

Avery Dennison® L-3050 Series Retroreflective License Plate Film

Issued: April 2011

Revision 1

Avery Dennison® L-3050 Series Retroreflective sheeting is a premium quality enclosed lens retroreflective material designed and engineered for the production of high quality embossed or flat license plates. It can include custom printing and optional security features that are critical to government requirements. It can be printed via digital thermal transfer, solvent and UV screen, and rollercoat technologies.



Performance:
LS-300C Table IV, Ref. 3
(Class 1)
ISO 7591, DIN 74069



Durability: 5 years
Vertical exposure only



Embossable



Face: High Gloss
Retroreflective Vinyl



Adhesive: Permanent
Pressure Sensitive



Liner: Two Side Polyethylene
Coated Paper



Application Surface:
Aluminum

Features:

- Available with high quality custom printed graphics.
- Embossable
- Avery Secure Mark™ custom designed to prevent counterfeiting
- High legibility day and night at various degrees of entrance angles
- High quality manufacturing - ISO certified – Lean Six Sigma

Product Availability:

L-3050	White
L-3051	Yellow
L-305x	Custom color matches
L-305x	Custom background print

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Retroreflectivity:

L-3050 Series Retroreflective License Plate Film **exceeds** all minimum coefficients of retroreflection values seen in **Table A**.

Table A:
Minimum Coefficient of Retroreflection (R_A)¹

Observation Angle	Color	Initial	Aged ²
		Entrance Angle	Entrance Angle
		- 4°	- 4°
0.2°	White	50	25
	Yellow	25	15

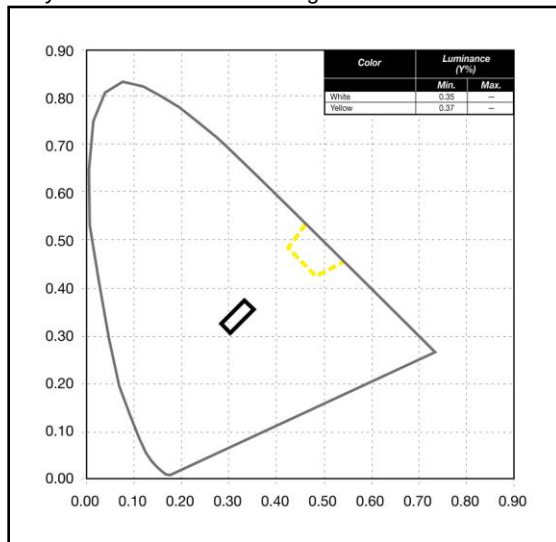
¹ R_A = candelas per foot-candle per square foot (cd/ft²)

²Refer to LS-300C and ISO7591 for detailed test method

Colors and Specification Limits:

L-3050 Series **meets** the color and minimum luminance requirements for ISO 7591 shown in **Figure A**.

Figure A:
Daytime Color – CIE Color Diagram³



Daytime Color – Coordinates³

	White		Yellow	
	X	Y	X	Y
1	0.355	0.355	0.465	0.534
2	0.305	0.305	0.427	0.483
3	0.285	0.325	0.487	0.423
4	0.335	0.375	0.545	0.454
Luminance Factor	> 0.35		> 0.27	

³The four pairs of chromaticity coordinates and luminance range in **Figure A** determine the acceptable color in terms of the CIE Document No. 15 (1971) and illuminated with the CIE Standard Illuminant D65, 45°/0° geometry.

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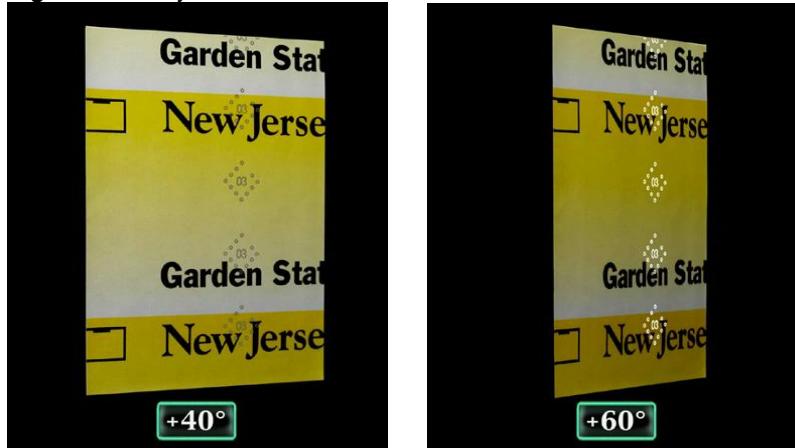
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Watermark/Security Mark:

L-3050 Series License Plate Sheeting can be made available with Avery Dennison Secure Mark™ (Figure B). It provides the highest level of sheeting security due to its unique optical characteristics. The Secure Mark™ feature is imaged within the reflective sheeting by a patented technology that cannot be duplicated by conventional printing methods or laser etching.

Figure B: Avery Dennison Secure Mark™



Characteristics:

<i>Property</i>	<i>Value</i>
Shelf-Life	1 year from date of purchase when stored at the following conditions; 65°-75°F (18°-24°C) and 50% ± 5% R.H.
Typical Film Caliper	4.3 – 5.3 mils (122 – 147μ)
Min. Application Temperature	70° F substrate temperature during lamination using squeeze roll applicator (21° C)
Service Temperature	-22°F to +150°F (-30°C to + 65°C)
Dimensional Stability	Less than 0.03 inches (0.8mm) shrinkage after 1000 hours Atlas Twin Xenon Arc Weatherometer
Other Tests	Passes all tests required for LS-300C and ISO 7591 including; temperature resistance, adhesion to the substrate, impact resistance, bending resistance, water resistance, cleanability, rainfall, shrinkage, fungus resistance, specular gloss, and resistance to saline mist.

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Solvent Resistance:

When properly processed and applied, the film is resistant to most common solvents. When tested according to LS-300C, Section 3.6.2, immersion in the following solvents for the specified length of time the film shows no deterioration:

Solvent	Time
Kerosene	10 Minutes
Turpentine	10 Minutes
Toluene	1 Minute
Xylene	1 Minute
Methyl Alcohol	1 Minute
70% Heptane / 30% Toluene	1 Minute

Converting Information:

The following Avery Dennison literature will provide information to the user for proper application, storage, and other requirements. Find the latest information on the Avery Dennison website, www.reflectives.averydennison.com. We encourage you to check our website periodically for updates.

Converters and end users must pre-qualify all printing inks, print processes, ribbons, toners and equipment to insure durability and desired performance for specific decal applications.

Screen printing inks and thermal transfer ribbons:

All inks available in custom colors

Printing Method	Supplier	Series	System
Screen Printing	Nazdar	System II	Solvent Based
	Nazdar	Gloss Vinyl (GV)	Solvent Based
	Nazdar	3500 UV	UV Cure
	Sericol	TMI II	Solvent Based
Roller Coating	Nazdar	CD-381	Solvent Based
	Coates	J	Solvent Based
	Sericol	UVLP	UV Cure
Hot Foil	ITW	Foil Stamping	Thermal Transfer
	Kurz	Foil Stamping	Thermal Transfer

Substrates:

The application of Avery Dennison L-3050 Series sheeting is limited to properly prepared clean, chemically treated or conversion coated aluminum. Users are urged to carefully evaluate, under actual use conditions, any film application to other substrates. Failure of film caused by other substrates, materials, contamination, or improper surface preparation is not the responsibility of Avery Dennison.

Product Data Sheet

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Graphics and Reflective Solutions

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License Plate Production:

Lamination	<ul style="list-style-type: none"> The aluminum substrate should be clean, dry and heated to a temperature of 70-90°F (21-32°C) prior to lamination of the reflective sheeting. Tension of the sheeting during the lamination process needs to be kept at a minimum to avoid overstretching the material. The sheeting will not perform properly when stretch exceeds 2%. A 1% stretch recommended for preprinted graphic registration.
Dwell Time	<ul style="list-style-type: none"> After lamination, allow a minimum 24-hour dwell at 60°F (15°C) before embossing to allow the adhesion of the sheeting to build to the substrate.
Specialty Designs – Screen printing	<ul style="list-style-type: none"> If screen printing specialty designs is to be done, this must occur before embossing the plates. See list of compatible screen print inks. Please consult the ink manufacturer for printing and drying conditions.
Embossing	<ul style="list-style-type: none"> Maximum embossing depth of 0.08" (2.mm), deeper embossing may tear the sheeting. Minimum embossing temperature is 70 °F (21 °C).
Roller Coating	<ul style="list-style-type: none"> NOTE: L-3050 should not be exposed to oven temperatures in excess of 220°F (104.5°C). Avery CD-381 series roller coat inks are made from a highly durable resin making them extremely weather resistant with excellent color retention. Five-year outdoor durability for color fade, chemical and abrasion resistance Avery's CD381 roller coat inks are provided ready to use from the container. Up to 5% thinner CD381-180 may be added during the day to replace lost solvent due to evaporation. The non metal rolls used in the roller coating equipment need to be made of a highly durable, solvent resistant rubber material. Any excess ink can be cleaned off of the plates by using the thinner. Any loss of gloss that occurs during the ink removal will be restored during the oven drying process. Adjust the roller coater so that the ink layer is deposited uniformly on the embossed characters. Thinner can be added if needed to improve the coat of the ink.
Drying/Cure	<ul style="list-style-type: none"> For CD 381 ink, typical Temp: 200°F +/- 20°F min 2 minutes max 20 minutes. Oven efficiencies vary so testing the cure of the ink under each specific oven condition is recommended. Follow suppliers recommendation for UV cured inks and roller coaters.
Packaging	<ul style="list-style-type: none"> Laminated plates must be stored on edge. The plates need to be cooled to room temperature before stacking and packing the plates for shipment. Plates must be used within one year after date of purchase for best embossing results.

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Warranty:

Avery Dennison Corporation ("Avery Dennison") warrants that its Avery Dennison® L-3050 reflective sheeting will retain its effectiveness as a component of a license plate for a period of five (5) years from the date of purchase if processed, applied, installed and maintained according to the Procedures defined below. If within five (5) years from the date of purchase, the sheeting deteriorates, due to solely to normal use and wear conditions, e.g. the license plates shows fading, cracking, blistering or peeling which may significantly impair the intended visibility or legibility of the plate, Avery Dennison will furnish a replacement amount of like sheeting at no cost.

Avery Dennison L-3050 Series beaded retroreflective sheeting ("Product(s)") are warranted to be free from defects in material and workmanship for one (1) year from date of purchase (or the period stated on the specific product information literature in effect at time of delivery, if longer). It is expressly agreed and understood that Avery Dennison's sole obligation and Purchaser's exclusive remedy under this warranty, under any other warranty, express or implied, or otherwise, shall be limited to repair or replacement of defective Product without charge at Avery Dennison's plant or at the location of Product (at Avery Dennison's election), or in the event replacement or repairs is not commercially practical, to Avery Dennison's issuing Purchaser a credit reasonable in light of the defect in the Product.

WARRANTY CONDITIONS. The foregoing warranty shall be contingent on Avery Dennison's satisfactory conclusion that the following conditions are met:

The product failure must have resulted solely from a manufacturing defect or deterioration of the sheeting due to normal wear and use conditions and not from subsequent processing, handling, manipulation or application of the product. Without limiting the generality of the foregoing, there is no warranty or liability for the failure of the sheeting or resulting license plate due to improper application, improper storage, handling, installation, maintenance, failure of the substrate, vandalism, accidents, fire, exposure to high levels of industrial pollutants, fuel spills, engine exhaust, or mischief. Slight color fading, cracking, chalking, blistering, peeling or slight reduction in gloss or reflectivity will not materially detract from appearance and does not constitute a claim under this warranty for replacement product.

Avery Dennison has published instructional bulletins pertaining to the storage, handling, cleaning and maintenance of sheeting, approved sheeting substrates, and sheeting application procedures (collectively, the "Procedures"). The sheeting must have been processed and applied to blank, clean (no contaminants on the surface) approved license plate substrates in accordance with the Procedures, as such may be amended from time to time without notice.

WARRANTY/LIABILITY LIMITATIONS. The remedies provided under this warranty are exclusive. Avery Dennison shall not be liable for any direct, indirect, incidental or consequential damages or specific relief, including costs of procurement of substitute goods or services, arising in any way or under any cause of action whether or not Avery Dennison has been advised of the possibility of such damages. These limitations will apply notwithstanding the failure of the essential purpose of any limited remedy. Except as specifically provided herein, in no event shall Avery Dennison's liability hereunder exceed the remedies specifically set forth in this warranty or shall Avery Dennison's liability exceed the replacement value of the Products purchased.

THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHERS. ANY AND ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY EXPRESSLY DISCLAIMED.

All Avery Dennison products are sold with the understanding that Purchaser has independently determined the suitability of such products for its intended and other purposes.

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