



Graphic Overlay

Technical Data Sheet

TECHMARK MTS

UV Curable Ink for Graphic Overlays and Membrane Switches

Features

- **Excellent Opacity/Bright Clean Colors**
- **Can Be Used for In-Mold Decoration Applications with a Barrier Adhesive**
- **Consistent Ink Viscosity for All Blending Colors**
- **Optimized Cure Rates for All Colors and Floods**
- **Superior Intercoat Adhesion (Designed for Repeated Passes Through UV Cure Unit)**
- **Resistant to Common Laminating Adhesives**
- **Outstanding Flexibility for Embossing and Diecutting**
- **Passed Two Million Actuations per Independent Lab Testing (ASTMF157895)**

Thinning

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

Mesh

The MTS ink is recommended to be used with 355-390 count mesh made with low elongation monofilament polyester (120 to 150/cm²).

Stencils

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

Coverage

Standard IMS colors should yield 2500 to 3000 square feet/gallon.

Cure Parameters

All colors should receive a minimum of between 250-330 mj using one 200-watt mercury vapor lamp. The 311 Opaque White will require a higher dosage of between 330-380 mj using a 300

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. If the UV output of the cure equipment is below the recommended levels the use of the MTS-FTH (Fast Thinner) is recommended to promote cure. The MTS-FTH should be added in 1% increments by weight and should not exceed 5%.

Wash Up

Wash up on press with press washes and after the production run with ink degradents.

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 which, like plasticizer migration, may impair adhesion and block resistance even after 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.

Laminating

The MTS ink series have been tested and resistant to most adhesives utilized in the membrane switch/overlay industry. For best results, lamination should be delayed until 24 hours after the last color is applied.

Please note: The use of the MTS-FTH will adversely affect the flexibility of the MTS ink and may reduce its ability to be embossed and actuated. It is recommended that independent actuation testing be conducted if the MTS-FTH is used.

Adhesion Modifier

Some grades of polyester will require the use of an MTS-adhesion modifier (MTS-PTH). The PTH should be added initially at 3 - 5% by weight and should not exceed more than 10%.

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Special Matches

Special color matches can be supplied against prints, wet ink,

Metallics

Metallics can be produced using the standard MTS-MX mixing clear. The recommended mixing ratios are:

Metallic Paste	Percent by weight
K-84215 Super Fine Flake	8%
ARS20307 Pale Gold	20%
ARS20308 Rich Gold	20%

Due to the possibility of chemical changes after mixing, it is recommended that metallic shades be mixed daily. Due to the adverse effect of the metallic paste on the UV and chemical resistance of the ink, the use of a metallic color as the primary color in an overlay is strongly discouraged.

Intense Seritone Matching System (IMS) Colors

The MTS 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. Using the IMS base colors plus the Shading Black (MTS-SB) and Tinting White (MTS-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

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

PANTONE numbers, or other standard colors.

Opaque Colors

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

Halftone Colors

MTS-IHY	High Intense H/T Yellow
MTS-IHR	High Intense H/T Red
MTS-IHB	High Intense H/T Blue
MTS-IHK	High Intense H/T Black
MTS-LVX	Low Viscosity H/T Base
MTS-HVX	High Viscosity H/T
Base	

Transparent Colors

MTS-240	TSP Yellow (GS)
MTS-260	TSP Red (YS)
MTS-265	TSP Red (BS)

Hardcoats

MTS-GHC	Gloss Hardcoat (not embossable)
MTS-MVHC	Matte Velvet Hardcoat (not embossable)
MTS-MTHC	Matte Texture Hardcoat (not embossable)
MTS-FTHC	Flexible Texture Hardcoat (embossable)
MTS-FVHC	Flexible Velvet Hardcoat (embossable)
MTS-ITH	Intermediate Texture HC (embossable)

Thinners/Retarders

MTS-TH	Thinner
MTS-MX	Mixing Clear
MTS-FTH	Fast Thinner
MTS-PTH	Polyester Adhesion Modifier/Thinner



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Applications

The use of Techmark MTS for in-mold decoration (IMD) applications is 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 MTS 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 196-230 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. Please note that we do not recommend exceeding these temperatures as excessive heat may result in damage to the printed film.

We recommend the use of a cross hatch 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 an 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 an ink to film failure is noted.

Back Filled Resin to Ink Failure – This is often referred to as a delamination failure. The most common cause is the MTS-BA has not been 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).

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.

Storage

Containers should be tightly closed immediately after use. At the end of long print 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.

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