Florida Department of Transportation

RON DESANTIS
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JARED W. PERDUE, P.E.
SECRETARY

September 11, 2026

Daniel Holt, PE, PTOE
Director, Project Delivery
Director, Technical Services
FHWA
400 West Washington Street, Suite 4200
Orlando, FL 32801

Re: State Specifications Office
Section: 994
Proposed Specification: **9940101 Retroreflective and Nonreflective Sheeting and Sign Panel Fabrication**
Associated Specification: **7000101 Highway Signing**

Dear Mr. Holt:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

The changes are proposed by Julia Cooper to remove language tied to the retired Random Sampling Program and add sign fabricators to the approved products list.

Please review and transmit your comments, if any, within two weeks (10 business days). Comments should be sent via email daniel.strickland@dot.state.fl.us.

If you have any questions relating to this specification change, please call me at (850) 414-4130.

Sincerely,

Signature on File

Daniel Strickland, P.E.
State Specifications Engineer

DS/am
Attachment
cc: Florida Transportation Builders' Assoc.
State Construction Engineer

RETROREFLECTIVE AND NONREFLECTIVE SHEETING AND SIGN PANEL FABRICATION
(REV 5-19-26)

SUBARTICLE 994-1.1 is deleted and the following substituted:

994-1.1 General: This Section specifies the requirements for retroreflective and nonreflective sheeting and sign panel materials and fabrication. This includes ~~the~~ sign sheeting materials such as transparent and opaque process inks for retroreflective sheeting materials, vinyl and transparent overlays.

SUBARTICLE 994-2.2 is deleted and the following substituted:

994-2.2 Approved Product List (APL): All sheeting, process inks and overlay materials shall be listed as a system on the Department's Approved Product List (APL). Sign sheeting systems shall consist of base sheeting with ink and/or overlay materials. Products with an ASTM classification of Type XI will not be accepted for qualification on the APL for fluorescent orange. ~~Manufacturers seeking evaluation of their products need to submit product data sheets, performance test reports from an independent laboratory showing the sign sheeting system meets the requirements of this Section, and APL application in accordance with Section 6.~~ Information on the APL application shall include the individual materials comprising the sign sheeting system and identify colors, ASTM base sheeting classification, adhesive backing class, availability of transparent and/or opaque backing and availability of liner types.

Digital print systems shall include a digital printer, with appropriate software and drivers, flexible white or colored prismatic retroreflective sheeting with colorless overlay in accordance with the recommendation of the sheeting manufacturer. For all digital print systems, the Department will list the ink, base sheeting, and clear overlay on the APL, in addition to the printer.

Sign sheeting manufacturers seeking evaluation of their product shall submit an application in accordance with Section 6 and include the documentation identified in Table 994-1.

Table 994-1

Documentation	Requirements
Product Photo	Provide product photos that display the significant features of the product.
Technical Data Sheet	Provide product literature that uniquely identifies the product and includes product specifications, storage instructions, and recommended installation materials and equipment as applicable.
Product label and Packaging	Provide label and packaging photos for each component of the product system.

Safety Data Sheet (SDS)	Provide SDS meeting OSHA requirements for product and manufacturer recommended installation materials as applicable. Non-Hazardous, per RCRA Subtitle C Table 1 of 40 CFR 261.24 "Toxicity Characteristic" and not exude fumes which are hazardous, toxic, or detrimental to persons or property.
Independent Lab Test Report	Provide independent testing conducted in accordance with the specification requirements. Laboratories used must be independent from the manufacturer unless otherwise stated in the specification.
Installation Instructions or Manufacturer's Instructions	Provide installation instructions in accordance with the specifications.
Product Sample	A sample may be requested to verify the product, in accordance with the specifications. If the product is a system, a sample of each component must be submitted.

SUBARTICLE 994-2.3.6 is deleted:

~~**994-2.3.6 Samples:** Field samples shall be obtained in accordance with the Department's Sampling, Testing and Reporting Guide Schedule and on a random basis at the discretion of the Engineer.~~

SUBARTICLE 994-3.2 is deleted and the following substituted:

994-3.2 Preparation of the Sign Panel Blanks:

994-3.2.1 De-greasing and Etching for Aluminum Sign Blanks:

994-3.2.1.1 General: Prior to the application of retroreflective sheeting, use any of the methods shown below to de-grease and etch the aluminum sign blanks.

994-3.2.1.2 Hand Method: Under this method, de-grease and etch the blanks in one operation, using steel wool (medium grade) with any of the following combinations of materials:

1. An abrasive cleanser of a commercial grade kitchen scouring powder.
2. Acid and a suitable detergent solution.
3. An alkaline solution.

Thoroughly rinse the blanks with clean water following all hand de-greasing operations.

994-3.2.1.3 Power-Washer Method: Under this method, de-grease the blanks with an inhibited alkaline cleanser, by spraying for 90 seconds with the solution between 135 and 249ºF, the exact temperature to be as recommended by the manufacturer of the cleanser. After the spraying, rinse the blanks with clean water. Then etch the blanks by immersing them in a 6 to 8% solution of phosphoric acid at a temperature of 100 to 180ºF for 60 seconds. After immersion, rinse the blanks in clean water.

994-3.2.1.4 Immersion Method: Under this method, de-grease the blanks by immersing them in a solution of inhibited alkaline cleanser at a temperature between 160 and

180ºF for three to five minutes, and then rinsing with clean water. Then etch blanks by immersing them in a 6 to 8% solution of phosphoric acid at a temperature of 100ºF for three minutes. After immersion, rinse the blanks in clean water.

994-3.2.1.5 Vapor De-greasing Method: Under this method, de-grease the blanks by totally immersing them in a saturated vapor of trichloroethylene. Remove trademark printing with lacquer thinner or a controlled alkaline cleaning system.

994-3.2.1.6 Alkaline De-greasing Method: De-grease the blanks by totally immersing them in a tank containing an alkaline solution, controlled and titrated in accordance with the solution manufacturer's directions. Adapt immersion time to the amount of soil present and the thickness of the metal. After immersion, thoroughly rinse the blanks with running water.

994-3.2.1.7 Etching Method when De-greasing is Separate Operation: If using either of the de-greasing methods described in this section, accomplish etching by one of the following alternate methods:

1. Acid Etch: Etch well in a 6 to 8% phosphoric acid solution at 100ºF, or in a proprietary acid etching solution. Rinse thoroughly with running cold water, which may be followed by a hot water rinse.

2. Alkaline Etch: Etch aluminum surfaces in an alkaline etching material that is controlled by titration. Meet the time, temperature, and concentration requirements specified by the solution manufacturer. After completing etching is complete, rinse the panel thoroughly.

994-3.2.1.8 Chromate Coating: Before applying retroreflective sheeting to the aluminum, treat the aluminum sign surfaces with chromate conversion coating. Coating may consist of an organic or inorganic chromate material. Coatings shall be applied according to the manufacturer's instructions and shall conform to ASTM B449, Class 2.

SECTION 994 is expanded by the following new Article:

994-4 Fabrication of Retroreflective Sign ~~Faces~~Panels.

994-~~3.5~~4.1 General: Fabricate signs in accordance with this Section, with sign sheeting systems listed on the APL, and sign blanks, meeting the requirements in Section 700 and this Section of~~,~~ the Standard ~~Plans~~Specifications and the Standard Plans Index 700.

994-4.2 Approved Product List (APL): Fabricators of Reflective Signs seeking approval for inclusion on the APL shall submit an application in accordance with Section 6 and certify the materials and fabrication methods meet the requirements of Section 700 and this section of the Standard Specifications. Provide an example of the back panel label meeting the requirements of 994-4.7.

994-~~3.5.2~~4.3 Application of Sheeting: Apply retroreflective sheeting to the base panels with mechanical equipment in a manner specified for the manufacture of traffic control signs by the sheeting manufacturer. For sheeting that has been identified as rotationally sensitive, apply white sheeting for cut-out legends, symbols, borders and route marker attachments within the parent sign face at the optimum rotation angle according to the identification markings. Apply all background sheeting at a uniform rotational angle. The retroreflective sheeting for each sign will be from the same roll or LOT number. Apply consecutively alternate successive width sections of either sheeting or panels to ensure that corresponding edges of sheeting lie adjacent on the finished sign. If the sign cannot be constructed from retroreflective sheeting from the same roll

or LOT number, the fabricator may color match from a different LOT; the color between the rolls cannot exceed three ΔE's using test method ASTM D 2244. The Engineer shall not accept nonconformance that may result in non-uniform shading and an undesirable contrast between adjacent widths of applied sheeting or non-optimum retroreflectivity in the finished sign and installation.

Sheeting is to be trimmed at 45-degree angle from the edge of each panel. Finish signs by sealing sheeting splices and sign edges according to sign manufacturer recommendations.

994-~~3.5.3~~4.4 Direct and Reverse Screen Processing: Screen message and borders on retroreflective sheeting in accordance with the recommendations of the ink or overlay manufacturer. Process messages either before or after applying the sheeting to the base panels.

The transparent and opaque process inks furnished for direct and reverse screen processing shall be of a type and quality formulated for retroreflective sheeting materials as listed on the APL and applied in accordance with the manufacturer's instruction. Screen processing in accordance with the techniques and procedures recommended by the manufacturer shall produce a uniform legend of continuous stroke width of either transparent or opaque ink, with sharply defined edges and without blemishes on the sign background that will affect the intended sign use.

994-~~3.5.4~~4.5 Digital Printing Process: The use of a certified digital sign fabricator will be required. Digital sign fabricators shall be certified by the reflective sheeting manufacturer or a third-party certifier approved by the reflective sheeting manufacturer. Inks or ribbons shall be of a type and quality formulated to produce colors that meet the chromaticity requirements given in ASTM D4956 for retroreflective sheeting material when printed and finished as recommended by the sheeting manufacturer.

994-~~3.5.5~~4.6 Finished Sign Face: Provide finished signs with properly aligned clean cut and sharp messages and borders. Fabricated signs shall be free of wrinkles, bubbles, foreign matter, scratches, free of patches, or other visually identifiable defects. Ensure that finished background panels are essentially a plane surface.

994-~~3.5.6~~4.7 Packaging and Labeling: For permanent roadway signs, label the back of all finished panels at the bottom edge with "FDOT", the date of fabrication, sign sheeting system manufacturer, Type, and the fabricator's initials. For Type VI non-reflective vinyl work zone signs, label the back of all finished panels at the bottom edge with "Daytime Use Only". Make the labels unobtrusive, but legible enough to be easily read by an observer on the ground when the sign is in its final position. Apply the label in a manner that is at least as durable as the sign face.

~~Properly p~~Package signs to protect them during storage, shipment and handling to prevent damage to the sign face and panel.

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(REV 5-19-26)

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SUBARTICLE 994-2.2 is deleted and the following substituted:

994-2.2 Approved Product List (APL): All sheeting, process inks and overlay materials shall be listed as a system on the Department's Approved Product List (APL). Sign sheeting systems shall consist of base sheeting with ink and/or overlay materials. Products with an ASTM classification of Type XI will not be accepted for qualification on the APL for fluorescent orange. Information on the APL application shall include the individual materials comprising the sign sheeting system and identify colors, ASTM base sheeting classification, adhesive backing class, availability of transparent and/or opaque backing and availability of liner types.

Digital print systems shall include a digital printer, with appropriate software and drivers, flexible white or colored prismatic retroreflective sheeting with colorless overlay in accordance with the recommendation of the sheeting manufacturer. For all digital print systems, the Department will list the ink, base sheeting, and clear overlay on the APL, in addition to the printer.

Sign sheeting manufacturers seeking evaluation of their product shall submit an application in accordance with Section 6 and include the documentation identified in Table 994-1.

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Independent Lab Test Report	Provide independent testing conducted in accordance with the specification requirements. Laboratories used must be independent from the manufacturer unless otherwise stated in the specification.
Installation Instructions or Manufacturer's Instructions	Provide installation instructions in accordance with the specifications.
Product Sample	A sample may be requested to verify the product, in accordance with the specifications. If the product is a system, a sample of each component must be submitted.

SUBARTICLE 994-2.3.6 is deleted:

SUBARTICLE 994-3.2 is deleted and the following substituted:

994-3.2 Preparation of the Sign Panel Blanks:

994-3.2.1 De-greasing and Etching for Aluminum Sign Blanks:

994-3.2.1.1 General: Prior to the application of retroreflective sheeting, use any of the methods shown below to de-grease and etch the aluminum sign blanks.

994-3.2.1.2 Hand Method: Under this method, de-grease and etch the blanks in one operation, using steel wool (medium grade) with any of the following combinations of materials:

1. An abrasive cleanser of a commercial grade kitchen scouring powder.
2. Acid and a suitable detergent solution.
3. An alkaline solution.

Thoroughly rinse the blanks with clean water following all hand de-greasing operations.

994-3.2.1.3 Power-Washer Method: Under this method, de-grease the blanks with an inhibited alkaline cleanser, by spraying for 90 seconds with the solution between 135 and 249ºF, the exact temperature to be as recommended by the manufacturer of the cleanser. After the spraying, rinse the blanks with clean water. Then etch the blanks by immersing them in a 6 to 8% solution of phosphoric acid at a temperature of 100 to 180ºF for 60 seconds. After immersion, rinse the blanks in clean water.

994-3.2.1.4 Immersion Method: Under this method, de-grease the blanks by immersing them in a solution of inhibited alkaline cleanser at a temperature between 160 and 180ºF for three to five minutes, and then rinsing with clean water. Then etch blanks by immersing them in a 6 to 8% solution of phosphoric acid at a temperature of 100ºF for three minutes. After immersion, rinse the blanks in clean water.

994-3.2.1.5 Vapor De-greasing Method: Under this method, de-grease the blanks by totally immersing them in a saturated vapor of trichloroethylene. Remove trademark printing with lacquer thinner or a controlled alkaline cleaning system.

994-3.2.1.6 Alkaline De-greasing Method: De-grease the blanks by totally immersing them in a tank containing an alkaline solution, controlled and titrated in accordance with the solution manufacturer's directions. Adapt immersion time to the amount of soil present and the thickness of the metal. After immersion, thoroughly rinse the blanks with running water.

994-3.2.1.7 Etching Method when De-greasing is Separate Operation: If using either of the de-greasing methods described in this section, accomplish etching by one of the following alternate methods:

1. Acid Etch: Etch well in a 6 to 8% phosphoric acid solution at 100ºF, or in a proprietary acid etching solution. Rinse thoroughly with running cold water, which may be followed by a hot water rinse.

2. Alkaline Etch: Etch aluminum surfaces in an alkaline etching material that is controlled by titration. Meet the time, temperature, and concentration requirements specified by the solution manufacturer. After completing etching is complete, rinse the panel thoroughly.

994-3.2.1.8 Chromate Coating: Before applying retroreflective sheeting to the aluminum, treat the aluminum sign surfaces with chromate conversion coating. Coating may consist of an organic or inorganic chromate material. Coatings shall be applied according to the manufacturer's instructions and shall conform to ASTM B449, Class 2.

SECTION 994 is expanded by the following new Article:

994-4 Fabrication of Retroreflective Sign Panels.

994-4.1 General: Fabricate signs in accordance with this Section, with sign sheeting systems listed on the APL, and sign blanks, meeting the requirements in Section 700 and this Section of the Standard Specifications and the Standard Plans Index 700.

994-4.2 Approved Product List (APL): Fabricators of Reflective Signs seeking approval for inclusion on the APL shall submit an application in accordance with Section 6 and certify the materials and fabrication methods meet the requirements of Section 700 and this section of the Standard Specifications. Provide an example of the back panel label meeting the requirements of 994-4.7.

994-4.3 Application of Sheeting: Apply retroreflective sheeting to the base panels with mechanical equipment in a manner specified for the manufacture of traffic control signs by the sheeting manufacturer. For sheeting that has been identified as rotationally sensitive, apply white sheeting for cut-out legends, symbols, borders and route marker attachments within the parent sign face at the optimum rotation angle according to the identification markings. Apply all background sheeting at a uniform rotational angle. The retroreflective sheeting for each sign will be from the same roll or LOT number. Apply consecutively alternate successive width sections of either sheeting or panels to ensure that corresponding edges of sheeting lie adjacent on the finished sign. If the sign cannot be constructed from retroreflective sheeting from the same roll or LOT number, the fabricator may color match from a different LOT; the color between the rolls cannot exceed three ΔE's using test method ASTM D 2244. The Engineer shall not accept nonconformance that may result in non-uniform shading and an undesirable contrast between adjacent widths of applied sheeting or non-optimum retroreflectivity in the finished sign and installation.

Sheeting is to be trimmed at 45-degree angle from the edge of each panel. Finish signs by sealing sheeting splices and sign edges according to sign manufacturer recommendations.

994-4.4 Direct and Reverse Screen Processing: Screen message and borders on retroreflective sheeting in accordance with the recommendations of the ink or overlay manufacturer. Process messages either before or after applying the sheeting to the base panels.

The transparent and opaque process inks furnished for direct and reverse screen processing shall be of a type and quality formulated for retroreflective sheeting materials as listed on the APL and applied in accordance with the manufacturer's instruction. Screen processing in accordance with the techniques and procedures recommended by the manufacturer shall produce a uniform legend of continuous stroke width of either transparent or opaque ink, with sharply defined edges and without blemishes on the sign background that will affect the intended sign use.

994-4.5 Digital Printing Process: The use of a certified digital sign fabricator will be required. Digital sign fabricators shall be certified by the reflective sheeting manufacturer or a third-party certifier approved by the reflective sheeting manufacturer. Inks or ribbons shall be of a type and quality formulated to produce colors that meet the chromaticity requirements given in ASTM D4956 for retroreflective sheeting material when printed and finished as recommended by the sheeting manufacturer.

994-4.6 Finished Sign Face: Provide finished signs with properly aligned clean cut and sharp messages and borders. Fabricated signs shall be free of wrinkles, bubbles, foreign matter, scratches, free of patches, or other visually identifiable defects. Ensure that finished background panels are essentially a plane surface.

994-4.7 Packaging and Labeling: For permanent roadway signs, label the back of all finished panels at the bottom edge with "FDOT", the date of fabrication, sign sheeting system manufacturer, Type, and the fabricator's initials. For Type VI non-reflective vinyl work zone signs, label the back of all finished panels at the bottom edge with "Daytime Use Only". Make the labels unobtrusive, but legible enough to be easily read by an observer on the ground when the sign is in its final position. Apply the label in a manner that is at least as durable as the sign face.

Package signs to protect them during storage, shipment and handling to prevent damage to the sign face and panel.