



Graphic Overlay

Technical Data Sheet

TECHMARK GSO

UV Curable Ink for Graphic Overlays, Membrane Switches, and In-Mold Printing

Features

- V-Pyrol Free
- Optimized Cure Rates for All Colors and Floods
- Excellent Opacity / Bright Clean Colors
- Superior Intercoat / Multi-Pass Adhesion Properties
- Resistant to Common Laminating Adhesives
- Extremely Flexible for Embossing and Die Cutting Properties
- Can Be Used for In-Mold Decorating Applications with Barrier Adhesive

Thinning

It is absolutely essential to thoroughly stir the ink completely before use. We recommend stirring the ink for three to five minutes using a high-speed agitation device. Techmark GSO is designed to be press ready. If thinning is required, the ink should be thinned 5% to 10% by weight using GSO-TH thinner. It is recommended that thinner be added in 1% increments until desired viscosity is achieved.

Mesh and Squeegee

Techmark GSO is recommended to be used with 355 – 390 count mesh made with low elongation monofilament polyester (120 to 150/cm). The ideal squeegee durometers are from 70 to 85 and resistant to UV inks.

Stencils

Stencil materials must be solvent resistant and produce a thin film stencil (3-6 microns over mesh).

Cure Parameters

With Mercury Vapor Lamp:

The GSO-381 and GSO 382 require the lowest dosage of all the GSO inks and should receive a minimum of between 175 and 225 mJ/cm² in the 320-390nm range (A band) using one 200-watt mercury vapor lamp. The irradiance at this cure level should be approximately 500 mW/cm².

The 009 Dense Black and 312 Super Opaque White require the highest dosage of all the GSO inks and should receive a minimum of between 330 and 380 mJ/cm² in the 320-390nm range (A band) using one 300-watt mercury vapor lamp. The irradiance at this cure level should be approximately 650 mW/cm².

All other GSO colors require a minimum of between 280 and 330 mJ/cm² in the 320-390nm range (A band) using one 200-watt mercury vapor lamp. The irradiance at this cure level should be approximately 650 mW/cm².

For improved cure results, GSO-FTH fast thinner can be added at 3 – 5% by weight and should never exceed 10%.

With Iron or Gallium doped Lamps:

All colors are also responsive to doped lamp system. Doped lamp systems are bulbs that have an additional metal (Iron or Gallium) introduced to provide a shift in the output wavelength.

The GSO-381 and GSO 382 require the lowest dosage of all the GSO inks and should receive a minimum of between 150 and 200 mJ/cm² in the 320-390 nm range (A band) using one 200-watt lamp.

The 009 Dense Black and 312 Super Opaque White require the highest dosage of all the GSO inks and should receive a minimum of between 300 and 350 mJ/cm² in the 320-390nm range (A band) using one 300-watt mercury vapor lamp.

All other GSO colors require a minimum of between 250 and 300 mJ/cm² in the 320-390nm range (A band) using one 200-watt mercury vapor lamp.

Cure speeds are dependent on colors, film thickness, opacity and condition of the curing unit. It is recommended that the energy output of the cure units be measured using a radiometer or similar equipment.

	Mercury Vapor	Doped Bulb
GSO-381/ GSO-382	175 and 225 mJ/cm ² 500 mW/cm ²	150 and 200 mJ/cm ²
GSO colors not mentioned above or below	280 and 330 mJ/cm ² 500 mW/cm ²	150 and 200 mJ/cm ²
GSO-009/ GSO-312	330 and 380 mJ/cm ² 650 mW/cm ²	300 and 350 mJ/cm ²



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Coverage

Standard line and IMS colors should yield approximately 2500 to 3000 square feet/gallon through a 380.34 mesh.

Wash Up

Wash up on press with Xtend™ press washes and after the production run with Xtend™ ink degradants.

Laminating

Techmark GSO ink series is resistant to most adhesives utilized in the membrane switch / overlay industry.

For optimal results, lamination should be delayed until 24 hours after the last color is applied.

Pre-Production Tests

It is strongly recommended that all substrates be tested before use as supposedly similar substrates can vary between manufacturers and even between different batches from the same manufacturer. Certain plastics may be impregnated with lubricants that, like plasticizer migration, may impair adhesion and block resistance, even a considerable period after printing. Other plastics can become brittle or caused to curl after printing.

END-USER MUST DETERMINE SUITABILITY OF THIS PRODUCT FOR THE INTENDED USE PRIOR TO PRODUCTION.

Co-Use with Other Inks

It is not recommended that Techmark GSO be intermixed with any other UV or solvent-based ink system. Techmark GSO can be inter-printed over and/or under the Techmark MTS series.

Color Availability

The Techmark GSO color range includes standard printing colors as well as matching system colors. This color range includes transparent as well as opaque pigments (where appropriate), which allows a variety of backlit and first-surface colors to be matched.

Intense Seritone Matching (IMS) Colors

The Techmark GSO ink series uses the Intense Seritone Matching System (IMS). The IMS system has been designed to enable printers to readily match PANTONE and most other colors in-house. The system consists of IMS base colors, each of which has been selected for its cleanliness of tone and suitability for intermixing.

Intense Seritone Matching (IMS) Colors

Using the IMS base colors plus the Shading Black (GSO-SB) and Tinting White (GSO-TW), almost any color can be produced. It is not recommended to use either the 009/301 Dense/Opaque Black or 311/312 Opaque White for color matching purposes.

IMS Toners

GSO-SB	IMS Shading Black
GSO-TW	IMS Tinting White
GSO-064	IMS Yellow (Green Shade)
GSO-066	IMS Yellow (Red Shade)
GSO-114	IMS Orange
GSO-121	IMS Red (Yellow Shade)
GSO-127	IMS Violet
GSO-164	IMS Red (Blue Shade)
GSO-165	IMS Magenta
GSO-230	IMS Blue (Green Shade)
GSO-233	IMS Blue (Red Shade)
GSO-325	IMS Green

Transparent Colors

GSO-240	Trans. Yellow (Green Shade)
GSO-250	Trans. Yellow (Red Shade)
GSO-260	Trans. Red (Yellow Shade)
GSO-265	Trans. Red (Blue Shade)

Opaque Colors

GSO-141	Fire Red
GSO-190	Process Blue
GSO-210	Ultra Blue
GSO-221	Emerald Green
GSO-009	Dense Black
GSO-301	Opaque Black
GSO-311	Opaque White
GSO-312	Super Opaque White

GSO-381	SpeedCure White
GSO-382	SpeedCure Black

Halftone Colors

GSO-IHY	High Intense H/T Yellow
GSO-IHR	High Intense H/T Red
GSO-IHB	High Intense H/T Blue
GSO-IHK	High Intense H/T Black



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GSO-LVX Low Viscosity H/T Base

Thinners and Clears

GSO-FTH Fast Thinner
GSO-TH Thinner
GSO-MX Mixing Clear

Hardcoats/Specials

The Techmark Hardcoats are V-Pyrol free and can be used in GSO constructions.

MTS-GHC Gloss Hardcoat (not embossable)
MTS-ITH Intermediate Hardcoat (not embossable)
MTS-MVHC Matte Velvet Hardcoat (not embossable)
MTS-MTHC Texture Hardcoat (not embossable)
GSO-FVHC Flexible Velvet Hardcoat
GSO-FTHC Flexible Textured Hardcoat
GSO-SRC Security Release Clear

IMD Adhesives

GSO-BA UV Curable Adhesive
MTS-BA Waterbase Adhesive

Metallics

Techmark GSO Mixing Clear is recommended for use with metallic powders. Suggested ratios of powder and Mixing Clear are 8% by weight of silver powder and 20% by weight of gold powder. It is recommended that fresh metallics be mixed daily to prevent color shift of the finished mix.

Special Matches

Special colors can be supplied against prints, wet ink, PANTONE® numbers, or other standard colors.

Use of Techmark GSO for In-Mold Decoration

Applications

The use of Techmark GSO for in-mold decoration (IMD) applications are not significantly different than for flat graphic overlay printing, with the exception that the use of a water-based clear coat (called a Barrier Adhesive) is required. This clear coat provides a good bond between the printed ink and the back filled resin polycarbonate or a blend of resins (such as polycarbonate/ABS).

The water based barrier adhesive for use with the

Techmark GSO ink is MTS-BA. The MTS-BA is a clear, non-tacky coating that is low in VOC content and can be easily dried through a conventional jet drier. The MTS-BA is applied as the last coating down as a full flood over the entire printed surface area.

Mesh Selection for MTS-BA Barrier Adhesive

The MTS-BA should be printed using a 196 to 230-mesh count. The use of these meshes will provide an adequate layer of adhesive to achieve the necessary peel strength for an IMD part. It is crucial to achieve a fairly thick lay down of the MTS-BA as this provides the basis for a good bond in the finished part. However, it is NOT NECESSARY to lay down multiple hits of the MTS-BA as these often result in a lowering of the peel strength of the finished part.

Drying of the MTS-BA Barrier Adhesive

It is absolutely critical that the MTS-BA is adequately dried. The MTS-BA is a water-based material and any residual water, which is not completely driven off the part will likely result in a delamination failure. Drying should be completed using either an efficient jet dryer or an oven set at 150-160°F for a dwell time of 2-3 minutes. We recommend the use of a crosshatch tape test to ensure that the MTS-BA layer is dried.

Troubleshooting Guide for IMD

Delamination Failure – This is one of the more common modes of failure in the IMD process and is typically the result of inadequate cure of the base UV ink or insufficient drying of the MTS-BA Barrier Adhesive. You can identify the mode of failure for delamination by determining if it is ink to the film failure or if the back filled resin peeled away from the printed surface. This is normally easily seen but the use of a microscope may be required.

Ink to Film Failure - The most common cause for this failure is inadequate cure of the UV ink. This can be caused by insufficient UV energy (peak irradiance), the UV bulbs being out of focus, dirt or "grit" on the UV reflectors. All of these should be checked if ink to film failure is noted.



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Back Filled Resin to Ink Failure – The most common cause of this type of failure is the MTS-BA not being thoroughly dried. An increase in the dwell time in the drier or the addition of a short post print bake cycle will most likely eliminate this failure (20-30 minutes at 150-160°F).

Troubleshooting Guide for IMD (cont.)

Ink Washout – Ink washout is defined as the ink actually washing away around the gating area of the part. This can be caused by incomplete cure of the UV ink. Gate design, the temperature of the back filled resin and shear or pressure under which the resin is injected in the back fill process also can have an impact here but are not under the control of the printer.

Since the variables of IMD processes are so many, Nazdar recommends that you test products for compatibility with one another. Your TSM can help to answer any questions you have.

Storage

Containers should be tightly closed immediately after use. At the end of long printing runs, surplus ink from the screen should be disposed of. Refer to Material Safety Data Sheet (MSDS) for materials and conditions to be avoided.

In the interest of maximum shelf life, storage temperatures should be between 50°F (10°C) and 77°F (25°C). When stored under these conditions the maximum shelf life is shown by the use by dates, which are clearly marked on all ink containers.

Safety and Handling

Refer to MSDS for safety, handling, and waste disposal information.

The information and recommendations contained in this Technical Data Sheet, as well as technical advice otherwise given by representatives of our Company, whether verbally or in writing, are based on our present knowledge and believed to be accurate. However, no guarantee regarding their accuracy is given as we cannot cover or anticipate every possible application of our products and because manufacturing methods, printing stocks and other materials vary. For the same reason, our products are sold without warranty and on condition that users shall make their own tests to satisfy themselves that they will meet fully their particular requirements. Our policy of continuous product improvement might make some of the information contained in this Technical Data Sheet out of date and users are requested to ensure that they follow current recommendations.