

3500 Series UV Durable Graphic Screen Ink

Code Ref: 496

technical information and application instructions

Substrates	Premium pressure sensitive vinyls intended for exterior applications.
End Uses	Highly flexible and durable pressure sensitive decals for Fleet and Original Equipment Manufacture (OEM).

Product Information

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 thermal diecut and premasked.

The 3500 Series is a one part, 100% solids UV-curable screen printing ink that exhibits high gloss and moderate cure speeds.

The 3500 Series 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®).

Application Information

Mesh	140-150T Monofilament polyester mesh is recommended for most applications. 120-165T Monofilament polyester can be used for specialty applications.
Stencil	Direct emulsions and thin capillary films that are solvent resistant, UV ink compatible, and yield a thin ink deposit will work best.
Squeegee	Sharp 70-90 single durometer polyurethane blades as well as multi-durometer blades that produce an even, thin ink deposit will work best.
Coverage	60-100 Square meters/kilo depending upon ink deposit.
Reducer	D564-S082 UV Reducer is to be used to reduce the viscosity of these inks by adding no more than 5% by weight. It is recommended that these inks be thoroughly mixed, and acclimatised to an 18°C-30°C environment prior to reducing.
Mixing Clear	Mixing Clear is used to reduce the density of colours, or as a clear base for metallic powders (refer to Metallic Colours mixing Guidelines later in this TDS). In process colours use Process Medium to maintain structure.
Clean Up	Use Special UV Screen Wash D574-S016.

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Storage These inks are reactive to light and temperature extremes. Store in a clean area below 35°C sealed tightly in dark plastic containers out of direct sunlight. For maximum shelf life, store ink in ambient temperatures of 15°C to 30°C. Ink taken from the press should not be returned to the original container; store separately to avoid contaminating unused ink.

Shelf life is 2 years from date of manufacture.

General Guidelines

Ink Handling 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 MSDS for further instructions and warnings.

Printing 3500 Series Inks are formulated to print from the container with excellent flow characteristics. If the need arises to reduce the viscosity, add 2-5% of D564-S082 UV Reducer. 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 18°C - 30°C. Temperatures below 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, 18°C - 30°C. Add reducer at this point if necessary.

Cure Parameters The 3500 Series Inks are formulated to cure when exposed to a focused, medium pressure mercury vapour lamp at a belt speed to achieve:-

225-300 mJ/cm² and 600 mW/cm² for colours and metallics.

For overprint clear 275-350 mJ/cm² and 600 mW/cm² is required.

This recommendation is based on using 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.

If ink is left on the screen while not printing (lunch breaks etc.) it is advisable to cover with black plastic sheeting.

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Adhesion Testing

Even though the above UV energy output levels are recommended, this is not the criteria to be used to determine proper cure and adhesion. It is imperative to check adhesion on a cooled down print by checking:

1. **Touch of ink surface** – The 3500 ink will be smooth and slick.
2. **Thumb twist** – The ink surface will not mar or smudge.
3. **Scratch surface** – The 3500 ink 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 a cut area, rub down, wait for 1 minute and rip off using 180 degree pull. Ink should only come off in actual cut areas.

Full adhesion characteristics will be demonstrated within 4 hours after cure.

Warning: Multilayer Printing

UV ink by its nature becomes brittle and inflexible when printed in multiple layers, and after multiple and repeated exposure to curing lamps. This will manifest itself most noticeably when printing onto flexible substrate, where more than 2 to 3 layers of ink are printed on top of each other.

This problem is also more frequently found on highly plasticized substrates where it is possible that some plasticizer has migrated to the surface and this can give a weak ink bond. Unfortunately this failure of adhesion may only become apparent several days after printing.

We must therefore emphasise the importance of testing both a new print construction and new supplies of substrate.

Outdoor Durability

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 north and mounted vertically under normal climate conditions. Variables during productions (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 colour change and loss of gloss should be expected.

Fluorescent colours fade with exposure to ultraviolet light. This includes outdoor exposure as well as UV reactor exposure. Due to the instability of fluorescent pigments, GL can make no warranty for the outdoor durability of these colours.

The following will decrease outdoor durability –

- Adding mixing clear or white to any colour.
- Mixing small quantities of several colours to achieve a specific colour.
- Mixing a small quantity of any single colour with any other colour.

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- Printing on a print treated polyester or non-premium vinyl films.
- Mounting the decal at an angle or horizontally (i.e. on the back window or the hood of an automobile).
- Exposure to excessive abrasion (e.g. brush car washes).

Colour Availability For the US market NAZDAR has a range of PMS matching colours available, as well as a selection of popular spot colours, 2 or more ranges of Process Colours and a range of single pigment toners.

The demands of the SA market are very different and at GL we hold stocks of the Process Colours and a small selection of popular corporate colours. All other colours are quickly blended in our factories to customer specific requirements.

Matching Off White or Pastel Colours

The matching of durable pastel colours in the red or yellow shades requires the specific use of very lightfast pigmented inks. Contact your local GL representative to discuss your needs so we can formulate correctly.

Metallic Colours Recommended meshes for printing metallics are 120-140T plain weave monofilament polyester. Mix only enough metallic ink to be used the same day – Chemical reactions in metallic inks may result in viscosity, colour and printability changes over time.

Check curing – Metallic colours are possibly more difficult to cure.

When inks are to be printed over a metallic colour, the overprinting ink(s) must be evaluated for intercoat adhesion over the metallic colour before proceeding with the production run. To maximize intercoat adhesion over metallic colours, we recommend that the metallic be printed as late as possible in the print sequence.

Recommended ratios: Metallic Powders

Silvers (aluminium) 8% by weight – 80gms powder to 1kg Clear

Gold (bronze) 15% by weight – 150grms powder to 1kg Clear

Finishing 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.

Premasking It is important to evaluate the ink with specific pre-masks as well as application methods prior to using in production. The use of a medium to high tack adhesive is recommended for most application methods.

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Troubleshooting Guide:

Ink Not Curing

Check for proper mesh count.

Check squeegee pressure, angle and sharpness. Too much pressure or a dull edge blade will significantly affect ink film thickness and cure.

Check UV unit for effective millijoules and milliwatts (UV output). Ensure the reflectors are clean and shiny bright silver.

Colour may be too opaque for UV light to penetrate. This can occur when a colour match requires the use of opaque white or black. Reduce the opaque colour with the addition of Mixing Clear until effective cure is obtained.

Poor Adhesion

Excess ink deposit causing poor through-cure.

Surface contamination on substrate. Wipe a section of the substrate with isopropyl alcohol prior to print, and check adhesion.

Try another type or batch of substrate.

Insufficient cure. Check UV unit for effective millijoules and milliwatts (UV output). Ensure the reflectors are clean and shiny bright silver.

Note

The 3500 Series has been formulated to render exceptional performance on pressure sensitive vinyls; however, due to variables in the chemical make-up of vinyls and batch to batch variation, a thorough test relative to all performance characteristics should be conducted prior to production printing. For further assistance please call GL SPECIALIZED INKS: +27 (0)31 7006455

caution

Please proof this ink, reduced to the consistency you wish to adopt, on a sample of the ACTUAL SUBSTRATE you will be printing BEFORE starting a production run.

Give the proof 4 hours to post cure then check for: Abrasion resistance, adhesion, print appearance and correctness of colour. The adequacy of this ink in these properties cannot be fully established on laboratory equipment on a small scale.

Based on information from our raw material suppliers, these products are formulated to contain less than 0.06% lead. If exact heavy metal content is required, independent lab analysis is recommended.

GL stands behind the quality of this product. GL cannot, however, guarantee the finished results because GL exercises no control over individual operating conditions and production procedures. While technical information and advice on the use of this product is provided in good faith, the User bears sole responsibility for selecting the appropriate product for their end-use requirements. Users are also responsible for testing to determine that our product will perform as expected during the printed item's entire life-cycle from printing, post-print processing, and shipment to end-use. This product has been specially formulated for screen printing, and it has not been tested for application by any other method. Any liability associated with the use of this product is limited to the value of the product purchased from GL.

Last date amended: 11th July 2014