

Avery Dennison® V-9700RR Series

Conspicuity Tape for Railcar Delineation

ISSUED: OCT 2023

Overview

Avery Dennison® V-9700RR Series Conspicuity Tape is designed for railcars and locomotives for easy nighttime detection and recognition. It is a high-quality, durable, microprismatic retroreflective material with a pressure-sensitive adhesive. The solid construction does not require edge sealing.

Avery Dennison V-9700RR Series Conspicuity Tape increases the visibility of your rolling stock. This series is offered in yellow and carries the required FRA-224 certification. Available in 4" wide rolls as well as strips and kiss cut finishes. V-9700RR comes with an aggressive adhesive for low-temperature applications.

Availability

Series/Color	Durability* (years)
V-9701RR Yellow	10

*Vertical exposure only

Features

- Typical values are 2 times higher than required by specifications
- Low-temperature adhesive allows for application in cold weather situations
- Solid construction does not require edge sealing
- Provides exceptional all-distance viewing at dawn, dusk, and night
- Approval marks are protected against abrasion ensuring continual compliance
- Heavy duty adhesive allows users to apply at low temperatures
- Omni - Directional

Performance

North America	49 CFR 224.111
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Avery Dennison recommends the user obtain the current requirements from their local governing agency to ensure product conformance.

Characteristics

Construction	Acrylic Retroreflective Film with microprisms with a low temperature pressure-sensitive adhesive protected with polymeric film liner,
Typical Film Caliper (does not include liner)	12.5-14.5 mils (317-368 µm)
Application Surface	Metal & Painted Metal of railcars and locomotives
Min. Application Temperature	32° F (0° C)
Service Temperature	-22°F to +158°F (-30°C to + 70°C)
Gloss	100
Shelf-life	1 year from the date of purchase when stored at 65°–75°F (18°–24°C) 50% ± 5% R.H.

Watermark



Table A - Retroreflectivity (V-9700RR series exceeds all minimum coefficients of retroreflection values seen below)

Minimum Coefficient of Retroreflection (R _A) cd/ft ²		
Observation Angle	Entrance Angle	Yellow
0.2°	-4°	400
	30°	220
0.5	-4°	100
	30°	45

Table B

Daytime color specification limits (meets FRA-224 and ASTM D4956)										
Colors	1		2		3		4		Luminance Factor Y	
	x	y	x	y	x	y	x	y	Min	Max
Yellow	0.498	0.412	0.557	0.442	0.479	0.520	0.438	0.472	12	30

Table C - Other Testing

Test	Requirement	V-9700RR Typical Values
Dimensional Stability*	Less than 1/8" change on 9x9 panel	Pass
Flexibility* Wrap around 0.125" mandrel @ 32°F (0°C)	No Cracking	Pass
High Pressure Wash Test 45° angle, 1200 psi, 8 inch distance	No delamination, edge lift, cracking, or water penetration	Pass
Adhesion* 0.79kg 90° hanging weight	Less than 2" movement	Pass
Chemical Resistance SAE J 1967 Immersion in diesel fuel, xylene/mineral spirits mixture, TSP solution	No softening, dulling, color change, or adhesion loss	Pass
Corrosion Resistance ASTM B-117 5% salt spray for 1000 hours	No white corrosion, red rust, discoloration, delamination, flaking, checking, cracking, or blistering	Pass
Impact Resistance Room Temp* Falling dart with 10 in-lb force and 5/8" tip at room temperature	No damage outside impact area	Pass
Impact Resistance Cold Temp Falling dart with 10 in-lb force and 5/8" tip at -20°C	No damage outside impact area	Pass
Peel Adhesion PSTC-2 12in/min, 90° peel angle	Degreased Aluminum Substrate	4.9 lb/in (.88 kg/cm)
	Prepainted Panel Substrate	4.2 lb/in (.75 kg/cm)
	Stainless Steel Substrate	3.8 lb/in (.68 kg/cm)

*FRA-224 and ASTM D4956 Requirement

Where to Apply

Please check for any changes to local, state or Federal regulations that are relevant to Conspicuity Tape markings. For railroad freight cars, tank cars, flat cars, and locomotives, exemplary standards include section 106 from 49 CFR Part 224. Vertical or horizontal applications are described, including illustrations. The type of application required is dependent on the type of car.

Maintenance

Regular cleaning is recommended to ensure maximum performance for vehicle identification day and night. The following cleaning methods are recommended. A.) By hand with a sponge, cloth, or other non-abrasive media using mild detergent and water. B.) Pressure washed according to the following parameters: Maximum Pressure: 1200 psi Maximum wash temperature: 140°F Water jets must be a minimum of 12" from the Conspicuity Tape Spray water jets at an angle of 90° (±45°) from the surface Cleaning solution should have a pH of 3-11. Follow dilution ratios of cleaning solutions per manufacturer recommendations.



Finishes

- 4" x 50 yard Rolls
- Kiss Cut Rolls
- Pre-Cut Length Strips
- Custom Finishes

Substrates

The application of Avery Dennison V-9700RR is limited to properly prepared metal and painted metal substrates. Users are urged to carefully evaluate, under actual use conditions, any film application to other substrates. For painted surfaces follow the manufacturer's recommendations for drying and curing. 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 products are warranted to be free from defects in material and workmanship for one year from date of purchase. 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. Avery Dennison further warrants that Avery Dennison V-9700RR Series ("Products") will retain its effectiveness for its intended use ("Performance Warranty") as set forth in accordance with the following standards: PERFORMANCE WARRANTY: If within ten (10) years from the initial date of installation, the Product deteriorates due to natural causes to the extent that the Product is ineffective for its intended purpose when viewed from a moving vehicle under normal daytime or nighttime driving conditions, Avery Dennison will furnish a replacement amount of like Product at no cost to enable the installed surface to be restored to its original effectiveness.

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 fabrication, improper storage, handling, installation, maintenance, failure of the 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 hailstones or other acts of God, do not constitute a breach of warranty or give rise to any liability by Avery Dennison.

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.

