

Avery Dennison®

Substrate Requirements

Instructional Bulletin #8.01
Revised: March 2012

Introduction

The following standard practices are essential for the proper application of Avery Dennison retroreflective films. To utilize the full effective performance life of Avery Dennison retroreflective sheeting, properly prepared surfaces and application to approved materials must be used.

Users are urged to carefully evaluate, under actual use conditions, any sheeting application to such materials. Failure of sheeting caused by the substrate (such as thermal expansion, warpage, or surface contaminants) will void any sheeting warranty.

Testing for Surface Cleanliness

Before applying Avery Dennison Reflective Sheeting, the surface of the material must be totally free of any contamination, dust, residue, loose scale and, in particular, traces of oil, grease or wax. Sign blanks should be handled by the edges using clean cotton or canvas gloves.

To check the cleanliness of the substrate, two tests are available for guidance:

Tape Test — Press onto the surface a 3"- 5" length of common transparent self-adhesive tape. After several seconds, lift it off quickly at a right angle and inspect for evidence of transferred material or indications of a contaminated surface for metal substrates.

Water-Break Test — Very small traces of grease, oil or wax can be detected by pouring clean water onto the surface. On a clean surface, water tends to hold a uniform film. On a contaminated surface, the water beads up into many small droplets.

Solvent Wiping

Immediately prior to the application of the sheeting, it may be necessary to remove any greasy fingerprints or residue by solvent wiping the surface of the substrate:

1. Saturate a clean cloth with an alcohol based solvent, mineral spirits, or a similar commercial solvent. Be sure the solvent is absolutely clean. Continual use from the same solvent container can result in contamination.
2. Wipe the surface thoroughly, including areas near the edges where handling occurs.
3. With a dry, clean, lint-free cloth wipe the surface clean before the solvent evaporates.

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Surface Preparation

Many reasonably rigid, weather-resistant substrates having smooth, flat, clean surfaces will work satisfactorily for proper application. However, the specifically approved materials of choice are sheet and extrusion aluminum.

Sheet aluminum — Sheet aluminum (6061-T6 or 5052-H38) that has been thoroughly treated and properly prepared.

These materials fulfill the terms of the Avery Dennison warranty and are found to be the most reliable. Users are urged to carefully evaluate all other materials for their specific use.

Extrusion Aluminum — Extrusion Aluminum may be 6061-T6 or 5052-H38 alloys and must be properly prepared and chemically treated prior to the application of Avery Dennison Reflective Sheeting. This also applies to special sign extrusions (See Fig. 1).

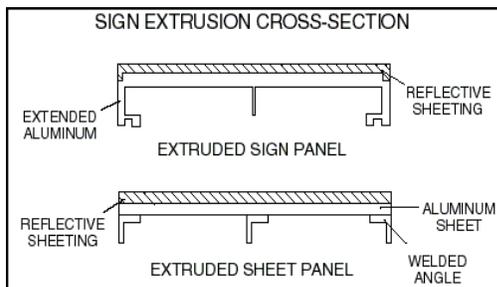


FIGURE 1

Generally users will obtain aluminum blanks from an experienced supplier who will treat them to a "degreased, etched and chromate conversion coated" specification. Use of an experienced, reliable source with quality treatment is strongly recommended.

1. **Degreasing** — Degreasing methods using an alkaline solution in a tank-type bath may be used. Contact the solution manufacturer for details regarding time, temperature, and concentration. Rinse thoroughly using a high pressure wash with clean water and allow to dry completely.
2. **Etching** — This process is performed using specially designed chemical conversion tanks and either an acidic or alkaline etch solution. Time, temperature, and concentration may vary depending on the type of solution. Contact the solution manufacturer for details. Always rinse thoroughly using a high pressure wash with clean water and allow to dry completely.

Chromate Conversion Coating — This type of coating is used to resist corrosion and aluminum oxide. It must be applied according to ASTM B449-67 specification. It should be a consistent weight (nominally 10-35 mg/sq ft.) and no darker than pale yellow. The coating should be well bonded to the metal and

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coherent within itself showing no dusting of the surface. For non-chrome conversion coatings the sign blanks must pass the requirements of ASTM D 3359. This requirement is similarly noted in ASTM B921.

Reclaimed Aluminum — The refurbishment of aluminum from old traffic control signs may be achieved by means of mechanical abrasion processes. The signs must first be flat and free of large indentations or surface damage. The aluminum must be treated as stated above.

Note: Be sure to follow all cautions and safety procedures in the use of any chemicals.

Galvanized Steel — Direct applications to galvanized steel that has been phosphate coated can be made. The surface must be smooth and free of scale and any type of rust. If necessary, degrease or solvent wipe the surface and rinse with clean water. Allow the blank to dry.

Galvanized Panel Preparation.

The test panel must be properly cleaned in order to achieve a consistent level of cleanliness and surface energy on each test panel. The following steps are strongly recommended to achieve good adhesion and consistent performance of adhesion.

Degrease the panel

- 1) Apply a liberal amount of Isopropanol and flood coat the galvanized substrate
- 2) Wait 10 to 15 seconds
- 3) Wipe the panel and remove the Isopropanol using a lint free wipe such as Kimwipes, from Kimberly Clark (http://www.kcprofessional.com/us/product-details.asp?prd_id=05514)

Clean the panel with 10% Citric Acid (Solution of 10% citric acid and water by weight)

- 4) Apply a liberal amount of 10% Citric Acid solution and flood coat the galvanized substrate.
- 5) Wait for 10 to 15 seconds
- 6) Wipe the panel and remove the Citric Acid using a lint free wipe such as Kimwipes.
- 7) Allow panel to completely dry before applying reflective sheeting.

Consult an Avery Dennison representative regarding the application of reflective films to other types of steel or finishes.

Plywood and Other Wood Products

Due to the inconsistencies in wood products, carefully evaluate, under actual use conditions, any sheeting application to such materials. Failure of the sheeting caused by the substrate is not covered by Avery Dennison warranty. It is not recommended to use wood for permanent traffic sign applications.

Overlaid Plywood — When using medium density overlaid plywood (MDO), the surface must be clean and free of release agents or other contaminants. Before application, abrade the surface with a fine grit sandpaper and wipe with a tack cloth to remove any foreign particles or residue. Seal all edges of the wood.

Other Substrates

The following are recommendations on other substrates. Because many of these products vary in composition and uniformity, users are urged to carefully evaluate each product for their intended use. Further, sign fabricators should consider evaluating each batch of substrates from their suppliers.

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Plastics

All plastics vary as to the manufacture because of the various types and composition (polyethylene, polypropylene, etc.) Some plastics contain migrating contaminants that will bloom to the surface during exposure and affect the adhesive bond. The use of processes such as solvent wipes, flame treatment and heat treating may help in achieving initial and maximum bond. Application to these substrates requires careful evaluation. Evaluate all plastic substrates under actual use conditions prior to large scale application. The following are only recommendations for using the various substrates. Check with an Avery Dennison representative for the warranty coverage on special applications.

Acrylics and ABS — Solvent wipe the surface with isopropyl alcohol before application.

Fiberglass and Polycarbonates — Sometimes outgassing may occur with these materials. Solvent wipe the surface with isopropyl alcohol before application. Apply a small piece of sheeting and allow it to bake at 150°F (65°C) for 24 hours. If bubbles appear under the sheeting, outgassing is occurring. It may be necessary to heat treat the panel prior to lamination.

Polyolefins — It is recommended these types of plastics be flame treated prior to use. Solvent wipe the surface with isopropyl alcohol before application. These products exhibit a range of thermal expansion, and the users are urged to test each product for its intended use.

Glass and Painted Surfaces — Due to the various surfaces encountered, evaluate these substrates under actual use conditions. Prior to application clean the surface with a non-abrasive cleaner. Rinse with clean water and thoroughly dry. Avoid painted surfaces that appear to have a chalky or waxy finish.

Other Materials — Application of Avery Dennison Reflective Sheeting can be made successfully to many materials but all substrates should be carefully evaluated before use.

Contact an Avery Dennison representative for further instructions on materials other than the ones listed in this bulletin.

The above Avery Dennison literature provides information to the user for proper application, storage, and other requirements. Please refer to Product Data Bulletins or your local Avery Dennison Representative for warranty information. Find the latest information on the Avery Dennison website, www.reflectives.averydennison.com. We encourage you to check our website periodically for updates.

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