Technical Data Sheet

# Nazdar 4000 UV Screen Ink Series

**Graphic / POP**

v 11 EN

Ref: v 10 EN

**4000 Series UV Screen Ink is a unique multi-purpose graphic screen printing ink formulated to adhere to a wide range of substrates and provide the flexibility to be suitable for heat-bending, router cutting, and low draw thermoforming for the sign and graphics markets**

## Substrates

- Acrylic
- PETG
- Styrene
- Polycarbonate
- Most rigid and flexible vinyl
- Static cling vinyl
- Some anodized metal
- Rigid and flexible treated polyethylene
- Rigid and flexible treated polypropylene
- Treated fluted polypropylene

*The surface tension for* polyethylene *and* polypropylene *substrates should be at or above 44 dynes/cm.*

*Substrate recommendations are based on commonly available materials intended for the ink's specific market when the inks are processed according to this technical data. 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. Reference the 'Quality Statement' at the end of this document.*

## User Information

### Mesh

355-420 tpi (140-165 tpcm) with a mesh opening of 22-38 um monofilament polyester mesh for most applications.

305-355 tpi (120-140 tpcm) monofilament polyester mesh can be used for specialty applications with the mesh opening appropriate to the effect *(i.e. pearlescents, aluminums, etc.).*

Coarser mesh counts and/or twill weave result in heavier ink deposit requiring additional cure output.

### Stencil

Use direct emulsions and capillary films which are solvent resistant and UV compatible.

### Squeegee

70-90 durometer polyurethane squeegee.

### Coverage

Estimated 3,200 – 4,200 square feet (295 - 390 square meters) per gallon depending upon ink deposit. Reference www.nazdar.com for examples of coverage calculations.

### Printing

4000 Series is formulated to be press ready. Thoroughly mix the ink prior to printing. Improper mixing can lead to inconsistent color and ink performance.

Maintain ink temperature at 65°-90°F (18°-32°C) for optimum print and cure performance. Lower temperatures increase the ink viscosity, impairing flow and increasing film thickness. Elevated temperatures lower the ink viscosity, reducing print definition and film thickness.

Pretest to determine optimum printing parameters for a particular set of ink, substrate, screen, press, and curing variables/conditions.

The ink can be affected by stray UV light. Be aware of skylights, windows and overhead lights curing the ink in the screen; light filters are recommended. Leaving a container uncovered may result in the ink's surface forming a "skin", caused by reaction with ambient lighting. Keep containers covered.

Nazdar does not recommend inter-mixing of 4000 Series with other inks besides the 4000 Series.

### Pad Printing

4000 Series can be pad printed. When pad printing with a UV ink on a 3D image, care must be taken to assure the correct amount of UV light output reaches the entire ink surface. Cure units that rotate the printed part in front of the cure lamp are the best solution for UV pad printing.

Use a silicone pad with good chemical resistance for printing. Clean equipment using the chemicals listed below in the cleanup section.

### Cure Parameters

4000 Series cures when exposed to a single medium pressure mercury vapor lamp emitting output millijoules (mJ) and milliwatts (mW) of:

100-180 mJ/cm² @ 600+ mW/cm²
*for most colors*

UV Screen Ink

180+ mJ/cm² @ 600+ mW/cm²
*for 4078, 4079, 4050, 4099, 40111, 40112, 40113, 40114, 40134, 40154, 40156*

When 2 lamps are used for curing a color, the first lamp should provide the required level of output. Additional output may be required when printing over a dark or colored background.

These guidelines are intended only as a starting point for determining cure parameters, which must be determined under actual production conditions. "Undercuring" the ink may result in poor adhesion, lower block resistance, reduced durability, and higher residual odor. "Overcuring" the ink may reduce the flexibility of the printed part and adhesion of subsequent ink layers.

To increase mJ levels, slow down the belt speed or scan speed. To increase mW levels, increase the wattage setting of the UV reactor. To optimize mJ and mW output, maintain the bulb and reflector, and ensure proper focus to the substrate.

These guidelines are representative of measurements taken using an EIT® UVICURE® Plus radiometer measuring the UVA bandwidth (320-390 nm). To obtain accurate mW readings with the UVICURE® Plus, reduce the belt speed to less than 40 ft/min.

## Clears / Varnishes

*Mixing Clear:* Use 4026 Mixing Clear to reduce the density of colors.

*Overprint Clear:*

Use 4027 Overprint Clear to provide added surface protection.

Use 4029 Premium Overprint Clear in place of 4027 Overprint Clear when maximum outdoor durability is needed.

## Common Performance Additives

The market specific performance properties of the 4000 Series should be acceptable for most applications without the need for additives. When required, any additives should be thoroughly mixed before each use. Prior to production, test any additive adjustment to the ink. Inks containing additives should not be mixed with other inks.

Example for additives: Ink at 100g with 8% of an additive is calculated as:
100g ink + 8g additive = 108g total

*Reducer:* Use RE315 UV Reducer to reduce the viscosity of these inks. Add up to 10% by weight. Over reduction can reduce print definition, film thickness and adversely affect cure.

*Reducer/Hardener:* Use CARE58 Fast Rigid Thinner to reduce the viscosity and increase the surface hardness of these inks. Add up to 5% by weight. Addition of Care58 may reduce the formability and flexibility of 4000 Series.

*Increase Block Resistance:* Use CARE63 Anti-Blocking Additive to increase the blocking resistance of these inks. Add up to 5% by weight. Addition of Care63 may reduce the formability and flexibility of 4000 Series. Addition of Care63 will lower the gloss level of these inks.

*Adhesion Promoter:* Use NB80 UV Adhesion Promoter to enhance adhesion to aged or lower grade substrates. Add up to 5% by weight. Improved adhesion will be demonstrated within 8-24 hours, with full cross linking in 4-7 days. Ink mixed with NB80 UV Adhesion Promoter has a 4-8 hour pot life.

## Cleanup

*Screen Wash (Prior to Reclaim):* Use IMS201 Premium Graphic Screen Wash, IMS203 Economy Graphic Screen Wash, or IMS206 Graphic Auto Screen Wash.

*Press Wash (On Press):* Use IMS301 Premium Graphic Press Wash.

## Storage / Shelf Life

Store closed containers at temperatures between 65°-78°F (18°-25°C). Storing products outside of these recommendations may shorten their shelf life. Ink taken from the press should not be returned to the original container; store separately to avoid contaminating unused ink.

Standard 4000 Series items supplied 1 gallon (4/5 kilo) containers or smaller are useable for a period of at least 24 months from the date of manufacture. Inks packaged in 5 gallon or greater (20 kilo or greater) containers may have a significantly reduced shelf life. To obtain the official shelf life letter, Contact Nazdar Technical

Service at InkAnswers@nazdar.com or see contact listing at the end of this document.

### Processing

4000 Series has been formulated to provide a mar resistant ink surface after UV curing. Exposure to additional high heat levels increases the level of gouging or scratch resistance.

*Stacking:* suitable for immediate stacking ink to substrate. Block resistance is influenced by the degree of cure, the weight of the substrates when stacked, and the heat and humidity of the printing environment. Although surface hardness of the cured ink film has been optimized for handling, the printer must assume responsibility for pre-testing and qualifying the parameters for stacking prints prior to each production run.

*Cutting:* suitable for die-cutting, router cutting, guillotine cutting, and laser cutting.

*Heat Bending:* suitable for heat bending at a 180° angle, inward and outward. Areas exposed to high heat may exhibit a harder ink surface.

*Thermoforming / Drape Forming:* suitable for 3-4" (8-10 cm) thermoforming draw and drape forming.

*Use with pre-mask:* not suitable for most applications. The printer is responsible to pre-test prior to full production printing.

*Use with adhesives:* not recommended for use with most adhesives. Some non-aggressive screen printable adhesives have shown to be compatible in limited applications. The printer is responsible to pre-test prior to full production printing.

## General Information

### Ink Handling

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 cloth (do not use solvent or reducer). Wash the affected area with soap and water. Consult the applicable Safety Data Sheet (SDS / MSDS) for further instructions and warnings.

This ink series is a one-part, 100% solids UV-curable screen printing ink and does not contain N-vinyl-2-pyrrolidone (trade name V-Pyrol®).

For assistance on a wide range of important regulatory issues, consult the following Regulatory Compliance Department link at http://www.nazdar.com or contact Nazdar Ink Technologies - World Headquarters (see contact listing at the end of this document).

### Adhesion Testing

Even when recommended UV energy output levels are achieved, it is imperative to check the degree of cure on a **cooled down** print:

1. Thumb twist – the ink surface should not mar or smudge.
2. Scratch surface – the ink surface should resist scratching.
3. Cross hatch tape test – per the ASTM D-3359 method, 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, and rip off at a 180 degree angle. Ink should only come off in actual cut areas.

### Weathering / Outdoor Durability

At full strength and properly cured, 4000 Series colors are formulated to provide an estimated 2-3 years outdoor durability when mounted vertically in the Central U.S.A. (See color exceptions below).
Use 4027 Overprint Clear to extend the outdoor durability approximately 6-12 months.
Use 4029 Premium Overprint Clear to extend the outdoor durability approximately 18-24 months.
(A chart rating estimated durability per color with and without overprint clears is available by request through technical service)

Outdoor durability cannot be specified exactly. Some color change and loss of gloss should be expected. Variables affecting a printed part's durability include:

- Ink film thickness and degree of curing
- Color formulation:
  - Adding large amounts of mixing clear or white to any color
  - Mixing several colors to achieve a specific color
  - Mixing a small quantity of any single color with any other color
- Substrate type and age, the substrate by itself should provide the required durability
- Mounting angle or directional orientation
- Geographical location
- Air pollution and exposure to excessive abrasion

(for example, brush car washes)
- Non-clear coated prints exhibit more color change and loss of gloss

*Exceptions:* White, grey or beige colors tend to chalk in approximately 2 years, it is always recommended to use an overprint clear such as 4027 or 4029 when printing these colors for outdoor durability.
40EC122 to 40EC153 (all economy halftones) have an estimated 3-6 months outdoor durability without an overprint clear and 6-12 months using 4029 Premium Overprint Clear.
4019 Fire Red, 4020 Brilliant Orange, 40362 Warm Red, and 40155 Halftone Yellow Dense RS (MTR) have an estimated 2 years outdoor durability without an overprint clear and 3 years using 4029 Premium Overprint Clear.

Special mixed metallic silver colors using Nazdar approved aluminum or pearlescent pigments and overprinted with 4029 Premium Overprint Clear have a projected 3-4 year outdoor durability.

Special mixed metallic colors using gold or bronze metallic pigments are not recommended for outdoor durability as these powders tarnish within 6 months, even when overprinted with a clear. To achieve more durable gold and bronze colors use aluminum or pearlescent pigments in blends overprinted with 4029 Premium Overprint Clear.

## Manufacturer's Product Offering

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

### Halftone Colors

*Halftone Extender Base* is used to reduce the density of any of the halftone colors.

*Standard Halftone Colors* are formulated with hues and densities common to the graphic industry.

*Dense Halftone Colors* are formulated with increased densities over the Standard Halftone colors and are designed for printers who want to have the latitude to adjust the density levels.

*Yellow Dense (RS) Halftone* is intended to better facilitate matching redder shades without blending Halftone Magenta into the Halftone Yellow.

*High Intensity Halftone Black* has been developed to function as a dense halftone and line color in a single pass.

*Low Tack Rheology (LTR) Halftones* can achieve the fastest processing speeds on newer in-line presses and cylinder presses while maintaining dot quality with very minimum dot pile.

*Medium Tack Rheology (MTR)* Halftones can achieve processing speeds for flatbed, clam shell and most in-line presses while maintaining dot quality.

### Backlit Halftones

Backlit Halftones have been specially formulated with high color saturation to provide intense color when finished prints are backlit. Backlit Halftones require a higher level of UV output to cure properly.

### Standard Printing Colors

Standard Printing Colors have excellent opacity and flow characteristics. These colors are intended to work as supplied.

### Barrier Colors

4050 Barrier White and 4099 Barrier Black provide the highest level of opacity of any of the 4000 Series black or white items. These colors are intended to work as supplied.

### Pantone Matching System® Base Colors

Pantone Matching System Base Colors are used to simulate the Pantone® Formulation Guide. These inks are press ready, can be used in matches to achieve Pantone color simulations, or let down with mixing clear. ColorStar® Color Management System software uses Pantone Matching System Base Colors to match Pantone colors. Blend formulations are also available at www.nazdar.com using ColorStar On-Line.

*360 Series Colors:* 40360-40369 colors are formulated to have no white or opaque pigments. This allows the colors to be more vibrant and allows for a better match of intense and darker colors.

## Pantone 871c-877c Metallic Simulated Colors

Pantone® 871c to 877c colors have been matched in 4000 Series ink using pearlescent pigments. When printed on a white background, a gold or silver metallic effect is achieved. A 305 tpi (120 tpcm) mesh with a mesh opening of 50 um or more is recommended.

## Special Effect Pigments

When inks are to be printed with a special effect color, all ink layers must be evaluated for intercoat adhesion before proceeding with the production run. To maximize intercoat adhesion, specialty colors should be printed as late as possible in the print sequence.

Pigments may settle in the container; prior to printing, thoroughly mix the ink.

The following special effect pigments may be added to 4000 Series. Contact Nazdar for the item number(s) and availability of special effect products. Technical Data Sheets for each of the following special effect pigments can be found at www.nazdar.com.

*Metallic Silver (aluminum):* Add up to 8% by weight.

*Metallic Gold (bronze):* Add up to 15% by weight.

Chemical reactions in metallic inks may result in viscosity, color and printability changes over time; due to this, mix only enough metallic ink to be used the same day.

*Pearlescent / Interference:* Add up to 20% by weight.

*Multi-Chromatic*: Add up to 10% by weight.

*Phosphorescent:* Add up to 30% by weight.

*Fluorescents:* Add up to 30% by weight. Fluorescent colors fade quickly with exposure to ultraviolet light. This includes outdoor exposure as well as UV reactor exposure.

## Color Card Materials

The following is a list of available screen printed sample literature representing 4000 Series.

*UV Color Card (CARDUV):* shows the Standard Printing Colors, Pantone Matching System Base Colors, and Halftone Colors.

*Special Effects Color Card (CARDSPL):* shows various special effect pigments mixed with clear.

*Non-Metallic Pantone Simulations sheet (LIT0121):* shows the 871c to 877c Pantone metallic color matches using pearlescent pigments.

# Packaging / Availability

Contact your Nazdar distributor for product availability and offering.

## Standard Ink Items

Standard ink items listed below are inventoried in gallon containers.

MTR Standard / Dense Halftone Colors
*(Medium Tack Rheology)*

| Item Number | Color |
|---|---|
| **40140** | Halftone Extender Base |
| **40141** | Halftone Cyan |
| **40142** | Halftone Magenta |
| **40143** | Halftone Yellow |
| **40144** | Halftone Black |
| **40151** | Halftone Cyan Dense |
| **40152** | Halftone Magenta Dense |
| **40153** | Halftone Yellow Dense |
| **40154** | Halftone Black Dense |
| **40156** | High Intensity Halftone Black |

Standard Printing Colors

| Item Number | Color |
|---|---|
| **4019** | Fire Red |
| **4026** | Mixing Clear |
| **4027** | Overprint Clear |
| **4029** | Premium Overprint Clear |
| **4052** | Super Opaque Black |
| **4075** | Super Opaque White |
| **4078** | High Intensity White |
| **4079** | High Intensity Black |

Barrier Colors

| Item Number | Color |
|---|---|
| **4050** | Barrier White |
| **4099** | Barrier Black |

Pantone Matching System® Base Colors

| Item Number | Color |
|---|---|
| **40358** | Tinting White |
| **40359** | Tinting Black |
| **40360** | Orange |
| **40361** | Yellow |

| | |
|---|---|
| **40362** | Warm Red |
| **40363** | Rubine Red |
| **40364** | Rhodamine Red |
| **40365** | Purple |
| **40366** | Violet |
| **40367** | Reflex Blue |
| **40368** | Process Blue |
| **40369** | Green |

## Non-Standard Ink Items

Non-Standard ink items listed below are special order, non-inventoried colors which may require additional lead time. These items are available in gallon containers.

Printing Colors

| Item Number | Color |
|---|---|
| **4010** | Primrose Yellow |
| **4011** | Lemon Yellow |
| **4012** | Medium Yellow |
| **4013** | Emerald Green |
| **4020** | Brilliant Orange |
| **4067** | Reflex Blue |
| **4068** | Process Blue |

Backlit Halftone Colors

| Item Number | Color |
|---|---|
| **40111** | Halftone Backlit Cyan |
| **40112** | Halftone Backlit Magenta |
| **40113** | Halftone Backlit Yellow |
| **40114** | Halftone Backlit Black |

LTR Standard / Dense Halftone Colors
*(Low Tack Rheology)*

| Item Number | Color |
|---|---|
| **40120** | Halftone Extender Base |
| **40121** | Halftone Cyan |
| **40122** | Halftone Magenta |
| **40123** | Halftone Yellow |
| **40124** | Halftone Black |
| **40131** | Halftone Cyan Dense |
| **40132** | Halftone Magenta Dense |
| **40133** | Halftone Yellow Dense |
| **40134** | Halftone Black Dense |

MTR Standard / Dense Halftone Colors
*(Medium Tack Rheology)*

| Item Number | Color |
|---|---|
| **40155** | Halftone Yellow Dense (RS) |

Pantone 871c-877c Metallic Simulated Colors

| Item Number | Color |
|---|---|
| **6002752640** | SPL 40 871C Pearl Gold |
| **6002752740** | SPL 40 872C Pearl Gold |
| **6002752840** | SPL 40 873C Pearl Gold |
| **6002752940** | SPL 40 874C Pearl Gold |
| **6002753040** | SPL 40 875C Pearl Gold |
| **6002753140** | SPL 40 876C Pearl Gold |
| **6002753240** | SPL 40 877C Pearl Silver |

## Additives / Reducers

| Item Number | Item Description |
|---|---|
| **CARE58** | Rigid Fast Thinner |
| **CARE63** | Anti-Blocking Additive |
| **RE315** | UV Reducer |
| **NB80** | UV Adhesion Promoter |

## Cleaners / Clean Up

| Item Number | Item Description |
|---|---|
| **IMS201** | Premium Graphic Screen Wash |
| **IMS203** | Economy Graphic Screen Wash |
| **IMS206** | Graphic Auto Screen Wash |
| **IMS301** | Premium Graphic Press Wash |

## Nazdar Quality Statement

*Nazdar® stands behind the quality of this product. Nazdar® cannot, however, guarantee the finished results because Nazdar® 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 Nazdar®.*

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UV Screen Ink

# Nazdar 4000 UV Screen Ink Series

## Graphic / POP

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