed, unopened containers as received from the producer and according to producer's recommendations for thinning.

- C. Durability.** Screen inks recommended by the ink producer for use on any of the types of reflective sheeting must exhibit the same durability as specified for that type of reflective sheeting.

When tested in accordance with Federal Test Method 6301, "Adhesion (Wet) Tape Test," the results must show no process inks removed after processing a minimum of 96 hr. or after exposure of the sheeting types to the durability and weathering tests specified.

- D. Screened Sheeting Optical Performance.** Before exterior exposure or weatherometer (WOM) exposure, sheeting reverse screened with transparent ink must have the minimum coefficient of retroreflectivity values specified in AASHTO M 268 for the same color of sheeting as the ink.

Retroreflectivity will be determined in accordance with Tex-842-B.

8300.13. Material Requirements for Colored Transparent Films and Non-Reflective Black Films.

- A. General.** Meet all the requirements of AASHTO M 268, as modified by this Specification. Colored, transparent films and non-reflective black films must consist of durable, EC films coated with a transparent, pressure-sensitive adhesive protected by a removable liner.

The films must be:

- available in standard traffic colors;
- dimensionally stable; and
- designed to cut, weed, lift, and transfer.

The films must not release any volatile organic compounds.

- B. Color.** Non-reflective black film must be acrylic and have a reflectance (Y) no greater than 4.0 as determined by Tex-839-B.
- C. Coefficient of Retroreflection.** Retroreflectivity will be determined in accordance with Tex-842-B.
- D. Durability.** All films, when applied to the various types of reflective sheeting, must meet the same durability requirements as specified for that type of reflective sheeting.

8300.14. Contrast Ratio of Sign Faces and Completed Signs. For all sign faces and completed signs using transparent screen inks or transparent films, the "Contrast Ratio" is the quotient obtained when the coefficient of retroreflection of the white is divided by the coefficient of retroreflection of the other color.

The contrast ratio will be determined at an observation angle of 0.2° and an entrance angle of -4°.

For all red and white signs, the contrast ratio must not be less than 4.0 or greater than 15.0. For all other signs, sign panels, sign faces, and traffic control devices, the contrast ratio must not be less than 4.0.

8300.15. Packaging. Package the materials in containers that will permit normal shipping and storage without the material sustaining damage or becoming difficult to apply.

Roll material must contain no more than three splices per 50 yd. (46 m). The length of the roll core must not be less than the width of the material.

- A. Pressure-Sensitive Material.** The ends of the material must be cut square with either a butt-splice or an overlap splice of $3/8 \pm 1/8$ in. in width (9.5 ± 3.2 mm). Edges of the overlap splice are to be straight and square.
- B. Heat-Activated Material.** Cut the ends of the material square, but jointed closely together and held securely in place with a removable tape.

8300.16. Archived Versions. Archived versions are available.