

9940201 Retroreflective and Nonreflective Sheeting and Sign Panel Fabrication  
COMMENTS FROM INDUSTRY REVIEW

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Comments: (10-10-23)

Digital printing is just another system and should not be listed as its own section.

Redundant. Spec should just say "submit APL application in accordance with Section 6."

What is opaque backing and liner type?

D4956 already has color requirements, including daytime, nighttime, and durability, and so this is redundant.

D4956 already has testing and panel prep requirements.

Are the warranty requirements outlines somewhere? What's expectation if sign fails? Who is liable for what? Should warranty be covered in Section 700 instead?

D4956 outlines retro as well as other requirements. Having a section for retro can make it seem like other requirements, such as color, or durability in D4956 are not required.

Why is there a section on clear only? Does this mean the other colors can delaminate?

Already covered in D4956.

Where is this document?

Sign fabricators using digital imaging methods to produce regulated traffic signs must be certified by the reflective sheeting manufacturer whose materials are used to produce the delivered signs. Certified sign fabricators must undergo an audit process by the sheeting manufacturer to ensure they have the proper equipment, manufacturing capabilities, manufacturing application processes and the materials required to fulfill the sheeting manufacturer's warranty obligations. Sign fabricators must recertify annually with reflective sheeting manufacturers or utilize a 3rd party certifier approved by the reflective sheeting manufacturer. Purchasing agency shall require proof of Sign Fabricator Certification with the execution of a purchase order (P.O.) or construction contract for signs.

Redundant. Performance requirements for inks (and digital inks) are outlined above.  
(see attachment)

Response: We appreciate their feedback and most of their proposed language will definitely help with the interpretation of the specification. Proposed changes regarding inks and overlays initial performance and warranty may require further discussion with APL office and other impacted offices. Most of their comments, while valuable, correspond to sections not changed in the FY24-25 revision cycle. Since the Spec book is already published and most are not critical, our recommendation is to wait until the next cycle.

Action: No action.

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## 994-2 Retroreflective and Nonreflective Sheeting Systems.

**994-2.1 Materials:** Retroreflective sheeting material shall be classified in accordance with and meet the requirements of ASTM D4956. Overlay materials include: colored and colorless transparent overlays (to provide UV protection) and opaque black vinyl. Inks include transparent and opaque silkscreen inks as well as inkjet inks used in digital print systems.

**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). Red ink will only be listed with a clear overlay. Digital print systems shall include a digital printer, with appropriate software and drivers, flexible white or colored prismatic retroreflective sheeting with a clear overlay in accordance with the recommendation of the sheeting manufacturer. Sign sheeting systems shall consist of base sheeting with ink and/or overlay materials. Products with an ASTM classification of Type XI or greater 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 a 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.

### 994-2.3 Performance Requirements:

**994-2.3.1 General:** Sheeting, process inks and overlay materials shall be tested in accordance with, and meet all the performance requirements of ASTM D4956. Reboundable sheeting shall also meet, including Supplemental Requirement S2, Reboundable Sheeting Requirements, except as amended in this Section. Inks and overlays shall meet 70% of retroreflectivity requirements.

For performance requirements that are color dependent, each color included in the APL application shall be tested and meet the requirements identified in ASTM D4956 or this Section as applicable. All sign sheeting systems consisting of inks and/or overlays will be tested as a system consisting of white base sheeting and each color of ink and/or overlay. Panels for testing sheeting shall be prepared in accordance with 994-3 for testing. The in-service life for the sign sheeting system shall equal the life of the reflective base sheeting of the system.

**994-2.3.2 Rotational Compliance: Retroreflective Intensity:** The retroreflectivity of sheeting and sheeting systems shall meet the minimum initial requirements as stated for all observation and entrance angles as identified in ASTM D4956. The 0.2-and 0.5 degree observation angles with an entrance angle of minus 4 degrees per ASTM D4956 shall be used for in-service requirements. Rotational sensitivity shall be tested in accordance with AASHTO M268.

**Commented [1]:** Digital printing is just another system and should not be listed as its own section.

**Commented [2]:** Redundant. Spec should just say "submit APL application in accordance with Section 6."

**Commented [3]:** What is opaque backing and liner type?

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Should warranty be covered in Section 700 instead?

**Commented [7]:** D4956 outlines retro as well as other requirements. Having a section for retro can make it seem like other requirements, such as color, or durability in D4956 are not required.

Rotationally sensitive sheeting will be noted on the APL.

**994-2.3.3 Clear Overlay Films:** Clear overlay film shall be compatible with the sign sheeting system and not delaminate or discolor for the in-service life of the system.

**Commented [8]:** Why is there a section on clear only? Does this mean the other colors can delaminate?

**994-2.3.4 Outdoor Weathering:** Outdoor weathering exposure of sign sheeting systems shall be performed in accordance with ASTM D4956, and meet the requirements for each system, color, and classification. All testing shall be conducted at an exposure location meeting the Tropical Summer Rain Climate Type (Miami, Florida or equivalent). Outdoor Weathering is not required for Type VI fluorescent pink.

**994-2.3.5 Packaging and Labeling:** Packaging and labeling shall meet the requirements of ASTM D4956.

**Commented [9]:** Already covered in D4956.

**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.

**Commented [10]:** Where is this document?

SUBARTICLE 994-3.5.4 is deleted and the following substituted:

**994-3.5.4 Certified Converters**~~Digital Printing Process:~~ ~~Digital print systems shall include a digital printer, with appropriate software and drivers, flexible white or colored prismatic retroreflective sheeting with a clear/colorless overlay in accordance with the recommendation of the sheeting manufacturer.~~

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.

**Commented [11]:** Sign fabricators using digital imaging methods to produce regulated traffic signs must be certified by the reflective sheeting manufacturer whose materials are used to produce the delivered signs. Certified sign fabricators must undergo an audit process by the sheeting manufacturer to ensure they have the proper equipment, manufacturing capabilities, manufacturing application processes and the materials required to fulfill the sheeting manufacturer's warranty obligations. Sign fabricators must recertify annually with reflective sheeting manufacturers or utilize a 3rd party certifier approved by the reflective sheeting manufacturer. Purchasing agency shall require proof of Sign Fabricator Certification with the execution of a purchase order (P.O.) or construction contract for signs.

~~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 sheetingManufacturer.

**Commented [12]:** Redundant. Performance requirements for inks (and digital inks) are outlined above.