

# Nazdar 3500 Series UV Curable Screen Ink Processing Specifications

Instructional Bulletin #3.30 (Revision 9)

Dated: 11/21/17

## 1.0 Substrates

Avery Dennison™ HV1100 & HV1200 reflective films; SC 900 cast films; HP700, PC500 calendered films; and some SF 100 specialty films are recommended with 3500 UV Durable Graphic Screen Ink and 3529 or 3539 clear coat only. Additionally, graphics digitally printed and identified as compatible with Nazdar 3529 or 3539 OverPrint Clear can be clear coated with this system. See the appropriate Product Data Sheet, or Instructional Bulletin for recommendations, or call your Avery Dennison Representative for further information. Always test your substrate prior to production.

## 2.0 Performance

The 3500 Series UV Screen Ink has been formulated specifically for outdoor applications on pressure sensitive vinyl. The 3500 Series exhibits exceptional flexibility, exterior durability, chemical resistance, and may be used on decals that will be thermocut, diecut, or premasked.

The 3500 Series is a one-part, 100% solids ultraviolet-curable screen ink that exhibits high gloss and moderate cure speeds. The 3500 Series comes in a range of Nazdar colors that includes; Blending Toner System, Halftone Colors, and Standard Printing Colors.

This ink is intended to work well straight from the container on a wide range of printing equipment. The 3500 Series does **not** contain N-Vinyl-2-Pyrrolidone (trade name, V-Pyrol®).

**Any questions or concerns regarding ink should be directed to your Nazdar or Avery Dennison Sales Professional.**

## 3.0 Color Availability

The selected 3500 UV Durable Graphic Ink colors listed below consist primarily of a wide range of excellent weathering toners, and are the only toners & colors approved for ICS warranted graphics.

Stock Number	Color
35159	Trans Orange
3529	Over-Print Clear
3539	Over-Print Clear

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Stock Number	Color
35160	Trans YS Red
35161	Primrose
35162	Yellow(GS)
35163	Yellow (RS)
35164	Medium Yellow
35165	Permanent Orange
35166	Red (YS)
35167	Deep Red
35168	Carmine
35169	Magenta
35170	Maroon
35171	Violet
35172	Green (YS)
35173	Green (BS)
35174	Blue (GS)
35175	Blue (RS)
3558	Tinting White
3559	Tinting Black
3536	Metallic Mixing Clear
3533	Permanent Yellow (RS)
35843	Permanent Red
35 HTY	HTY Halftone Yellow
35 HTM	HTM Halftone Magenta
35 HTC	Halftone Cyan
35 HTEX	Halftone Ext Base
35 HT BK	BK Halftone Black
RE305	UV Reducer
3567	Reflex Blue
3568	Process Blue
35176	Super Opaque White
35177	Super Opaque Black
35178	High Intensity White
35179	High Intensity Black

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Outdoor durability cannot be specified exactly. When 3500 series inks are printed at full strength, clear coated, properly processed and cured, a projected 5 year outdoor durability can be expected when facing south and mounted vertically under normal climate conditions. Variables during production (such as ink film thickness, completeness of cure, condition of substrate, etc.) and during exterior exposure (geographic location, directional orientation, air pollutants, etc.) will affect a printed part's durability. Slight color change and loss of gloss should be expected.

The following criteria will decrease outdoor durability or reduce warranty coverage.

- Adding mixing clear or white to any color.
- Mixing small quantities of several colors to achieve a specific color.
- Mixing a small quantity of any single color with any other color.
- Printing on print treated polyester or non-premium vinyl films.
- Using graphics on Transit-mix cement, or other trucks or trailers which are exposed to frequent cleaning with concentrated acids or aluminum brighteners.
- OEM Graphics.
- Where staining is a concern from excessive fuel or petroleum exposure.
- Staining from cleaning solutions, engine fuels, exhaust, or organic solvents.
- Mounting the decal at an angle or horizontally (i.e., on the back window or the hood of an automobile).
- Exposure to excessive abrasion (for example, brush car washes, excess washing, power washing with stiff brushes).

Please contact Nazdar Technical Service for questions regarding custom colors, or colors requiring metallic flakes.

#### 4.0 Application Information

<b>Mesh:</b>	355-390 PW (plain weave) monofilament polyester mesh. Other mesh sizes may be used after consultation with Avery Dennison or Nazdar Technical Support
<b>Stencil:</b>	A thin capillary film or photo emulsion.
<b>Squeegee:</b>	A sharp 80-90 Durometer Blade, or multiple durometer squeegee like 70/90, 70/90/70, 75/90/75.
<b>Coverage:</b>	2,500-3,500 Ft <sup>2</sup> /gal depending on mesh, squeegee, and press mechanics.
<b>Clearcoat Thickness:</b>	The clearcoat should be applied on digital graphics to provide a minimum of 8 microns and maximum of protection.
<b>Thinner:</b>	The viscosity may be reduced by adding 5% of 3530 thinner. Do not exceed 10% by weight.
<b>Mixing Clear:</b>	3536 mixing clear is used to reduce the density of colors.
<b>Reducer:</b>	Use RE 305 UV Reducer to reduce the viscosity of the ink. Do not use more than 10% by weights. It is recommended that inks are thoroughly mixed and acclimated to 65°- 90°FD (18°- 32°C) environment prior to reducing.
<b>Clean-Up:</b>	SW37 or IMS201 Universal Screen Wash.
<b>Packaging:</b>	Available in gallon containers.

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<b>Storage:</b>	These inks are reactive to light and temperature extremes For maximum shelf life, store ink at ambient temperatures of 60° to 90°F (15° to 32° C) in dark plastic containers out of direct sunlight.
<b>Ink Handling:</b>	Direct contact with the skin is the primary route of exposure and irritation with UV inks. Therefore, it is recommended that all personnel mixing and handling these products wear gloves and barrier cream to prevent direct skin contact. Safety glasses are suggested in areas where ink may be splashed. If ink does come in contact with skin, wipe ink off with a clean, dry absorbent cloth or rag (do not use solvent or reducer). Proceed to wash and rinse the affected area with soap and water. Consult the 3500 Material Safety Data Sheet for further instructions and warnings.

**5.0 Processing**

<b>Cure Parameters:</b>	The 3500 Series Inks are formulated to cure when exposed to a focused, medium pressure mercury vapor lamp at a belt speed to achieve 225 – 300 mJ/cm <sup>2</sup> and 600 mW/cm <sup>2</sup> for colors and metallics. For overprint clears a minimum of 275-350 mJ/cm <sup>2</sup> and 600 mW/cm <sup>2</sup> is required. This recommendation is based on using an EIT Uvicure Plus radiometer. Measuring the UVA spectrum. UV Inks can be affected by stray UV light in and around a printing facility resulting in the appearance of ink drying in the screen during the course of a long run. Be aware of skylights, windows, and overhead lights possibly curing the ink in the screen. Precautions include the use of light filters that block out the damaging wavelengths.
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<b>Adhesion Testing:</b>	Even though the above UV energy output levels are recommended, this is not the criteria to be used to determining proper cure and adhesion. It is imperative to check adhesion on a <b>cooled down</b> print by checking: 1 - Touch of ink surface – The 3500 will be smooth and soft. 2 - Thumb twist – The ink surface will not mar or smudge. 3 - Scratch surface – The 3500 will resist scratching when cool. Some soft vinyls scratch easily, so use magnification to determine if scratches are ink only, or ink and the top layer of vinyl. 4 -Cross hatch tape test - Use a cross hatch tool, or a sharp knife to cut through ink film only, then apply 3M #600 clear tape on cut area, rub down, allow to set for 60 seconds and remove the tape by pulling it back on itself at a 180 degree angle. Ink should only come off in actual cut areas.
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<b>Four-Color Process:</b>	3500 UV process inks are available in the three primary subtractive colors plus black used in four-color reproduction. These colors are balanced for shade and density to match the SWOP (Specifications Web Offset Publication) standards. The densities are formulated between 10-15% higher than SWOP standards through a normal 390 plain weave mesh. When it is necessary to reduce density, simply add 35 HTEX extender base. Densities will vary with densitometer types. The average
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	densities printed from the container should be approximately: yellow-0.9, magenta - 1.4, Cyan - 1.3, and black - 1.4.
<b>Overprint:</b>	3529 or 3539 overprint clear exhibits excellent mar resistance, long-term gloss retention, and resistance to gasoline and most household cleaners. 3529 or 3539 overprint clear is required for warranty applications.
<b>Printing:</b>	3500 Inks are formulated to print from the container with excellent flow characteristics. If the need arises to reduce the viscosity, add 2-5% of RE 305 UV Reducer. Do not exceed 10% by weight. The use of a mixer is recommended to thoroughly mix inks prior to printing. Inks will maintain optimum print and cure performance when the ink temperature is 65°-90°F (18°-32° C). Temperatures below 65°F (18° C) will increase the ink viscosity, impairing both flow and cure. Elevated temperatures will lower the ink viscosity, reducing print definition, film thickness, and opacity. When the ink is cold, it is best to mix the ink with a high-speed mixer until it returns to the proper temperature, 65°- 90° F (18°- 32° C). Add reducer at this point if necessary.
<b>Post Finishing:</b>	To assure optimum performance, with relation to die cutting, pre-masking or chemical resistance, allow 4-8 hours for the ink and substrate to stabilize after curing.
<b>Pre-Masking:</b>	To assure optimum performance with pre-mask tapes on the 3500 UV series, it is important to evaluate specific pre-masks as well as application methods used in production. Recommended: R-Tape 4760 and American Biltrite 6882.

### 5.1 Intercoat Adhesion Test

1. Add up the number of ink colors to be printed onto the decal, including any clear coat. Add one to this number.
1. Print the first color and pass the printed sheet through the curing unit the number of times calculated in Step 1 (allow the sheet to cool to room temperature between passes).
2. Print a second layer of ink onto the first print and pass it through the curing unit.
3. Perform the adhesion test (as outlined above).
4. If improper adhesion occurs, then reduce the energy output of the UV curing unit and repeat the intercoat adhesion test.
5. If the results are acceptable, then begin production.
6. Repeat the adhesion test and intercoat adhesion test for all colors printed on the decal.

### 6.0 Troubleshooting

<b>If The Ink Is Not Curing:</b>	<ul style="list-style-type: none"> <li>● Check for proper use of mesh.</li> <li>● Check squeegee pressure, angle and sharpness. Too much pressure or a dull squeegee will significantly affect film thickness and cure.</li> <li>● Check UV unit for adequate UV output.</li> </ul>
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	<ul style="list-style-type: none"> <li>• Color too opaque for UV light to penetrate, usually noted when a color match requires the use of opaque white or black. Reduce the opaque color with the addition of mixing clear until effective cure is obtained.</li> </ul>
<b>Poor Adhesion:</b>	<ul style="list-style-type: none"> <li>• Excess ink deposit resulting in inadequate cure.</li> <li>• Surface contamination on substrate. Wipe a section of the substrate with Isopropyl Alcohol prior to printing.</li> <li>• Try another type or batch of substrate.</li> </ul>

## 7.0 Quality Control in Processing

Nazdar and Avery Dennison™ require using the 3500 UV series processing guide which covers the quality control steps for processing.

NOTE: The 3500UV series has been formulated to render exceptional performance on selected Avery Dennison™ materials. However, due to possible batch-to-batch variability, a thorough test relative to all performance characteristics should be conducted prior to every production run.

Revisions have been italicized.

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