

Avery Dennison® T-1000-A Series

Engineer Grade Beaded Retroreflective Sheeting

ISSUED: NOV 2020

Overview

Avery Dennison T-1000-A Series beaded Engineering Grade Retroreflective Film for permanent traffic signage, is a high-quality, durable, enclosed lens retroreflective material with a pressure sensitive adhesive designed for screen and cut applications.

T-1000-A Series sheeting is an Omni-Directional beaded film. This feature benefits agencies by providing confidence that all signs will perform with uniform visual reflectivity at all sign face orientations.

Availability

Series/Color	TrafficJet Printable (Y/N)	Series/Color	TrafficJet Printable (Y/N)
T-1500-A White	N	T-1507-A Green	N
T-1501-A Yellow	N	T-1508-A Red	N
T-1505-A Blue	N	T-1509-A Brown	N

Performance

International	ASTM D4956 Type I	Japan	JIS Z9117
Australia, New Zealand	AS/NZS 1906.1 Class 100	Korea	KS T:3507, Type I
Brazil	ABNT 14644 Tipo I	Russia	GOST 55290 Class 1
China	GB/T 18833 Type I	South Africa	SANS 1519-1
Europe	EN 12899/1 RA1		

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 with Glass Microspheres and a permanent pressure-sensitive adhesive protected with a paper liner
Typical Film Caliper	5.5 - 6.5 mils (140 – 165 µm)
Durability	Up to 7 years, vertical exposure only,
Watermark	T-1000-A Does not have a watermark standard. Watermarks may vary due to local regulations. Contact Avery Dennison for details.
Service Temperature	-10°F to +150°F (-23°C to + 65°C)
Min. Application Temperature	65° F (18° C)
Shelf-life	1 year from the date of purchase when stored at 65°–75°F (18°–24°C) 50% ± 5% R.H.



Table A

Minimum Coefficient of Retroreflection (R_A) $\text{cd}/\text{fc}/\text{ft}^2$ ($\text{cd}\cdot\text{lx}^{-1}\cdot\text{m}^2$) (ASTM D4956 Type I Sheeting)							
Observation Angle	Entrance Angle	White	Yellow	Blue	Green	Red	Brown
0.2°	-4°	70	50	4.0	9.0	14	1.0
	+30°	30	22	1.7	3.5	6.0	0.3
0.5°	-4°	30	25	2.0	4.5	7.5	0.3
	+30°	15	13	0.8	2.2	3.0	0.2

Table B

Minimum Coefficient of Retroreflection (R_A) ¹ $\text{cd}/\text{fc}/\text{ft}^2$ ($\text{cd}\cdot\text{lx}^{-1}\cdot\text{m}^2$) (Table 3 EN-12899 RA1)							
Observation Angle	Entrance Angle	White	Yellow	Blue	Green	Red	Brown
12' (0.2°)	-4°	70	50	4.0	9.0	14.5	1.0
	+30°	30	22	1.7	3.5	6.0	0.3
	+40°	10	7.0	0.5	1.5	2.0	
20' (0.33°)	-4°	50	35	2.0	7.0	10	0.6
	+30°	24	16	1.0	3.0	4.0	0.2
	+40°	9.0	6.0		1.2	1.8	
2°	-4°	5.0	3.0		0.5	1.0	
	+30°	2.5	1.5		0.3	0.5	
	+40°	1.5	1.0		0.2	0.5	

Table C

Daytime color specification limits (ASTM D4956)									
Colors	1		2		3		4		Luminance Factor Y
	x	y	x	y	x	y	x	y	
White	.303	.300	.368	.366	.340	.393	.274	.329	≥ 27
Yellow	.498	.412	.557	.442	.479	.520	.438	.472	15 to 45
Blue	.140	.035	.244	.21	.19	.255	.065	.216	1.0 to 10
Green	.026	.399	.166	.364	.286	.446	.207	.771	3.0 to 12
Red	.648	.351	.735	.265	.629	.281	.565	.346	2.5 to 15
Brown	.430	.340	.610	.390	.550	.450	.430	.390	1.0 to 9.0

Table D

Daytime color specification limits (EN-12899 CR2)									
Colors	1		2		3		4		Luminance Factor Y
	x	y	x	y	x	y	x	y	
White	.303	.300	.368	.366	.340	.393	.274	.329	≥ 35
Yellow	.494	.505	.470	.480	.493	.457	.522	.477	≥ 27
Blue	.130	.086	.160	.086	.160	.120	.130	.120	≥ 1
Green	.110	.415	.150	.415	.150	.455	.110	.455	≥ 4
Red	.735	.265	.700	.250	.610	.340	.660	.40	≥ 5
Brown	.455	.397	.523	.429	.479	.373	.558	.394	3 to 9



Table E

Daytime color specification limits (EN-12899 CR1)									
Colors	1		2		3		4		Luminance Factor Y
	x	y	x	y	x	y	x	y	
White	.355	.355	.305	.305	.285	.325	.335	.375	≥ 35
Yellow	.522	.477	.470	.440	.427	.483	.465	.534	≥ 27
Blue	.078	.171	.150	.220	.210	.160	.137	.038	≥ 1.0
Green	.007	.703	.248	.409	.177	.362	.026	.399	≥ 4.0
Red	.735	.265	.674	.236	.569	.341	.655	.345	≥ 5.0
Brown	.455	.397	.523	.429	.479	.373	.558	.394	3.0 to 9.0

Table F

Nighttime color specification limits (ASTM D4956)									
Colors	1		2		3		4		
	x	y	x	y	x	y	x	y	
White	.475	.452	.360	.415	.392	.370	.515	.409	
Yellow	.513	.487	.500	.470	.545	.425	.572	.425	
Blue	.033	.370	.180	.370	.230	.240	.091	.133	
Green	.007	.570	.200	.500	.322	.590	.193	.782	
Red	.650	.348	.620	.348	.712	.255	.735	.265	
Brown	.595	.405	.540	.405	.570	.365	.643	.355	

Converting

T-1000-A may be converted in signs using the following methods:

- Screen printing
- Direct apply
- Transparent cuttable overlay film
- Drum and flatbed sign-cut
- Steel rule sign-cut

Substrates

Avery Dennison T-1000 Series sheeting is limited to properly prepared substrates which differ by product. For T-15XX-A, application is limited to properly prepared aluminum. Users are urged to carefully evaluate, under actual use conditions, any sheeting application to other substrates. Failure caused by other substrates, materials, contamination, or improper surface preparation is not the responsibility of Avery Dennison. Please refer to Instructional Bulletins for full details of substrate requirements.

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 T-1000-A beaded reflective 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

This warranty shall be effective only if all of the following conditions are met:

Fabrication and/or installation must occur within one (1) year from the date of purchase.

The failure must have resulted solely from a manufacturing defect or deterioration of the Product due to natural causes under the Performance Warranty. Without limiting the generality of the foregoing, there is no warranty for the failure of the sheeting due to improper sign fabrication, storage, handling, installation, maintenance, failure of the sign substrate, vandalism or mischief. Slight color fading, cracking, chalking, edge lifting, or slight reduction in gloss or reflectivity will not materially detract from appearance and does not constitute a breach of warranty.

Avery Dennison has published instructional bulletins pertaining to the storage, handling, and cleaning of Product, approved substrates, and application procedures (collectively, the "Procedures"). The Product must have been processed and applied to blank, clean material in accordance with the Procedures, as such may be amended from time to time. Avery Dennison reserves the right to reject any warranty claim where the fabricator or installer cannot satisfactorily prove or demonstrate that the Avery Dennison procedures were utilized. The date of installation, warranty registration, and claim procedures established by Avery Dennison must be followed, and failure to follow such procedures shall void this warranty. Replacement Product carries only the unexpired warranty portion of the Product it replaces. The Product must be properly stored and applied within the shelf-life as stated in the applicable Avery Dennison Product Data Sheet including adhesive and other material product data sheets.

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.

