

Avery Dennison® L-4050 Series

Retroreflective License Plate Sheeting

ISSUED: FEB 2023

Overview

Avery Dennison L-4050 Series Retroreflective sheeting is a premium quality enclosed lens retroreflective material containing glass microspheres designed and engineered for the production of high-quality embossed or flat license plates. It can include optional security features that are critical to government requirements. It can be printed via solvent and UV screen, digital print, and roller coat technologies.

Availability

Series/Color	Durability* (years)
L-4050 White	5

*Vertical exposure only

Features

- Available with optional printed or laser-etched security mark
- Embossable
- High-quality manufacturing - ISO certified - Lean Six Sigma
- High legibility day and night at various degrees of entrance angles

Performance

International	ISO7591	India	MoRTH India
North America	LS-300C, DIN 74069	Mexico	LS-300C
Australia, New Zealand	AS/NZS 1906.1: 2017 Class LP	Russia	DIN74069, P50577
Brazil	Denatran	South America	LS-300C
Europe	DIN 74069, BSAU145		

Avery Dennison recommends the user obtain the current requirements from their local governing agency to ensure product conformance.

Characteristics

Construction	High-Gloss Acrylic Retroreflective Film containing glass microspheres with a permanent pressure-sensitive adhesive protected with two-sided polyethylene-coated paper liner
Typical Film Caliper	6.5-7.5 mils (165-190 µm)
Application Surface	Aluminum
Watermark	Custom security mark design using printed or laser etch technology. Contact Avery Dennison for details.
Service Temperature	-22°F to +150°F (-30°C to + 65°C)
Min. Application Temperature	70° F (21° C) substrate temperature during lamination using a squeeze roll applicator
Shelf-life	1 year from the date of purchase when stored at 65°-75°F (18°-24°C) 50% ± 5% R.H.
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

Table A - Retroreflectivity (L-4050 series exceeds all minimum coefficients of retroreflection values seen below)

Minimum Coefficient of Retroreflection (R_A) cd/ft ² (cd-lx ⁻¹ -m ²) (ISO7591 and LS-300C)			
Observation Angle	Entrance Angle		White
0.2°	-4°	Initial	50
	-4°	Aged	25



Table B

Colors	Daytime color specification limits (ISO 7591)								Luminance Factor Y
	1		2		3		4		
	x	y	x	y	x	y	x	y	
White	.355	.355	.305	.305	.285	.325	.335	.375	> 0.35

Table C - 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
Methyl Alcohol	1 Minute
70% Heptane / 30% Toluene	1 Minute

Watermark/ Security Mark:

L-4050 Series License Plate Sheeting can be made available with an optional custom printed or laser engraved security mark.

Converting

L-4050 Series may be converted using the following methods:

- Digital printing*
- Screen printing - Solvent Based or UV Cured
- Roller Coating- Solvent Based or UV Cured
- Hot Foil Thermal Transfer

* Subject to individual trial and qualification to determine suitability

Substrates

The application of Avery Dennison L-4050 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.

Instructional Bulletins

Please refer to Instructional Bulletins which detail proper handling, storage, and converting of Avery Dennison retroreflective films, overlays, inks, and application tapes. Instructional Bulletins may be found in the Customer Tools section of our [website](#).

Warranty

WARRANTY

Avery Dennison Corporation ("Avery Dennison") warrants that its Avery Dennison L-4050 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-4050 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.

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.

ADDITIONAL LIMITATIONS

Unintended Use: This warranty only applies to Product that is used by professional converters and installers for the defined end uses and in the combinations described in the applicable Avery Dennison Product Data Sheets and Instructional Bulletins. For any other use, the user is responsible for determining the suitability of the Product, and for any and all risk or liability associated with that use or application, and the user agrees to indemnify, defend and hold harmless Avery Dennison for any claims, losses, damages, judgments, expenses and/or expenses, including attorneys fees, resulting from such use or application. This warranty is expressly conditioned on the Product being processed by professional converters or installers in accordance with the Avery Dennison recommended written processing instructions, and being applied to properly prepared surfaces and cleaned and maintained in accordance with recommended Avery Dennison procedures. It is the converters, installers or other users responsibility to perform incoming raw material quality inspections, to assure proper surface preparation and that approved application procedures are followed, to retain converted samples, and to immediately cease using and notify Avery Dennison and/or its authorized agent or distributor of any Product, Materials and/or finished Product discovered to be (or reasonably capable of being discovered to be) defective.

Misuse and Force Majeure: Avery Dennison has no obligations or liability under this warranty with respect to Product that has been altered, modified, damaged, misused, abused, subject to accident, neglected or otherwise mishandled or improperly processed or installed. Product is not warranted against premature failure caused by chemical, environmental or mechanical means such as, but not limited to, vandalism, cleaning solutions, paints, solvents, moisture, temperature, mechanical washing equipment, engine fuel spills, engine exhaust, steam, organic solvents or other spilled chemicals pollutants, including industrial and volcanic ash. Damage from fire, structural failure, lightning, accidents, and other force majeure events are not covered by this warranty.

Third Party Product: Avery Dennison assumes no responsibility for any injury, loss or damage arising out of the use of a product that is not of our manufacture. Where installer or converter uses or reference is made to a commercially available product, made by another manufacturer, it shall be the responsibility of the user, installer or converter to ascertain the precautionary measures for its use outlined by the manufacturer.

The remedies provided under this warranty are exclusive. In no event shall Avery Dennison be responsible for any direct, indirect, incidental or consequential damages or specific relief whether foreseeable or not, caused by defects in such Product, whether such damage occurs or is discovered before or after replacement or credit, and whether or not such damage is caused by Avery Dennison's negligence. In no event shall Avery Dennison's liability hereunder exceed the remedies specifically set forth in this warranty. Avery Dennison's liability shall be limited, at Avery Dennison's option, to the purchase price, replacement of the defective Product and in some cases when authorized by Avery Dennison the repair and replacement of the defective Product. **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 DISCLAIMED. NO WAIVER, ALTERATION, ADDITION OR MODIFICATION OF THE FOREGOING CONDITIONS SHALL BE VALID UNLESS MADE IN WRITING AND MANUALLY SIGNED BY AN OFFICER OF AVERY DENNISON.**

DEFINITIONS

Durability: means that the Product in a finished graphic, panel or sign situated outdoors, subject to the limitations herein and Avery Dennison Product Data Sheets and Instructional Bulletins, and applied to recommended surfaces, will not deteriorate excessively such that the finished sign, panel or graphic is ineffective for its identification when viewed under normal conditions from the intended viewing distance.

Outdoor Durability: is based on normal middle European and central North American outdoor exposure conditions and application to recommended surfaces. Actual performance life will depend on a variety of factors, including but not limited to substrate preparation, exposure conditions and maintenance of the Product and finished graphic, panel or sign. In case the finished graphics, panel or sign is in areas of high temperatures or humidity, in industrially polluted areas or other areas with air laden particulate matter, and/or in high altitudes, Outdoor Durability may be reduced. Please see your local Avery Dennison representative for changes to warranties based on such localized conditions.

Vertical Exposure: means that the face of the finished graphic is $\pm 10^\circ$ from vertical.

Non-Vertical Exposure: means that the face of the finished graphic is greater than 10° from vertical and greater than 5° from horizontal. Retroreflective films are not warranted for this exposure. Flat surfaces: means a two dimensional flat surface without protruding objects.

Weathering Effects: Some degradation of Product performance over time is considered normal wear. Slight color fading, chalking, edge lifting, or slight reduction in gloss or reflectivity due to normal wear exposure and other natural weathering, environmental or other conditions or damage caused by tornadoes, hurricanes, wind, excessive ice buildup or extraordinary frozen particulate conditions, large hail stones or other acts of God, do not constitute a breach of warranty or give rise to any liability by Avery Dennison.

Printing, Curing and Ink Defects: Ink contaminations, failures or other defects, or other failures due to improper printing conditions or settings including, but not limited to, unsuitable color calibration, incorrect ICC color profile or incompatible printing, do not constitute a breach of warranty. Product failure caused by ink over-saturation, excessive or under curing, failure of ink to render desired colors on Product, or other treatment or processing errors are not warranted.

Adhesion to Application Surfaces: This warranty does not cover the Product if the application surface is not properly prepared; nor does the warranty cover the Product or damage to the substrate because the layers of the substrate separate due to a lower bond between those layers than the bond between the Product and the top layer of the substrate, or surfaces which subsequently crack, peel, outgas, or become damaged beneath the Product

INDEPENDENT TESTING REQUIRED All statements, technical information and recommendations about Avery Dennison products are based upon tests and information believed to be reliable but do not constitute a guarantee or warranty of any kind. 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.

