Melco G3 - User Manual

Melco Patents: US 2010/0180809; US 2009/0030656; US 7,308,333; US 7,513,202; US 6,983,192; US 6,871,605; US D474,785 S; US 6,732,668; US 6,736,077; US 6,823,807; CH 693569 A5; US 6,445,970; more patents pending.

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Introduction

The Melco G3 has been designed for the use of garment printing.

The Melco G3 is a printer that uses cyan, magenta, yellow, and black ink to create a wide variety of colors as well as white ink to allow for printing on dark garments. The system is based on inkjet technology and is designed to print on natural fibers.

Designs can be created and saved using your favorite graphics program. MelcoRIP is then used to import the artwork to be printed on a garment. Should a white underbase be needed to print on a darker garment, MelcoRIP can be used to easily create one.

The Melco G3 prints on natural fibers. It will print on 100% cotton, hemp, or bamboo fibers.

Printer Specifications

Input Power Voltage	220-240V or 90-110V (check the label on power supply unit)
Rated Current	0.6A at 220V or 0.3A at 120V
Power Consumption	Approximately 30W or less
Dimensions (W x L x H)	24.6" x 50.6" x 20.28" (62.5 x 128.5 x 51.5 cm)
Weight	176.4 lbs (80 kg)
Printing method	Pressurized on-demand ink jet (piezo)
Printing dimensions (Maximum)	16.5" x 23.5" (42.0 x 60.0 cm)
Table options	Frame: 13" x 20" (34 x 52 cm) Standard: 16.5" x 23.5" (42 x 60 cm) Mini: 12.5" x 11" (32 x 28 cm) Polo: 16.5" x 23.6" (42 x 60 cm) Universal: 13" x 17.7" (33 x 45 cm)
Printing resolution (Maximum)	1440 x 1440 dpi
Printing direction	Bidirectional or unidirectional
Head height	Maximum 1.97" (5 cm) / Auto height adjust
Printable textiles	Natural fibers such as 100% cotton, hemp, or bamboo fibers.
Inks	Water-based textile pigment
Ink colors	CMYK + 4xWhite
Ink feeding	Refillable and auto resettable cartridge
Operating system	Windows 8, 7, Vista, XP (32/64 bit)
Connectivity	USB 2.0, Ethernet (10/100)
Operating conditions	Temperature: 50°-95°F (10°-35°C) Relative humidity: 40-80% non-condensing Specifications are for the printer only. Inks and pretreatment specification may vary. Please see ink or pretreatment guidelines for more information.

Safety Instructions

Read these instructions carefully before operating the equipment. Please follow the instructions given in this document or directly on the products to prevent damage to the equipment or your health.

Choosing a Place for the Printer

- ☑ ***Carry the printer using two or more people***

- ☑ ***Don't lift the product from the side covers.***
- ☑ ***Place this product on a flat, stable surface. The surface should be at least 26" x 24" (66 x 61 cm).***
- ☑ ***This product will not operate properly if it is tilted or at an angle.***
- ☑ ***The printer must only be used indoor.***
- ☑ ***Avoid places subject to rapid changes in temperature and humidity. Also keep this product away from direct sunlight, strong light, or heat sources.***
- ☑ ***Avoid places subject to shocks and vibrations.***
- ☑ ***Keep this product away from dusty areas.***
- ☑ ***If you use a stand, the stand must be at least 26" x 24" (66 x 61 cm) and able to support 275 lb (125 kg).***
- ☑ ***Operate the machine in an environment with a temperature range of 50°-95°F (10°-35°C).***
- ☑ ***The relative humidity must be between 40-80% non-condensing.***
- ☑ ***Before moving the printer to other position, empty the maintenance tank from the remaining ink.***

- ☑ *Always put the printer into a place where the lighting is sufficient.*
- ☑ *Place this product near a wall outlet where the plug can be easily unplugged.*

Setting Up the Printer

- ☑ ***Do not use a damaged or frayed power cord***

- ☑ ***Make certain that the source voltage is the same as the rated voltage, listed on the serial number/rating plate. If the product has an AC rating different from available power source, do not connect it to the power source.***
- ☑ ***Remove all shipping fixtures before starting up the printer.***
- ☑ ***Use the type of power source indicated on the printer label.***
- ☑ ***Connect all equipment to grounded outlets. Do not use the same outlet for any other system such as a copy machine or an air control unit that turn on and off.***
- ☑ ***If you are using an extension cord make sure the power ampere rate does not exceed the cord ampere rate of the product.***
- ☑ ***Keep electromagnetic devices and other potential sources with magnetic fields away from your product.***
- ☑ ***Do not unplug the printer to shut it off. Use the power button instead. Do not unplug the printer until the power light is off.***
- ☑ ***Do not use excessive force to push or pull the table.***
- ☑ ***Do not block any of the printer vents or insert anything foreign in its slots.***

- ☑ *Fill the cartridges with ink and place them in to the printers slot before starting up the printer.*
- ☑ *Remove the orange plug from the air inlet on the cartridges before placing it in to the printer slot.*
- ☑ *After filling the cartridges with ink, always put the color plug back into the cartridge hole*
- ☑ *Ensure to fill the correct color into the ink cartridges and the correct ink amount not higher or lower than the cartridge ink limits*
- ☑ *Do not connect the printer with the USB cable to the computer before installing the Epson 3880 printer driver.*

Using the Printer

- ☑ ***Always disconnect the printer from the power source while performing any maintenance or repair procedures.***
- ☑ ***No work should be performed on the unit by persons unfamiliar with basic safety measures for electronics and mechanics.***
- ☑ ***Always keep ink cartridges out of the reach of children.***
- ☑ ***When handling inks make sure to wear gloves.***
- ☑ ***Avoid skin and eye contact with inks. If ink does get on your skin wash it thoroughly with soap and water. If it gets on your eyes flush them out immediately with water.***
- ☑ ***Wear glasses and gloves when splashing or spraying the pre-treatment on the material.***
- ☑ ***Do not let the power cord be damaged.***

- ☑ ***Observe all relevant local, National and International regulations in connection with safety and this machine. This includes electrical, mechanical and environmental issues.***
- ☑ ***Follow the advised schedule for maintenance to guarantee smooth operation of the equipment.***
- ☑ ***During maintenance don't let the print head for long time disconnected from the capping station.***
- ☑ ***Do not insert object through the slots.***
- ☑ ***Take care not to spill liquid on this product.***
- ☑ ***Always make sure that the print head has a sufficient distance from material you print on. A direct contact between the print head and the printing media may destroy the print head.***
- ☑ ***Store the ink and ink cartridges in a clean, dry area, with temperatures between 50° and 86°F (10°-30° C).***
- ☑ ***If you store the cartridge in a cold environment and are ready to use them, set them at room temperature before you use them.***
- ☑ ***The maintenance tank must be reset before the ink level drops below 20%. It is recommended to reset the tank after the ink level drops below 50%.***
- ☑ ***Do not dismantle the ink cartridges. This could damage the print head.***
- ☑ ***Do not touch the IC chip on the cartridges. Do not spill liquid on it. This will affect the normal printing operations.***

- ☑ ***If you remove the ink cartridges, make sure to place them in a bag individually to keep them away from dust, dirt and debris.***
- ☑ ***Do not attempt to service the printer yourself.***
- ☑ ***Do not modify the printer without prior consent of Melco.***
- ☑ ***Contact Melco Technical Support at 1-800-799-8313 or service@melco.com if you need help.***

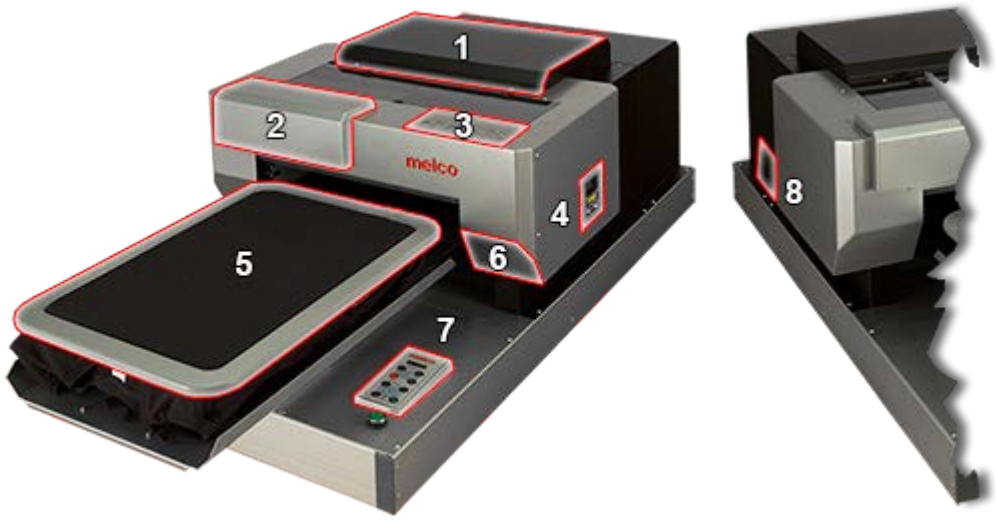
- ☑ *The product should not be disposed into the normal household waste stream.*
- ☑ *Do not discard the inks into any sewers, into any body of water, or on the ground.*

We decline all responsibility of damages resulting by inadequate, neglectful or improper installation of the equipment as well as by improper utilization or non-compliance with the operational instructions. We repute that by the time of issuing the present instruction manual, the contents are correct.

We reserve the right to modify without any notice, the specifications and performances of the product and present manual.

Printer Overview & Controls

Printer Overview



1. Top Board Cover
2. Cartridge Holder Cover
3. Printer Control Panel
4. Print Head Release Gear Cover
5. Table/Platen
6. Maintenance Tank and Cover
7. Table Control Panel
8. Cable Connections

Printer Control Panel

Power ON/OFF

LED error indicators

Cancel button (hold for 3 seconds)

Printer display (shows the printer status, ink levels, menu, error messages, etc)

Up arrow

Down arrow

Left arrow (also used for "back")

Right arrow (also "menu" button. Press it for 3 seconds for a normal head cleaning)

Enter button (press it to select an option on the screen.)

Table Control Panel

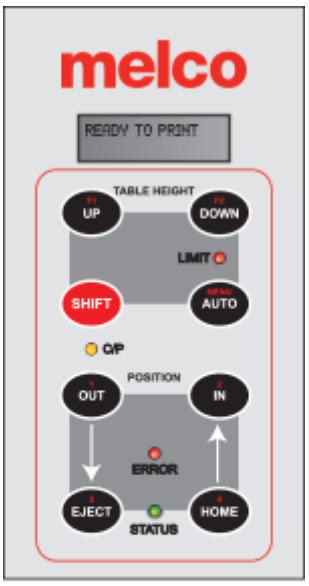


Table Control Panel Display

Table Height

Moves the table up.
With Shift: enable the special function to recover from load paper error.
Hold when powering on to enter diagnostic mode.

Move the table down.
With Shift: enter/exit the maintenance mode for the printer.

Automatically adjusts the height of the table.

Shift operation button. Used prior to other keys to access additional functions.
Press within 10 seconds of any other button to enable the first function line on the button and the respective attributes.

Table Position

Moves the table out.
With Shift: enables the automatic table movement for dark shirts.

Moves the table in.

Moves the table automatically to the load position.

Moves the table automatically to the home or print-ready position.
With Shift: disables the automatic table movement for dark shirts.

Other

The large green button function is an exact duplicate of the "HOME" button.

- ☑ When button is lit, press to send table to the print position.
- ☑ When button is unlit, the button is off.

LED lights for Limit, Error, Copies, and Status.
The keyboard is only active when the status LED remains on.

Status LED Light Indication

- ☑ ON: control panel is available
- ☑ OFF: device is switched off
- ☑ FLASHING: the printer is busy
- ☑ FLASHING SLOWLY: printer is in diagnostic mode

C/P LED Light Indication

- ☑ ON: many copies are in the spool
- ☑ FLASHING FAST: When the SHIFT button is pressed, the C/P LED will flash quickly for ten seconds. This indicates the time in which the user can utilize the function buttons.
- ☑ FLASHING SLOWLY: the function 1 is enabled and there are no copies
- ☑ OFF: there is no function enabled and there are no copies

Printer Setup

Printer Location

The location of the printer can impact print quality as well as ease of use. When selecting a location for the Melco G3, consider the following.

Is the surface level and stable?

The surface on which the printer sets should be able to support the full weight of the printer (approximately 175lbs) and a table that can support more is much preferred. The surface should be at least 28" x 26" (71cm x 66cm) and level. The printer will not operate properly if it is tilted or at an angle.

Is the height comfortable?

Does the surface place the printer at a height that is comfortable for you. You will need to easily interact with the printer control panel, the table control panel, and the table (where garments are loaded).

Is there enough space?

You will need room to move around the machine and reach all sides of the printer. The front of the machine must have enough room for the table to extend out and for you to load a garment to be printed.

Avoid drafts such as fans or open windows.

The Melco G3 prints by dropping tiny droplets of ink onto the garment surface. Should there be a strong enough air movement, it could displace the ink droplets before they contact the garment surface. The could potentially lead to poor print quality or a slightly blurry image.

Is the area well lit?

It is important to have a well-lit work area, but avoid direct sunlight. Direct sunlight can affect the sensors as well as the ink.

Is the area climate controlled?

It is important to keep your printer in a climate controlled area. Rapid or extreme changes in temperature or humidity can affect the inks and print quality. Please keep your printer in an area with a temperature between 50°-95°F (10°-35°C) and a relative humidity or 40-80% non-condensing.

Is the area clean?

Your printer needs to be located in an area that is relatively free of dust and debris.

Is there a power outlet easily accessible?

It is important that your printer is near a secure and grounded power outlet. Also minimize the risks of power interruption by avoiding long extension cords and preventing them from becoming a trip hazard.

Unpacking the Printer

1. Remove the lid from the box.

2. Remove the accessories box.

3. Remove the packing materials from the long sides of the box.

4. Then remove them from the short sides of the box.

5. Carefully lift the sides of the box up and away from the printer.

6. Lift the printer from the shipping base and onto the cart.
   Two people are required for lifting printer.

Do not dispose of the shipping materials. These will be required should the machine need to be shipped back to Melco for any reason.

Two people are required for lifting printer.

Removing the Shipping Fixture

The shipping fixture and securing tape will need to be removed before the printer is powered up or used in any way.

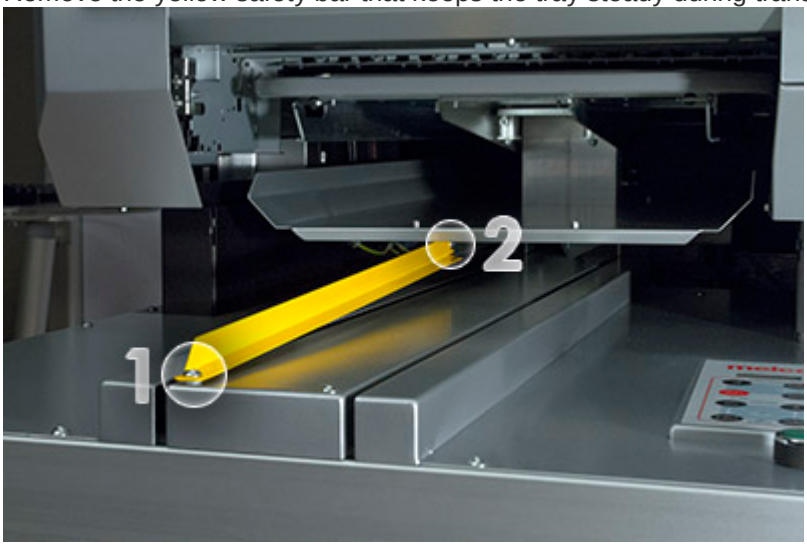
Do no throw away the shipping fixture. It will be needed for any future transportation of the printer.

You will need the following tools to remove the shipping fixture:

- ☑ 4mm Allen wrench
- ☑ Pliers

To remove the shipping fixture:

1. Remove all tape from the printer housing.
2. Remove the yellow safety bar that keeps the tray steady during transportation.



   a. Remove the screw attaching the fixture to the base of the printer (#1).
   b. Manually pull the table slowly forward and out of the printer.
   c. Remove the screw attaching the fixture to the table tray (#2).
   d. When finished, replace the screw in the base of the printer (#1).
   e. Replace the screw and nut in the fixture so as not to lose it during storage.

Leveling the Printer

You will need to level the printer using the four leveling feet on the bottom of the machine

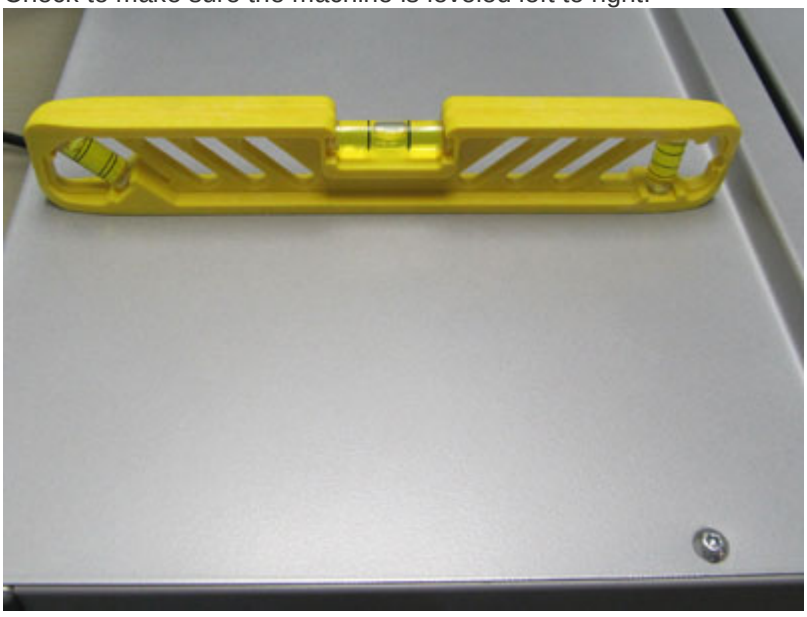
The following tools are needed to level the printer:

- ☑ Adjustable (Crescent) Wrench
- ☑ 9" or 12" level

To level the printer:

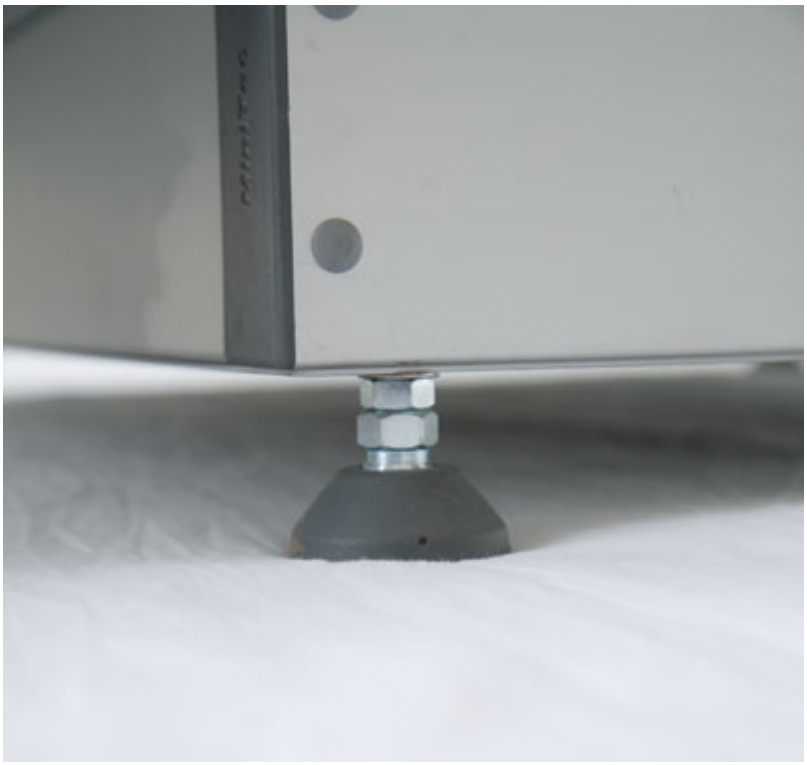
1. Place the level on the front machine base cover to check if the machine is level front to back.

2. Check to make sure the machine is leveled left to right.



3. To adjust the machine leveling feet.

a. The bottom nut is attached to the leveling foot, you will need to loosen the top jam nut before moving the bottom nut.
b. Adjust each foot until the machine is level.
    1. Turn the foot clockwise to un-thread the foot from the machine.
    2. Hold the bottom nut with one of the crescent wrenches while turning the top nut counter clockwise until it comes in contact with the printer chassis.



Ink Cartridges

The Melco G3 uses refillable 160ml cartridges. These cartridges will need to be filled with the appropriate ink prior to inserting them into the printer.

In this section, you will find information on the following:

Filling the Ink Cartridges

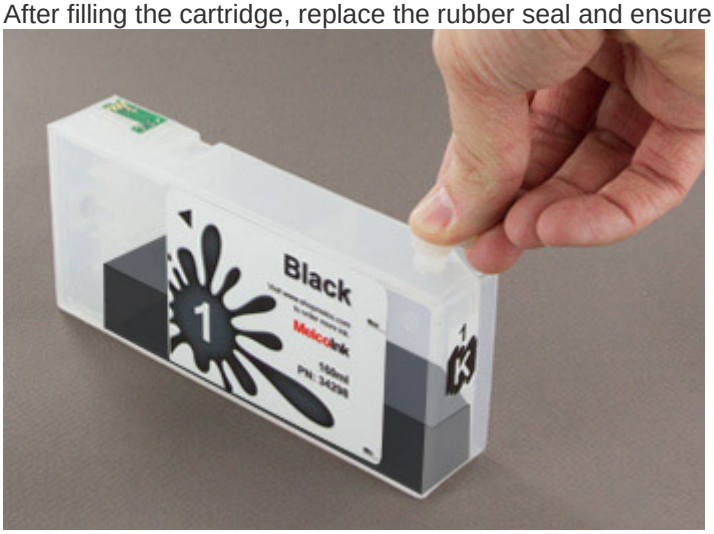
Do not refill the cartridges while they are inserted into the printer. First remove them from the printer and then proceed with the filling process.

160ml cartridges:

1. Remove the rubber seal from the supply hole in the cartridge.

2. Use the funnel provided with the printer to fill the cartridge with its respective ink. It is advised that the ink level does not exceed 90% of the maximum capacity marked on the label.

3. After filling the cartridge, replace the rubber seal and ensure that it is fully inserted.



4. Completely remove the air supply rubber seal.

5. The cartridge is now filled and ready to insert into the printer.

Inserting the Ink Cartridges Into the Printer

Ink cartridges must be inserted into the appropriate bays for the printer to print colors and underbases appropriately. The correct placement for the ink cartridges is as follows.

Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9
Black	**Black**	**White**	**White**	**Cyan**	**Magenta**	**White**	**White**	**Yellow**

To install the ink cartridges,

1. Lift the ink cartridge cover.

2. Slide each cartridge into the appropriate bay as shown above. Slide into place until you hear a click.

3. The ink cartridge(s) is now in place and the cover may be closed.

Removing Ink Cartridges

To remove the ink cartridges from the printer,

1. Lift the ink cartridge cover.

2. Remove the rubber seal from the supply hole in the cartridge. (See step 1 from 160ml cartridges)
3. Push the release button for the ink cartridge to be removed.

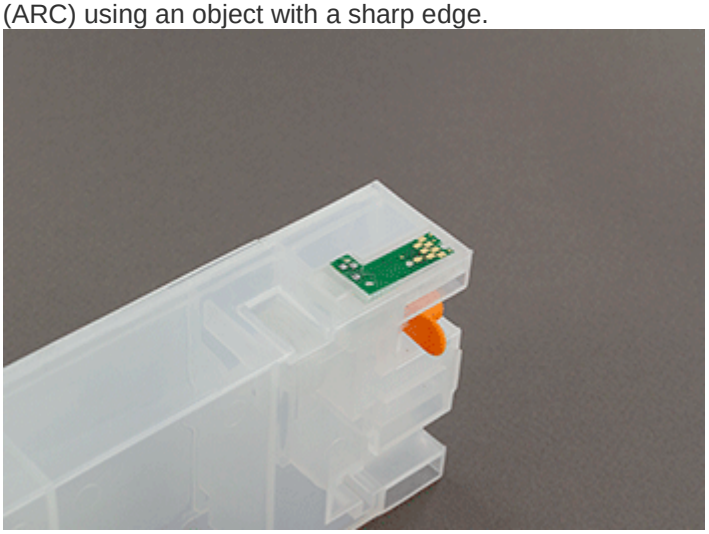
4. Gently pull the ink cartridge away from the printer and free of the bay.

5. Replace the rubber seal in the supply hole.

Replacing Ink Cartridge Chips

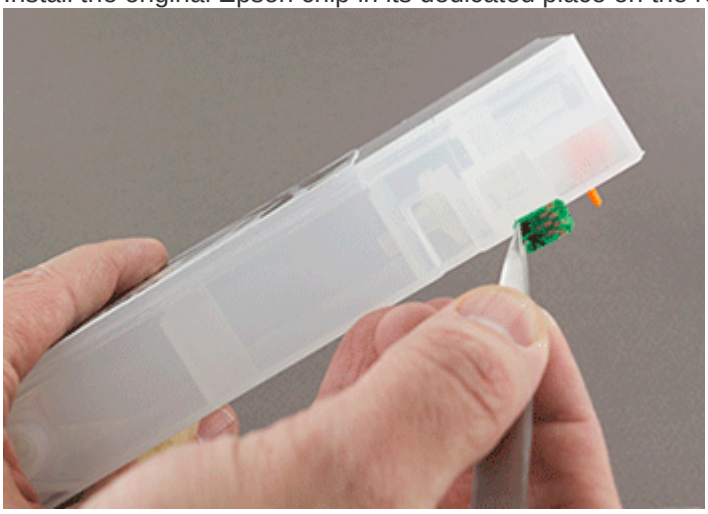
Should a chip on an ink cartridge cease to function, it can be replaced using the following steps.

1. Detach the removable part on the top of the refillable cartridge that holds the Auto Reset Chip (ARC) using an object with a sharp edge.

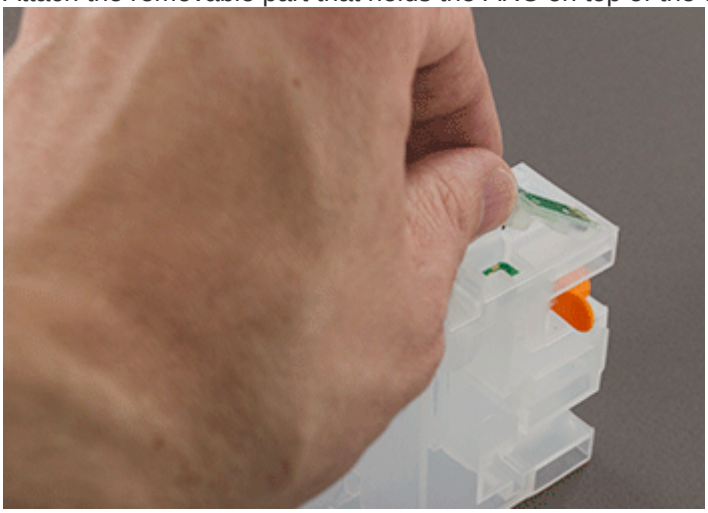


2. Remove the original chip from the original cartridge (of the same respective color).

3. Install the original Epson chip in its dedicated place on the refillable cartridge.



4. Attach the removable part that holds the ARC on top of the original Epson chip.



The auto-reset chip resets itself. The user only has to release the cartridge via the release button and then put it back inside. The respective icon on the display showing the ink level should be full.

White ink cartridges should be vigorously shaken for 3-5 seconds before use and weekly.

Maintenance Tank

The maintenance tank must be reset before the ink level drops below 20%. It is recommended to reset the tank after the ink level drops below 50%. Before resetting it, empty the maintenance tank of all remaining ink.

1. Remove the maintenance tank.
    a. Open the maintenance tank cover.

    b. Lift up slightly and pull the maintenance tank forward and out of the machine.

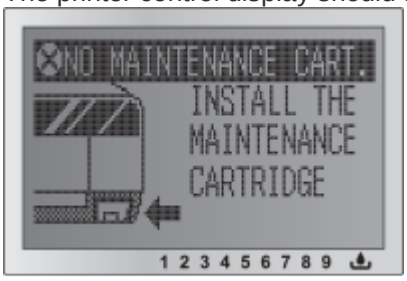
2. Empty and properly dispose of the remaining ink from the maintenance tank. Make sure to not get ink on the maintenance tank chip.
3. Reset the maintenance tank chip.
    a. Position the resetter on the maintenance tank chip so that the pins will align with the gold contacts of the chip.

b. At first contact with the maintenance tank chip, the LED light of the resetter should blink red. Firmly press the pins of the re-setter against the chip gold contacts until the LED on the re-setter blinks red and then changes to solid green.

4. While the maintenance tank is NOT installed, eject the table by pressing the eject button on the table control panel.

5. Press the home button to move the table back to the home position.

6. The printer control display should state "INSTALL MAINTENANCE CARTRIDGE".



7. Insert the maintenance tank into the printer and close the maintenance tank cover.

8. While the maintenance tank is NOT installed, eject the table by pressing the eject button on the table control panel.

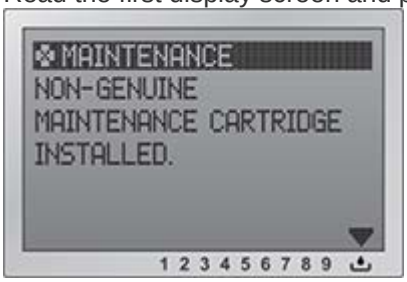
9. Press the home button to move the table back to the home position.

10. If the procedure is done properly, you should see a completely black maintenance cartridge on the printer control display and it should read "READY".

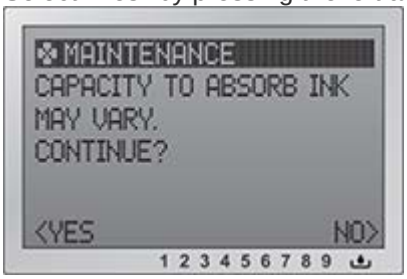
If, instead of the "READY" message, the "NON-GENUINE" message appears on the printer control display, then follow the instructions to clear the "NON-GENUINE" message below.

Clearing the "Non-Genuine" Message

1. Read the first display screen and press the down arrow to proceed.



2. Select "Yes" by pressing the left arrow to accept.



If the ink level icon of the maintenance tank remains blank ("NON-GENUINE") the user must always check visually the real ink level of the tank and empty it when needed.

Connecting the Printer

Cable Connections

1. Power Supply (220V-240V)* socket
2. Network (Ethernet-LAN) connection socket
3. USB connection socket (used for printing)
4. USB connection socket (used only for firmware update)

For countries with 110V power network, the user must use a voltage converter (110V-220V).

Data Cable

Use the USB cable to connect the machine to the computer. To connect the printer to a USB port, you need a standard shielded USB cable. To print at full speed it is necessary to use an USB2 interface.

If you use an inappropriate cable or connect peripheral devices between the printer and the computer, the connection may become unstable.

Starting Up the Printer

Before powering up the printer, make sure that:

- ☑ ***All safety/shipping fixtures have been removed.***
- ☑ ***The tray is inside, but not all the way back.***
- ☑ ***No objects or tools are placed on the tray.***
- ☑ ***The cartridges are filled with ink and properly inserted into their respective bays.***
- ☑ ***White inks must be shaken for 3-5 seconds.***

Initial Powering Up of the Printer

To power up the printer,

1. Shake the white ink cartridges for 3-5 seconds.
2. Press the power button.

3. After powering up, an automatic ink charge will be initiated. Do not do anything with the printer until the initial ink charge is completed.
4. After the initial ink charge, perform a nozzle check to confirm that all the ink channels were filled correctly. See the nozzle check section of this document for instructions.

If the automatic ink charge is not initiated after start up, you must manually charge the inks by completing at least 3 power cleans from the printer control panel. After the power cleans, perform a nozzle check. If the nozzle check is not perfect, perform one or two more power cleans until the nozzle check is perfect. For reference, see the nozzle check and power clean sections.

Performing a Nozzle Check

Nozzle checks are performed to check the performance of the print head nozzles.

To perform a nozzle check:

1. Move the table to the load position by pressing the Eject button on the table control panel.

2. Place a transparent film page at the top left corner of the table.

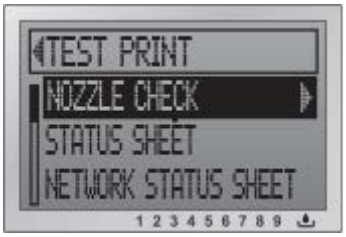
3. Adjust the height of the table by pressing the Auto button on the table control panel.

4. Move the table to the print position by pressing the Home button on the table control panel.

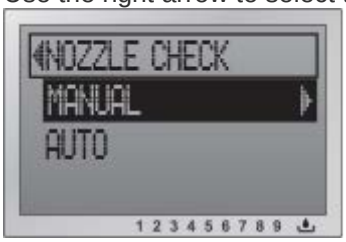
5. Use the buttons on the printer control panel to navigate the menu and perform a nozzle check.
    a. Press the menu button (right arrow)

    b. Scroll down to "Test Print" and press the right arrow to continue.

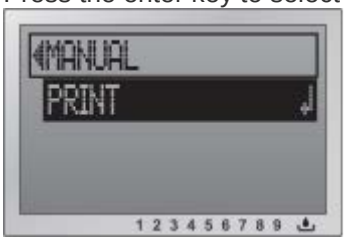
c. Scroll down to "Nozzle Check" and press the right arrow to continue.



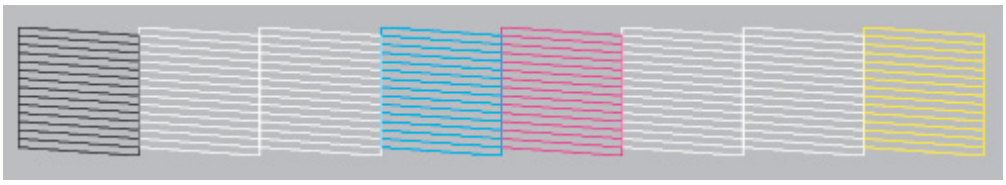
d. Use the right arrow to select the "Manual" option.



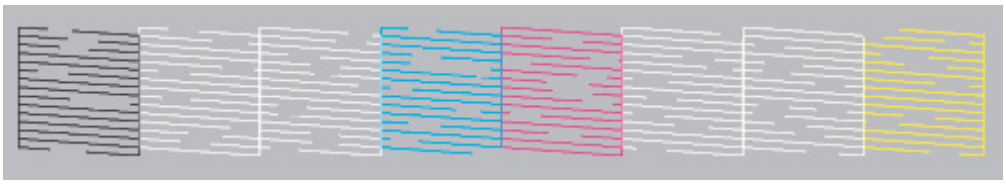
e. Press the enter key to select the "Print" option.



6. A nozzle check will be printed. A perfect nozzle check should look like the one below.



Make sure that the ink assignment is correct and as shown. If you see any gaps as shown below, perform a power cleaning from the printer control panel.



To perform a power clean, see the power clean section of this document.

Performing a Power Clean

Power cleans may need to be commanded for the following reasons.

- ☑ to clear a clogged nozzle in the case of a poor nozzle check
- ☑ to charge the ink lines should an automatic in charge not take place upon powering up the printer.

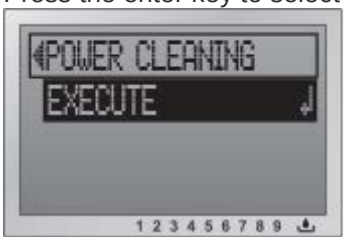
To perform a power clean:

1. Press the menu button (right arrow)

2. Scroll down to "Maintenance" and press the right arrow to continue.

3. Scroll down to "Power Cleaning" and press the right arrow to continue.

4. Press the enter key to select the "Execute" option



Graphics Preparation

Graphics Preparation

The process of printing graphics directly onto garments is a fast and effective way to embellish many products. There are a few concepts in graphic preparation that, if kept in mind, can make the process much smoother. They can also greatly improve the final product.

1. Color Modes
    - What color space is being used? CMYK or RGB
    - How will this affect the print?
2. Color of Product (process printing)
    - With four color process printing, the color of the surface can play a large part.
    - Is an underbase required?
3. Vector vs. Raster
    - Can the graphic be scaled without loss of quality?
4. Image Resolution
    - Is the image resolution sufficient for a quality print?
5. Image Transparency
    - Does the image have a transparent background?
    - Does it even need one?
6. File Format
    - Will the file format being used support the features of the graphic?

Each of these will be discussed in the following sections.

Color Modes - CMYK/RGB

With color, there are two main systems. These systems are the light or additive color system and the pigment or subtractive color system. Computer screens use the additive color system. They use projected light to create colors. Printers use pigment or the subtractive system to create colors. Many of the discrepancies noticed from an image on screen and that same image printed on paper or a shirt can be explained and in many cases avoided by understanding these two systems.

What Color Really Is

Visible light is the very small portion of the electromagnetic spectrum that most humans can see. It is composed of energy waves of different lengths. As these wavelengths very, different colors of light is perceived. White light like sunlight actually contains many colors. If viewed through a prism or more commonly, a few raindrops, those colors are separated and can be viewed as a rainbow.

Additive Color System (RGB)

The additive color system works with projected light. Computer monitors and televisions use this model. Light comes from the screen and is viewed by people directly with nothing reflecting the light.

The primary colors of the additive system are Red, Green, and Blue. When mixed, red and green create yellow, green and blue create cyan, and blue and red create magenta. When all three primaries are combined, white light is created. Black is produced by the absence of any light.

Computer monitors use tiny dots of red, green, and blue light to create all of the colors seen on screen. By varying the intensity of each dot of light, a wide range of colors can be produced.

Subtractive Color System (CMY)

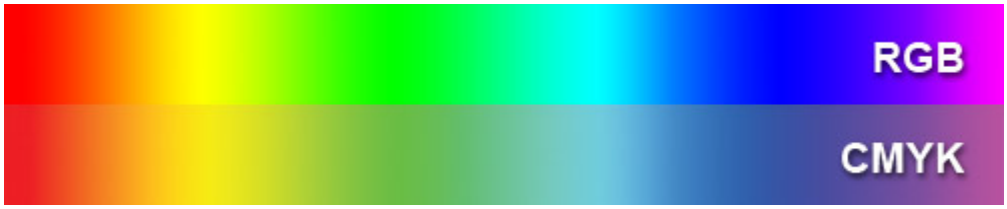
Objects that do not emit light create color by absorbing some colors of the light falling on the object and reflecting rest of the colors back to the viewer. Because these objects absorb or subtract color from white light, this process is called subtractive color. A blade of grass outside does not project green light. It projects no light at all. Instead, the white light from the sun hits the grass. The grass absorbs varying amounts of the other colors of light, but it reflects back green. That is how the grass is perceived as green.

The primary colors of the subtractive color system are cyan, magenta, and yellow. By combining these colors in varying degrees, a large number of colors can be reproduced. This is process used by printers, magazines, and photographers, or anyone else using dyes or pigments to create color.

In theory, combining all three primary colors will create black. Because so few color models are perfect, many printers add black ink to allow for deeper and richer dark colors. The black plate in offset printing was the Key plate. This is where the K has been added to CMYK.

Different Gamuts

While both systems can be used to create color, the range of colors created by each system varies. The additive system (RGB) can create a much wider and more vibrant range of color. Below is an example of the same color image simulating the differences in RGB and CMYK modes.



If this image were to be printed using CMYK inks, the differences in the two halves would be far less noticeable. This is why you can create an incredibly vibrant green on screen, but when it is printed, it may look darker and less brilliant.

In the example below the image is shown in both RGB and CMYK. The differences can be drastic.

Avoiding Printing Surprises

To lessen the differences in an image on screen and the one printed by a printer, there are a couple of steps that can be taken.

Know the color space. Make sure that when creating an image, only colors that can be reproduced by a CMYK printer are used. Many graphics programs have a color mode or workspace setting that can be changed from RGB to CMYK. Try creating in a CMYK environment or with CMYK color mixers.

Some RIP software or programs process RGB files better than CMYK. If that is the case, create the image using CMYK and convert it to RGB before saving.

Process Printing

Process printing refers to the process of printing images using the subtractive color model. Usually, the process uses the primary colors of cyan, magenta, and yellow printed on a white ground to create a full color image. The blacks created by using all three of these colors are often pale and dirty. To create cleaner and richer images, black ink is often added to the process. This creates an image using CMYK or the four color process method.

This process uses very tiny dots of those primary colors. These dots are optically mixed by the viewer to create a wide range of colors.

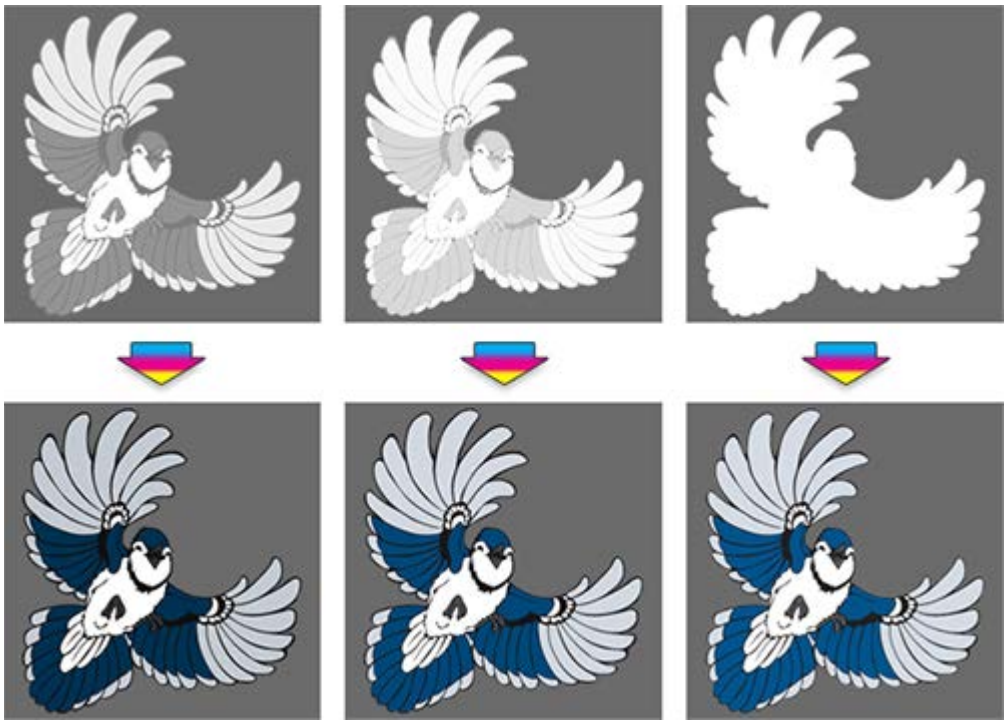
This process also utilizes the printing of these colors on a white ground. To print a pink, very small magenta drops are printed sparingly on a white surface. These small dots and the white background optically mix for the viewer to create a pink.

Printing on Colored Surfaces

Process printing relies on printing CMYK inks on a white surface to create accurate color. Because of this, printing on a colored surface will produce some very different results.

While this can be used to great effect, it is often not what people are looking for. To prevent this color distortion, some printers will use a layer of white ink underneath the color inks. This layer is often referred to as an underbase.

Underbases can be solid, or they can change depending on the top color. If black is being printed, there may be little reason to print solid white ink underneath it. Using different styles of underbase will produce differing results on the color print.



Vector vs. Raster Art

Almost all computer graphics files fall into one of two categories. There are raster images which are composed of pixels in a grid, and there are vector images that are created using paths.

Vector Art

Vector files are math-based art files and are sometimes referred to as line art. This line art uses points and the paths between them to create an image. Vector art is most often created with computer illustration programs or with computer aided drafting programs.

Because these files are composed of math-based lines and shapes, they are easily scaled up or down without any loss of quality.

Raster Art

Raster art files are created using small squares of color called pixels. These pixels are placed in a specific grid pattern to create an image.

These files are usually created by scanners, digital cameras, and image editing software programs. This type of file is best for more illustrative or photographic images.

If the design is scaled up, the pixels in the image are also enlarged. This can result in a loss of quality and a blocky appearance to your image. Because of this, the resolution of the image directly correlates to the quality of the print. 300 dpi or dots per inch will usually result in a good quality image. 72 dpi, while standard for images on the internet, will usually produce less than desirable results when printed.

Image Resolution

Raster images are comprised of small squares or pixels. The number of pixels making up an image help determine the sharpness of the image. If there are too few pixels in an image, the edges of shapes in the image will start to look jagged or grainy.

Resolution is often referred to as the number of units per inch. The unit tends to change depending on the process. For printing, resolution is often referred to as dots per inch or dpi. On a computer screen, the resolution is measure in pixels per inch or ppi.

Higher resolution images appear as continuous color to the human eye. At lower resolutions, humans begin to detect the small squares. A resolution that is ideal for printing is greater than or equal to 200 ppi at the final size. 300 ppi is very common and works extremely well.

Consider an image with the dimensions of 1800 pixels by 1200 pixels. If this image was set to be six inches wide, there would be 300 pixels per inch. If this image was scaled up to 12 inches wide, those same pixels would be expanded to reach twice as far. This would result in an image that had 150 pixels per inch. At this resolution, most people would begin to detect the small squares (pixels) on a print on paper.

Print Quality vs Image Quality

Some inkjet printers are capable of printing 1440 dpi. This can provide incredible crispness to the final print of an image and the illusion of continuous color. This is the print quality. Print quality will also be affected by the surface being printed on. A high quality photo paper will produce a finer print than a piece of fabric.

Image quality is largely affected by the resolution of the image itself. It is separate from the print quality. If a low resolution image (72 ppi for example) is printed by a printer using 1440 dpi, the quality of the print may be amazing, but it will be an amazing print of a poor quality image. The low resolution image will have pixilated edges. The higher print quality will only create very clean, sharp pixilated edges.

DPI vs. PPI

Often used interchangeably, dpi and ppi very similar, but they are not exactly the same.

The abbreviation dpi stands for "dots per inch", and is used more in reference to printing and dots of ink.

The term ppi refers to "pixels per inch" and is used when speaking of the resolution of a digital image. Both terms are a way of measuring resolution and they do so by counting sample units per inch.

Transparent vs. Solid Images

Not all image files have a visible background. Transparency is created in an image with the addition of an alpha channel. Digital image files have a channel for each of the primary colors that make it up. For RGB images, there is a channel for Red, Green, and Blue. For CMYK images, there are channels for Cyan, Magenta, Yellow, and Black (Key). Each of these channels contains information on how much of each color is needed to create a specific color in the image. Adding an alpha channel allows the file to contain information on how transparent an area is.

Alpha Channel

The alpha channel can control the transparency of a color. Some image formats can even vary the amount of transparency. The alpha channel can blend from opaque to transparent. The most common file types that support transparency (alpha) are:

- ☑ .TIFF
- ☑ .PNG
- ☑ .GIF (*no transitions)
- ☑ .PSD (Photoshop)

Uses for Transparency

Transparent background images become especially useful when printing on a colored product. Printing an image with a solid background can result in printing a block of color around the image.

Using a transparent background can eliminate that block, although some RIP software have the ability to remove solid backgrounds without editing the image.

Different Levels of Support

Not all file formats treat transparent alpha channels equally. Files like .TIF, .PNG, and .PSD allow for different levels of transparency.

*.GIF files only support 0% or 100% transparency. There is nothing in between. Pixels are either completely transparent or completely opaque. If the image has an area of color that is fading from opaque to transparent, this format will not work well.

Files like .JPG don't support transparency at all. They always appear with a color in the background.

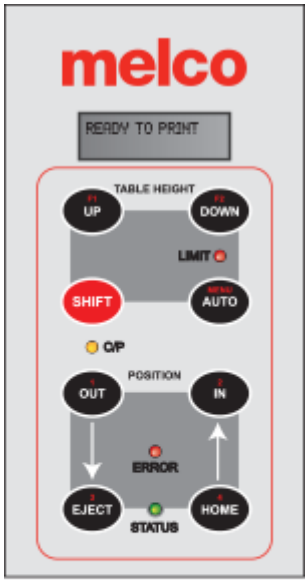
In the example below, three different file types were placed on a light grey background. The .JPG has a white box around it. The .PNG has a transparent background and is able to show multiple levels of transparency in the drop shadow. The .GIF has a transparent background but is unable to represent the subtleties in the drop shadow. The shadow just disappears.

File Extensions

Many different file formats can be used for printing. Below is a list of some of the more common extensions along with a few pros and cons of each one.

	Vector/Raster	Transparency	Layer Support	Pros/Cons
.TIF (.TIFF)	Raster	Yes	Yes	Pros: High quality images with little compression and smooth transitions of color. Cons: Can be extremely large file size.
.JPG (.JPEG)	Raster	No	No	Pros: Delectable quality and smaller file size. Cons: Can contain artifacts (small funny bits of color) from compression.
.BMP	Raster	No	No	 Cons: Can be larger in file size.
.PNG	Raster	Yes	No	Pros: Versatile file with large range of colors, smaller file size, ability for levels of transparency. Cons:
.GIF	Raster	Yes (special)	No	Pros: Small file size. Good for flat color and text. Cons: Only on level of transparency. Smaller range of colors requires dithering to create illusion of more colors. Lower quality images.
.EPS	Vector, but can have embedded raster elements	Yes	Limited - only supported by some software	Pros: Slightly more universal vector format. Cons: Can be larger file size
.AI	Vector	Yes	Yes	Pros: Vector format that can contain layers and text elements Cons: Can be software specific.
.PSD	Raster, but can contain vector elements	Yes	Yes	Pros: High quality with layers and text and some vector capabilities Cons: Software specific file and large size.

Printing Process



Below is a printing process quick reference guide. Each of the below topics that require more explanation will be expounded upon in later sections of this document.

1. Startup - The daily startup procedure should take little more than a few minutes. If the printer has been powered up and the nozzle check looks good, this step is complete.
2. Wait for ready - Wait until the message in the printer display shows "Ready". The status LED on the table display will stop flashing and remain constantly on.
3. Select and Load a Garment - Move the table to the load position by pressing the "Eject". Load the garment onto the table. Ensure that the garment lays flat on the table and is devoid of wrinkles.
    - Pretreatment - Pretreatment will be required for dark garments needing white ink.
4. Adjust the Table Height - Press the "Auto" button to automatically adjust the table height for the loaded media. If the adjustment is not enough and the limit LED continues to light, press the "Down" button until the limit
LED quits lighting.

Once the table height is adjusted for a style of garment, it shouldn't need to be adjusted until the style is changed.

5. Send the Table to the Print Position - Press the "Home" button or the green button to send the table to the print position.
6. Ready to Print - When the printer shows the "Ready" message on the printer display, you are ready to print.
7. Send the Design to the Printer
8. Remove the Garment
9. Heat Press - Cure the inks using a heat press
10. Shut down the printer when finished for the day.

Shaking the White Ink Cartridges

Every day before using the printer, you must remove and shake the cartridges. This will agitate the ink and reverse some of the settling of pigments that occurs.

1. The printer should be off.
2. Since the cartridges are pressurized, first remove the rubber seal to release the pressure. You may want to use a paper towel so that no ink spills or splatters onto the printer parts.

3. Press the release lever and slowly pull the cartridge from the slot.

4. Replace the rubber seal to prevent the spilling of ink.

5. Shake the cartridge back and forth for a few seconds. This will ensure that the ink stays homogeneous.

6. Reinstall the ink cartridge

Starting Up the Printer

Before powering up the printer, make sure that:

- ☑ ***All safety/shipping fixtures have been removed.***
- ☑ ***The tray is inside, but not all the way back.***
- ☑ ***No objects or tools are placed on the tray.***
- ☑ ***The cartridges are filled with ink and properly inserted into their respective bays.***
- ☑ ***White inks must be shaken for 3-5 seconds.***

Initial Powering Up of the Printer

To power up the printer,

1. Shake the white ink cartridges for 3-5 seconds.
2. Press the power button.

3. After powering up, an automatic ink charge will be initiated. Do not do anything with the printer until the initial ink charge is completed.
4. After the initial ink charge, perform a nozzle check to confirm that all the ink channels were filled correctly. See the nozzle check section of this document for instructions.

If the automatic ink charge is not initiated after start up, you must manually charge the inks by completing at least 3 power cleans from the printer control panel. After the power cleans, perform a nozzle check. If the nozzle check is not perfect, perform one or two more power cleans until the nozzle check is perfect. For reference, see the nozzle check and power clean sections.

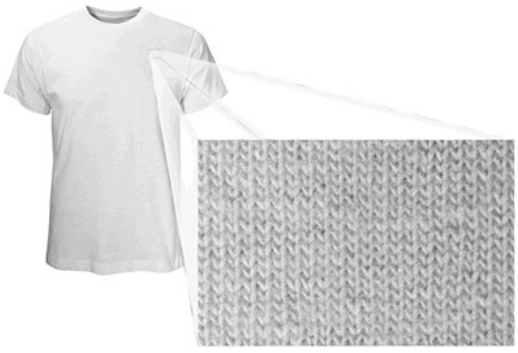
Selecting a Garment

Selection of a garment is mostly a matter of personal preference. However, it is important to keep in mind that you will be printing with water based inks. This means that the garment must be able to absorb water.

- ☑ We recommend garments made with natural fibers.
- ☑ Water sealed garments that have received a treatment with water repelling liquids will produce poor results. This is because the garment must be able to absorb the ink allowing the ink to seep into the fabric itself. Water repellent or treated garments do not take ink well.
- ☑ Old garments that have been worn multiple times and washed multiple times prior to printing may also yield poor results because the textile itself may have deteriorated due to use as well as residues from detergent and fabric softeners.
- ☑ It is important to remember that while printing on textiles the condition of the textile will impact the quality of the print. The surface of the garment will also affect the quality of the print. Printing on a fuzzy surface will often lead to a blurry or fuzzy print.
- ☑ Garments with buttons, seams or any object that creates an uneven surface when laid flat will impact printing. Table shape or height may need to be changed.
- ☑ Some garments by nature of their construction will interfere with the laser obstruction sensor no matter what you do. This also includes garments that will not fit into the print bay.

Your garment selection will directly determine the finished look of the design on the garment. For example, printing on a pink shirt with white ink versus printing on pink shirt with no white ink will give very different results. To learn more about how the color of a garment can impact the finished print, take a look at the graphics section of this document.

Fabric Texture



Keep in mind that all textiles have some amount of fuzz or lint on their surface. Also, as all textiles are an interlacing of fabric (of some kind), so the surface of the garment has many valleys and gaps (even if you cannot see them). The ink that is being applied to the garment is being done on a very small scale, meaning that the ink droplets themselves can fall into those imperfections on the textile creating a less than quality printed image to the naked eye. This is why prints on paper can appear so photo realistic while a print on a wool blanket would not retain the same level of crisp clarity that the same print would on a smooth surface (piece of paper). This is due to the nature of the material itself and it's overall surface properties when ink sits on top of it and drys. In addition to the indentations in fabric (the valleys and gaps due to the weave of the fabric) it is also possible that the fuzz from the textile itself may sit on top of the garment creating little mountains of fuzz. This can create that same distorted effect when printing.

Pretreatment

The purpose of pretreatment is to create a flat smooth surface on your garment so that ink can be applied to and adhere to the garment. Being made of a different composition than the color inks, white ink requires pretreatment to stay on the surface of the material.

The key to pretreatment is:

- ☑ Apply an evenly distributed amount of pre-treatment solution using an synthetic roller.
- ☑ Use the pretreatment and roller to flatten and smooth the surface of the garment.
- ☑ Roll in one direction preferably with the grain of the fabric to ensure no textile fuzz or imperfections in the weave of the fabric stick up.

Pretreatment Technique

Pretreatment is generally used in dark garment printing. The color of the material that you are printing on will impact the final appearance of the print because direct to garment printing use translucent inks. This means that in order to obtain the crispest colors possible on a dark garment, you need to create a white background on the garment.

All textiles have imperfections in their surface where ink can fall. In order to minimize this you need to create both a smooth surface to print your white background on and a surface with some additional adhesive qualities. The solution is to use pre-treatment in your dark garment printing process.

You should have a well ventilated room, a large flat surface for prep, and a container for your pretreatment solution. Lightly apply the pre-treatment solution to the shirt using the roller provided. Make sure that the print area becomes visibly damp, but not overly saturated. As long as total coverage is achieved, less pre-treatment is better for wash fastness and color vibrancy than too much pre-treatment.

1. Make sure the heat press is set at the following settings:
    a. 330°F
    b. 45 seconds
    c. High Pressure (80psi) or the number 7, 8 or 9 displayed on the automatic heat presses. Reduce the pressure if the pretreat does not wash out.
2. Heat set the blank shirt for 10 seconds; this will remove excess moisture and flatten the fibers while assisting with a smooth re-treatment application. Use a fresh sheet of silicone coated parchment or kraft paper.
3. The shirt collar should be to the front; the fibers lay down from top to bottom (collar to bottom of shirt).
4. Shake the pretreatment solution well to counteract settling. Make sure the cap is on tight before you begin.
5. Pour enough pretreatment into a paint pan.
6. Soak roller (do not over saturate).
7. Apply the pretreatment by rolling in one direction from neck to bottom of shirt or desired coverage area (one direction only; do not roll forward and backward); apply a medium pressure to ensure that the pretreatment is getting into the fiber.
8. Slightly overlap the roll. Dip the roller into pretreatment solution as needed.
9. Hover the heat press over the shirt for 10 seconds.

10. Cover the shirt with coated Kraft or parchment paper and close press.
11. Remove shirt after 45 seconds or when the steam disappears
12. Re-press for another 10 to 15 seconds if the shirt is still wet; this means you are applying too much pretreatment.

Excess pretreatment will come out after the shirt is washed.

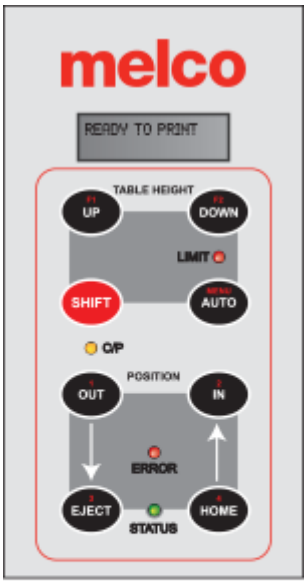
Staining On Certain Color Shirts

Some color garments such as bright orange, lime green and hot pink have dyes that react with heat and pressure. This reaction can cause a bluish/reddish stain to be seen after the shirt is cured.

To prevent this, you need to follow the following steps:

1. Do nor preheat garment.
2. Spray the shirt down with distilled water.
3. Apply pretreatment as described above.
4. Hover for 10 seconds.
5. Place parchment paper over garment and close heat press.
6. Use the curing parameters settings for the pretreatment above, but extend the time to 60 seconds.

Loading a Garment



1. Move table to the load position.
   Move the table to the "load" position (shown below) by pressing the "Eject" button on the table control panel. If using the standard (framed) table, raise the platen frame.

2. Load the garment on the table.
   Place the garment on the table by laying it flat against the platen with the head of the garment positioned at the front of the platen (closest to you). If the garment is not flat, the printer “obstruction sensor laser” will detect an obstruction and the platen will stop moving until the obstruction is cleared. The garment should be centered on the platen using the area of the garment to be printed upon as your point of reference for center.

3. Tuck garment under the platen.
   If using the standard (framed) table, carefully close the platen frame over the garment. This frame provides a gripping surface that prevents the garment from sliding on the platen. It also helps to eliminate wrinkles on the garment. Tuck any loose portion of the garment under the platen but above the print tray being careful not to leave any part of the garment hanging in a place where it may catch on the printer during platen movement.

Table Height Adjustment

Fabric Thickness

Table height (platen height) is adjustable and should be set for each type of garment on which you are going to print. The purpose of adjusting the height of the table (platen) is to ensure that the garment you is the optimal distance from the print head, ensuring the best possible quality of print. The distance that the print head is from the garment has a significant impact on print quality. Since the print head cannot be moved up and down, the garment will need to be moved closer to or farther from the print head by adjusting table height.

Adjusting the Table

While it is possible to adjust the table height when the table is in any position, you should only adjust the table height while it is in the "load" position. This is because it is possible, depending on the thickness of the garment you are printing on, to contact the print head. This must be avoided at as this can damage the print head beyond use.

The printer is equipped with a laser sensor that will alert you if you move a garment too high.

To automatically set table/platen height:

1. Start with the garment loaded on the table and the table in the load position. If not there, press the "Out" button on the table control panel.

When the table is in the load position, the printer display panel will display. This is a normal display message and will go away when the table is in the print position.

2. Press the "Auto" button on the table control panel. The table will move in and self-adjust to the appropriate height. It will then eject itself.

3. Occasionally, the auto-adjust will be slightly too high for the edge of the table. Pressing the "Home" button will send the table to the print position. If the limit LED lights, the down button

must be pressed.

If the garment it is too far from the nozzle plate, the print quality will suffer and ink over spray will be visible. If the garment is too close to the nozzle plate, there is risk of the print head touching the garment which could make the print head unusable.

Proper table height is critical to quality prints and to continued function of your printer.

Never adjust table height while the table/platen is in the "print" position as you may strike the print head with the garment causing irreparable damage to the print head.

Remove Garment

The ink on your garment is wet after printing, be careful not to touch the wet ink or allow the garment to touch the wet ink. This will smear the print.

Once the print job has completed the table will move out to the load position providing you with access to remove the garment. Gently lift the platen frame (if using it) to gain access to the garment. When you remove the garment it is recommended that, with your back to the printer, you grab the garment at the shoulders using two hands and slide it from the printing table in a smooth and even motion to avoid wrinkling or bunching the print.

You should end up with the print on your garment facing you.

Heat Press Settings

Printing inks require heat treatment after printing. The most common method is using a heat press because of size, cost and efficiency.

To fix the ink onto the garment with heat treatment, place the garment on a heat press with the printed side up. Spread it flat on the heat press, minding not to touch the wet ink or allow the garment to fold over on itself (touching the wet ink). Cover it with a sheet of heat press paper being careful not to drag the paper or smudge the wet ink. There are three types of heat press paper:

- ☑ Treated parchment paper for a matte finish
- ☑ Coated craft paper for matte finish
- ☑ Teflon paper for a shiny finish

If you reduce the heat press temperature, you must increase the time. If you are using a textile oven or conveyor dryer, you can set the temperature lower but you will have to increase the time. Settings and results vary depending on the manufacturer and brand of your conveyor dryer, see manufacturer recommendations.. Heat treatment below 300ºF is not recommended.

Curing the Printed Product:

Dark colored shirts (white ink underlay):

1. Make sure the heat press is set at the following settings:
    a. 330°F - 340°F
    b. 90 seconds
    c. Light pressure (10 - 12 psi or the number 3 displayed on the automatic heat presses)
2. Hover the heat press over the shirt for 10 seconds; this will help cure the inks before applying pressure (this is similar to the flash technique used in screen printing).
3. Carefully cover the ink with parchment or kraft paper and close the press. Do not slide the paper into place as that will smear the inks.

White or light colored shirts (no white ink):

1. Make sure the heat press is set at the following settings:
    a. 360°F to 370°F (use a temperature in this range that does not scorch the garment)
    b. 25 seconds
    c. Medium pressure (40psi) the number 4 or 5 displayed on the new automatic heat presses)
2. You do not need to hover since this is only 1 layer of ink (CMYK)
3. Carefully cover the ink with unbleached paper and close the press. Do not slide the paper into place as that will smear the inks.

Teflon sheets will cause the final product to have a shiny look; the recommended paper above will give the image a matte look.

Garment Care Instructions

As with all decorated garments, you will prolong the life of the shirt by washing with the following recommendations:

- ☑ Turn the shirt inside out.
- ☑ Wash in cold water.
- ☑ Dry on delicate cycle.
- ☑ Do not use bleach.

Ink Storage and Handling

- ☑ When handling inks, wear gloves.
- ☑ Avoid skin and eye contact with inks. If ink does get on your skin, wash skin thoroughly with soap and water. If ink gets in your eyes, flush them our immediately with water.
- ☑ Store the ink and ink cartridges in a clean, dry area with temperatures between 50°F and 86°F (10°-30°C).
- ☑ Wear glasses and gloves when splashing or spraying the pretreatment on the material
- ☑ If you store the cartridge in a cold environment, set them out and let them come to room temperature before use.
- ☑ Do not dismantle the ink cartridges. This could damage the print head.
- ☑ If you remove the ink cartridges, place them in an individual bag to keep them away from dust, dirt, and debris.
- ☑ Do not discard the liquid inks into any sewers, into any body of water, or on the ground.

Guidelines for Storage and Handling of White Inks

The Melco white ink will provide excellent results when stored and handled properly. The following storage and handling practices are require to ensure consistent quality and performance of the white ink.

Product Storage Guidelines

Store the ink and ink cartridges in a clean, dry area with temperatures between 50°F and 86°F (10°-30°C).

Handling of white ink in bottles

Keep bottles on mechanical rollers while storing or vigorously shake the bottle manually every 3-4 days and before filling the bulk system.

Shelf life of white ink

With constant rolling: 1 year

With weekly agitation: 6 months

If sedimentation occurs, do not use a paint shaker. This will break the sediment up and will form particles that can be caught in the print head or damper and restrict the ink flow. Light swirling or shaking of the bottle will be enough to agitate the ink into its usable form. Hard material settle on the bottom of the bottle should not be mixed back in. Soft sediment can be easily mixed back in with minimal energy stirring or rolling.

Handling of ink in ink cartridges and printer tubes

Shake ink cartridges vigorously for 3-5 seconds before use and weekly. First, make sure to remove the rubber seals from the cartridges in order to release the pressure. When restarting after one or two days, we recommend performing a cleaning cycle before starting production.

Remove white ink during long time of inactivity

Remove the white ink from the ink system and flush out the print head with distilled water or cleaning solution. The print head should remain filled with distilled water or cleaning solution until the printer is ready to be refilled with white ink.

Disposing of Waste Ink

DO NOT DISCARD INTO ANY SEWERS, INTO ANY BODY OF WATER, OR ON THE GROUND. Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local laws and regulations.

Check with your local regulations for the proper disposal of waste ink.

Maintenance

Daily Maintenance

This basic maintenance has to be performed at the end of every day to appropriately shut down the printer.

1. Press the SHIFT and then the DOWN (F2) button on the table control panel to enter the maintenance mode.

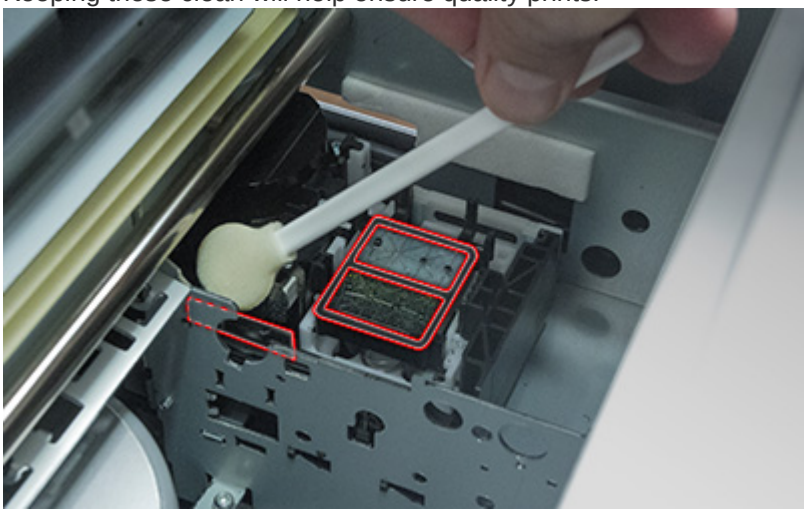
   The table control panel will display that it is in maintenance mode.

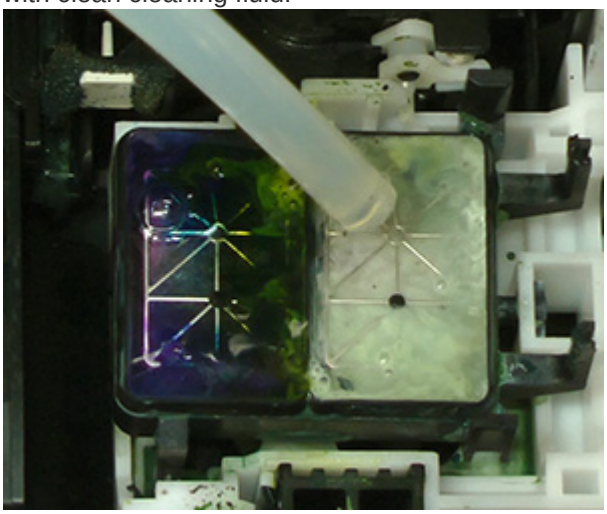
2. Press and hold the right arrow on the printer control panel for 3 seconds. This cause the machine to perform a small cycle and then it will release the print head. The printer control panel display will switch off.

3. Open the printer cover and slide the unlocked print head to the left side of the printer and off of the capping station.
4. Pour a bit of cleaning solution into a small container. This will be used with a swab to clean the wiper and capping station. This will prevent the contamination of the larger container of cleaning fluid.
5. Carefully clean around the capping station and the wiper blade with a cleaning applicator dipped in the cleaning solution from the small container in step 4 above. Make sure that the rubber parts of both the wiper and the capping station are always clean and free from any ink, dried ink, dust, or dirt. These two are the only parts of the printer that contact the print head. Keeping these clean will help ensure quality prints.

6. After cleaning the capping station and wiper, use a syringe or dropper to fill the capping station with clean cleaning fluid.



7. Press the SHIFT and then the DOWN (F2) button on the table control panel to exit the maintenance mode.

After exiting maintenance mode, the print head will move back over the capping station and perform one normal head cleaning so that the cleaning solution will be able to clean the cap, the pump, and the tubes inside.

8. After the head cleaning has finished, the printer display will read "Ready".
9. The printer may now be powered down.

Do not leave the print head off of the capping station longer than 15 minutes. There is a danger if that time should be exceeded that the print head may dry out.

Weekly Maintenance

This maintenance should be performed once per week, ideally at the end of the work week or whenever the printer will be left for few days. This maintenance would follow the daily maintenance.

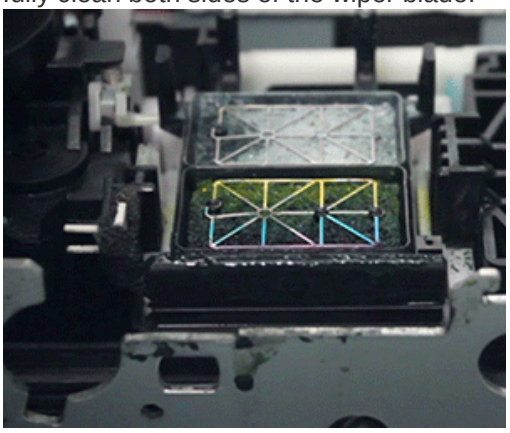
1. Power down and unplug the printer.

2. Pour a bit of cleaning solution into a small container. This will be used with a swab to clean the wiper and capping station. This will prevent the contamination of the larger container of cleaning fluid.
3. Open the printer cover and prepare to slide the print head to the left. You will release the print head in the following steps.
4. Locate the maintenance cover window on the right side of the printer. Slide it to the left and open.

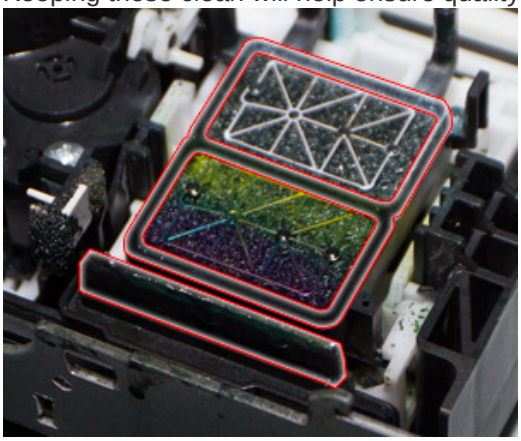
5. Press the gear slightly in and rotate counter-clockwise. As you rotate the gear, apply slight pressure to the print head with the intent of sliding it to the left. Continue to rotate the gear until the print head is freed and slide it to the left.

6. Move the print head by had to the far left side of the printer. This will allow you free access to the capping station and the wiper.

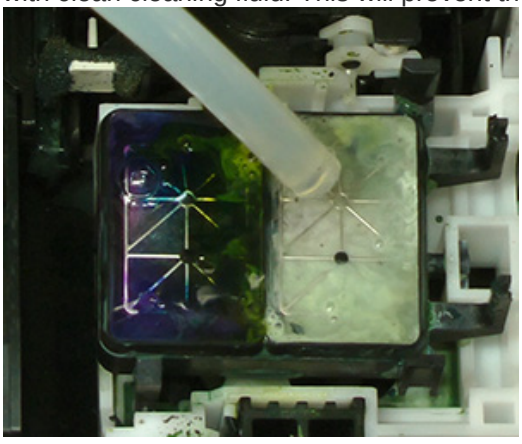
7. Continue to rotate the gear until the wiper blade moves forward. From this position, it is easy to fully clean both sides of the wiper blade.



8. Carefully clean around the capping station and the wiper blade with a cleaning applicator dipped in the cleaning solution from the small container in step 2 above. Make sure that the rubber parts of both the wiper and the capping station are always clean and free from any ink, dried ink, dust, or dirt. These two are the only parts of the printer that contact the print head. Keeping these clean will help ensure quality prints.



9. After cleaning the capping station and wiper, use a syringe or dropper to fill the capping station with clean cleaning fluid. This will prevent the print head from drying out over a longer period.



10. Manually slide the print head to the right and into the parked position.

11. Rotate the gear clockwise until the print head can no longer be moved. The will ensure that the print head is in the locked position and is resting in the cleaning solution.

12. Close the printer cover and slide the maintenance cover closed.

Do not leave the print head off of the capping station longer than 15 minutes. There is a danger if that time should be exceeded that the print head may dry out.

Monthly Maintenance

This maintenance should be performed once per month, ideally at the end of the work week or whenever the printer will be left for few days. This maintenance would follow the daily and weekly maintenance.

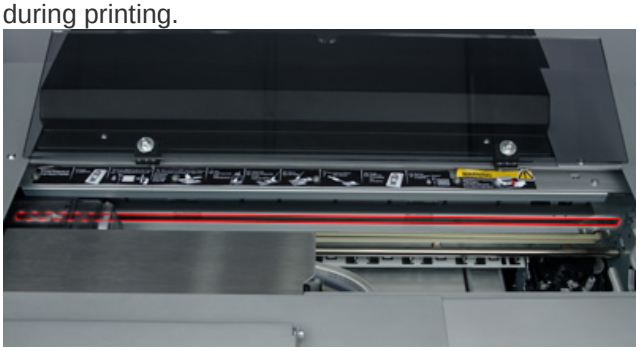
1. Power down and unplug the printer.

2. Pour a bit of cleaning solution into a small container. This will be used with a swab to clean the wiper and capping station. This will prevent the contamination of the larger container of cleaning fluid.
3. Open the printer cover and apply prepare to slide the print head to the left.
4. Release the print head in the following steps.
    a. Locate the maintenance cover window on the right side of the printer. Slide it to the left and open.

    b. Press the gear slightly in and rotate counter-clockwise. As you rotate the gear, apply slight pressure to the print head with the intent of sliding it to the left. Continue to rotate the gear until the print head is freed and slid to the left.

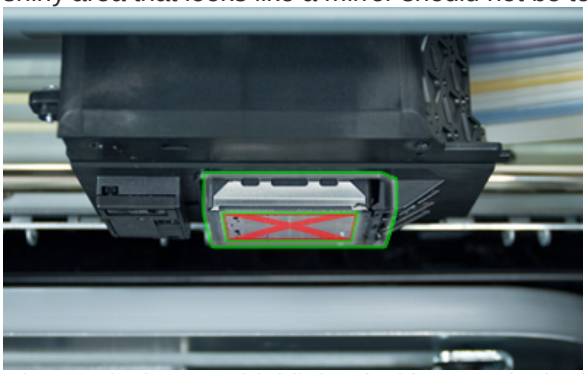
    c. Move the print head by had to the far left side of the printer. This will allow you free access to the carriage area.

5. Clean the linear encoder strip.
    a. Locate the linear encoder strip. The linear encoder strip is a thing film that contains the encoding information for the print head. This information indicates where the print head is when moving horizontally. This strip may get a bit dirty from dust or an excess of ink during printing.



    b. Clean the strip using a soft lint-free cloth and a solution of 50% isopropyl alcohol and 50% distilled water. Fold the cloth and gently pinch the strip between the plies of the cloth. Slide back and forth to remove any dirt or ink. Repeat the cloth until no dirt or ink comes off onto the cloth.

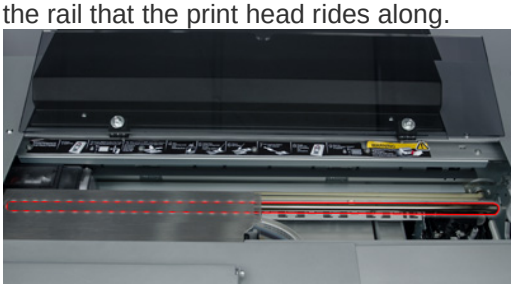
    c. Slide the print head toward the center of the machine and clean the strip on the left side of the machine.
6. Carefully clean around the print head. The surface around the print head will collect dried ink and must be cleaned for proper operation.
    a. To clean the print head, start with it near the middle of the machine.
    b. Slide the table to the back of the machine to allow for easier access.
    c. Using a cleaning applicator dipped in cleaning solution from step 2 above, clean around the nozzle plate. Be very careful to clean only the area around the nozzle plate. The shiny area that looks like a mirror should not be touched or scratched.



Clean only the area highlighted with green in the image. The area with the red "X" is the nozzle plate and must be avoided.

    d. The ramp to the right side of the nozzle plate should also be cleaned.

7. Clean the carriage rail.
    a. Locate the carriage rail. It is the metal rail running horizontally through the printer. It is the rail that the print head rides along.



    b. Clean the rail using a soft lint-free cloth and a solution of 50% isopropyl alcohol and 50% distilled water. You will need to slide the print head out of the way to clean the entire rail.

8. Once finished with cleaning, manually slide the print head to the right and into the parked position.
9. Rotate the gear clockwise until the print head can no longer be moved. The will ensure that the print head is in the locked position and is resting in the cleaning solution.

10. Close the printer cover and slide the maintenance cover closed.

Do not leave the print head off of the capping station longer than 15 minutes. There is a danger if that time should be exceeded that the print head may dry out.

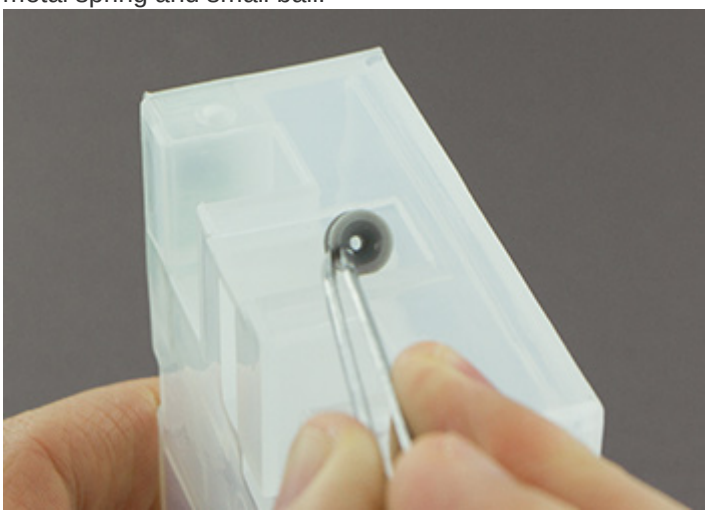
6 & 12 Month Maintenance

Every six months, the condition of the valves and openings on the bulk ink cartridges must be inspected and possibly cleaned. These valves, openings, and cartridge must be cleaned every twelve months. It is recommended to clean all the cartridges once per year and remove any remaining ink before refilling them with fresh ink.

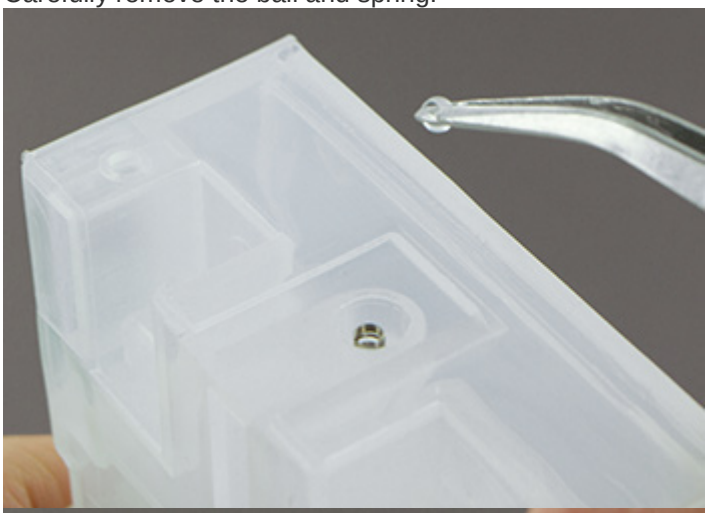
As this procedure will dispose of the inks in the cartridges, it is best to print the majority of ink before beginning this procedure. Do this when the ink levels are low.

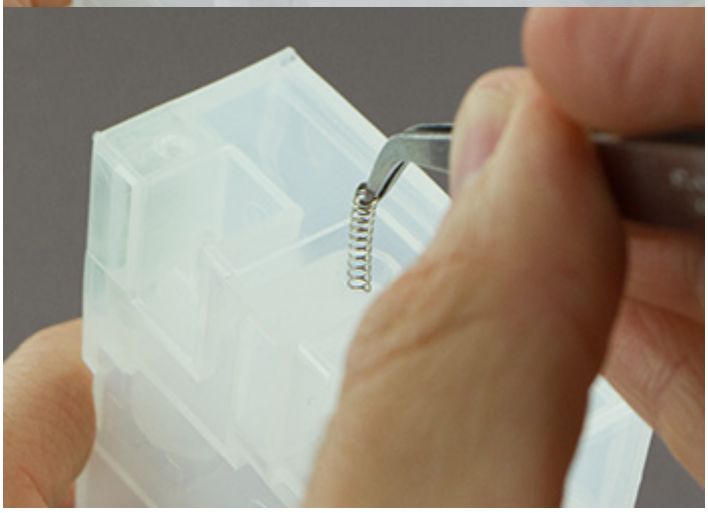
1. Remove the rubber seals from all the cartridges. Be careful to avoid spilling any ink on printer parts.
2. After the air pressure is released, you may safely remove the cartridges from the printer.
3. Reinstall the rubber seal and turn the cartridge on end to easily access the front valve.
4. Slide the plastic cover to the side and remove it.

5. Carefully remove the rubber valve. Use caution as the valve is positioned atop a pressurized metal spring and small ball.



6. Carefully remove the ball and spring.





7. Clean the valve, ball, and spring with a small portion of cleaning solution. Let them air dry. Be sure to not lose any of these components as they are vital for the proper functioning of the cartridge.
8. Now remove the remaining ink from inside the cartridge. For proper ink flow, please remove the rubber seal.
9. After the remaining ink has been removed, run distilled water through the cartridge so that all the ink route in the cartridge can get clean. After the cartridge is clean, leave it to air dry.
10. Once all the components have dried, they may be reassembled. Begin by reinserting the spring.
11. Place the small ball on top of the spring.
12. Install the rubber valve with the conical indention facing out of the cartridge. Make sure that the ball stays on top of the spring and the rubber valve is fully inserted.
13. Slide the plastic cover back into place.
14. Fill the cartridges with fresh ink and reinsert the rubber seal.
15. Insert the cartridges back into the printer.

Ink Cartridges

The Melco G3 uses refillable 160ml cartridges. These cartridges will need to be filled with the appropriate ink prior to inserting them into the printer.

In this section, you will find information on the following:

Filling the Ink Cartridges

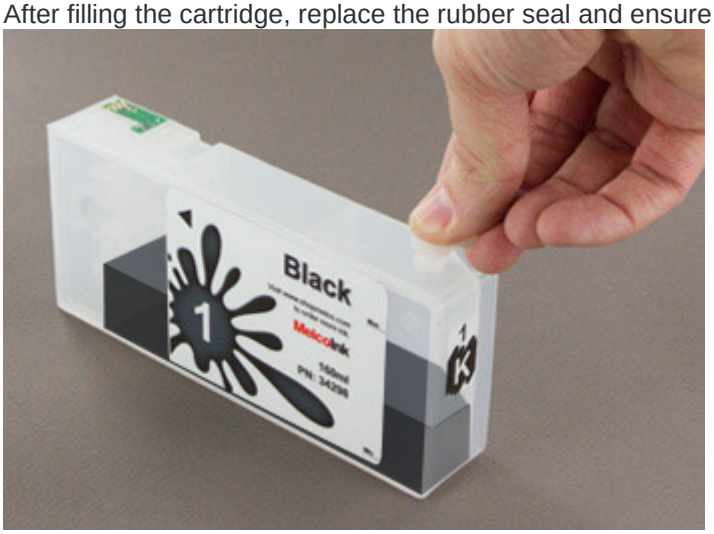
Do not refill the cartridges while they are inserted into the printer. First remove them from the printer and then proceed with the filling process.

160ml cartridges:

1. Remove the rubber seal from the supply hole in the cartridge.

2. Use the funnel provided with the printer to fill the cartridge with its respective ink. It is advised that the ink level does not exceed 90% of the maximum capacity marked on the label.

3. After filling the cartridge, replace the rubber seal and ensure that it is fully inserted.



4. Completely remove the air supply rubber seal.

5. The cartridge is now filled and ready to insert into the printer.

Inserting the Ink Cartridges Into the Printer

Ink cartridges must be inserted into the appropriate bays for the printer to print colors and underbases appropriately. The correct placement for the ink cartridges is as follows.

Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9
Black	**Black**	**White**	**White**	**Cyan**	**Magenta**	**White**	**White**	**Yellow**

To install the ink cartridges,

1. Lift the ink cartridge cover.

2. Slide each cartridge into the appropriate bay as shown above. Slide into place until you hear a click.

3. The ink cartridge(s) is now in place and the cover may be closed.

Removing Ink Cartridges

To remove the ink cartridges from the printer,

1. Lift the ink cartridge cover.

2. Remove the rubber seal from the supply hole in the cartridge. (See step 1 from 160ml cartridges)
3. Push the release button for the ink cartridge to be removed.

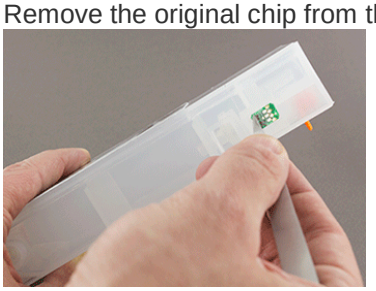
4. Gently pull the ink cartridge away from the printer and free of the bay.

5. Replace the rubber seal in the supply hole.

Replacing Ink Cartridge Chips

Should a chip on an ink cartridge cease to function, it can be replaced using the following steps.

1. Detach the removable part on the top of the refillable cartridge that holds the Auto Reset Chip (ARC) using an object with a sharp edge.

2. Remove the original chip from the original cartridge (of the same respective color).

3. Install the original Epson chip in its dedicated place on the refillable cartridge.

4. Attach the removable part that holds the ARC on top of the original Epson chip.


The auto-reset chip resets itself. The user only has to release the cartridge via the release button and then put it back inside. The respective icon on the display showing the ink level should be full.

White ink cartridges should be vigorously shaken for 3-5 seconds before use and weekly.

Maintenance Tank

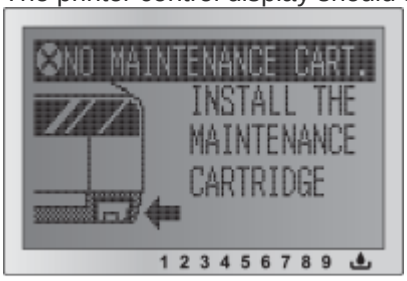
The maintenance tank must be reset before the ink level drops below 20%. It is recommended to reset the tank after the ink level drops below 50%. Before resetting it, empty the maintenance tank of all remaining ink.

1. Remove the maintenance tank.
    a. Open the maintenance tank cover.
    
    b. Lift up slightly and pull the maintenance tank forward and out of the machine.
    
2. Empty and properly dispose of the remaining ink from the maintenance tank. Make sure to not get ink on the maintenance tank chip.
3. Reset the maintenance tank chip.
    a. Position the resetter on the maintenance tank chip so that the pins will align with the gold contacts of the chip.
    
    b. At first contact with the maintenance tank chip, the LED light of the resetter should blink red. Firmly press the pins of the re-setter against the chip gold contacts until the LED on the re-setter blinks red and then changes to solid green.
    

4. While the maintenance tank is NOT installed, eject the table by pressing the eject button on the table control panel.

5. Press the home button to move the table back to the home position.

6. The printer control display should state "INSTALL MAINTENANCE CARTRIDGE".

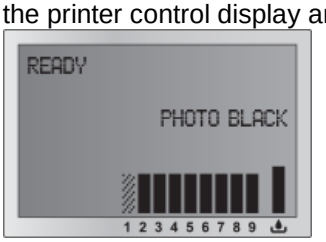


7. Insert the maintenance tank into the printer and close the maintenance tank cover.

8. While the maintenance tank is NOT installed, eject the table by pressing the eject button on the table control panel.

9. Press the home button to move the table back to the home position.

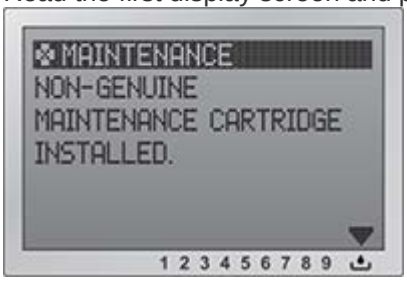
10. If the procedure is done properly, you should see a completely black maintenance cartridge on the printer control display and it should read "READY".



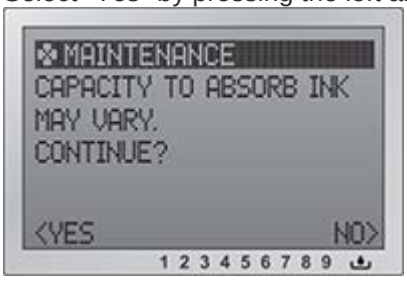
If, instead of the "READY" message, the "NON-GENUINE" message appears on the printer control display, then follow the instructions to clear the "NON-GENUINE" message below.

Clearing the "Non-Genuine" Message

1. Read the first display screen and press the down arrow to proceed.



2. Select "Yes" by pressing the left arrow to accept.



If the ink level icon of the maintenance tank remains blank ("NON-GENUINE") the user must always check visually the real ink level of the tank and empty it when needed.

Performing a Nozzle Check

Nozzle checks are performed to check the performance of the print head nozzles.

To perform a nozzle check:

1. Move the table to the load position by pressing the Eject button on the table control panel.

2. Place a transparent film page at the top left corner of the table.

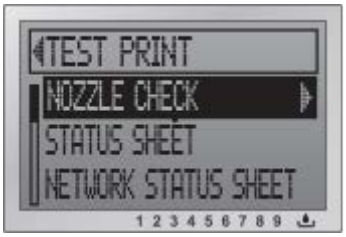
3. Adjust the height of the table by pressing the Auto button on the table control panel.

4. Move the table to the print position by pressing the Home button on the table control panel.

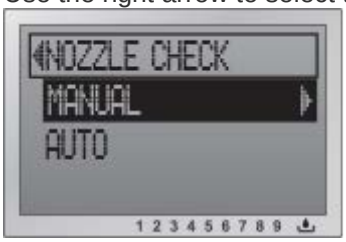
5. Use the buttons on the printer control panel to navigate the menu and perform a nozzle check.
    a. Press the menu button (right arrow)

    b. Scroll down to "Test Print" and press the right arrow to continue.

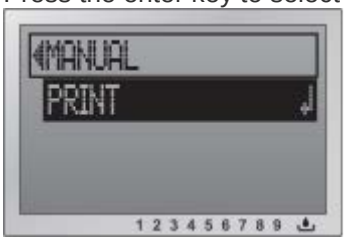
c. Scroll down to "Nozzle Check" and press the right arrow to continue.



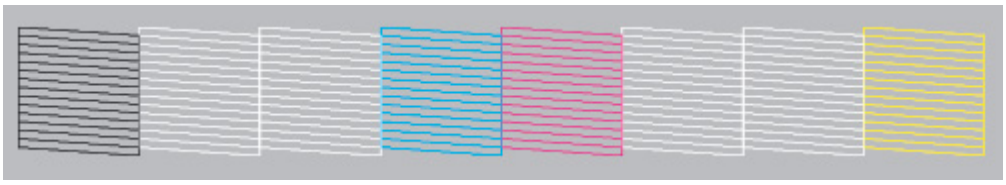
d. Use the right arrow to select the "Manual" option.



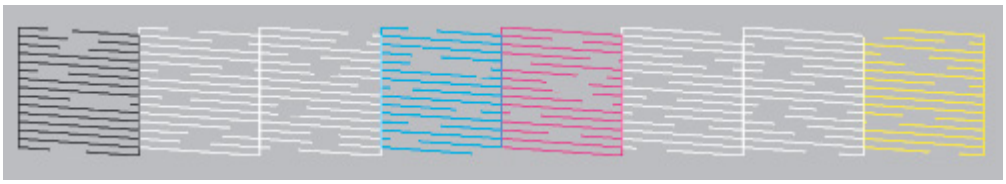
e. Press the enter key to select the "Print" option.



6. A nozzle check will be printed. A perfect nozzle check should look like the one below.



Make sure that the ink assignment is correct and as shown. If you see any gaps as shown below, perform a power cleaning from the printer control panel.



To perform a power clean, see the power clean section of this document.

Performing a Power Clean

Power cleans may need to be commanded for the following reasons.

- ☑ to clear a clogged nozzle in the case of a poor nozzle check
- ☑ to charge the ink lines should an automatic in charge not take place upon powering up the printer.

To perform a power clean:

1. Press the menu button (right arrow)

2. Scroll down to "Maintenance" and press the right arrow to continue.

3. Scroll down to "Power Cleaning" and press the right arrow to continue.

4. Press the enter key to select the "Execute" option

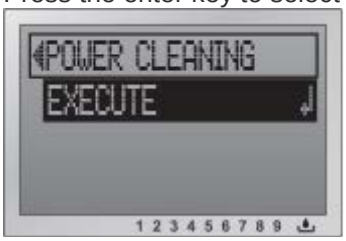


Table Options

The MelcoJet G2 has optional tables that can be changed out to provide a different print area and garment accessibility than the standard platen.

The installation instructions for each of the table options are in the following topics.

When shipped, the tables may be covered in a protective film. This film should be removed before use. Most of the images in this section show the tables with the protective film.

For any questions please contact Melco Technical Support at 1-800-799-8313.

Universal Table

Tools needed for installation:

- ☑ 2.5mm Metric Hex Driver
- ☑ 3mm Metric Hex Driver

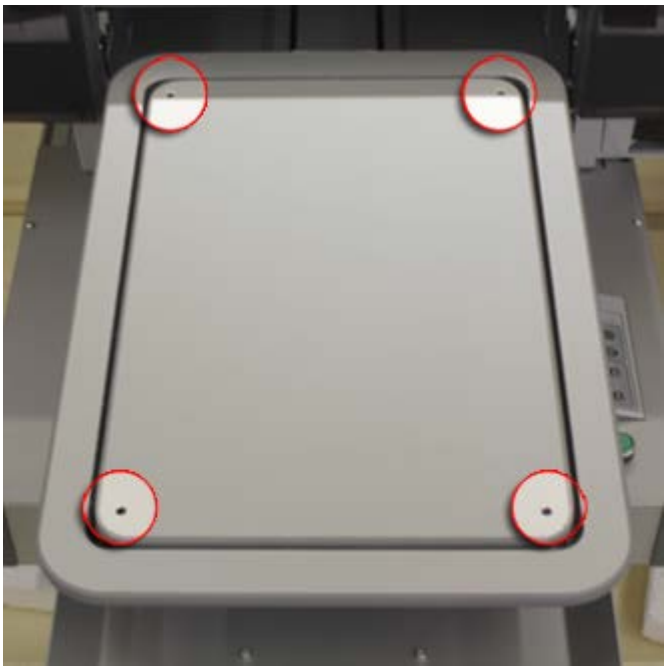
Needed Parts:

- ☑ T-Shirt Table, Universal
- ☑ Four (4) M4 Countersunk Hex Screws

Installation Instructions

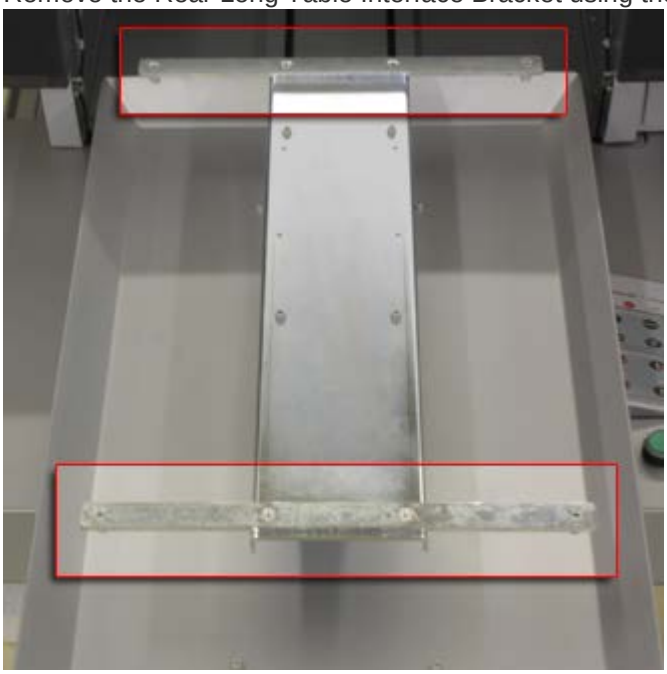
1. Remove the Standard Frame Table from the machine.

a. Loosen and remove the hardware – 4 screws – at each corner of the table using the 3mm Metric Hex Driver.

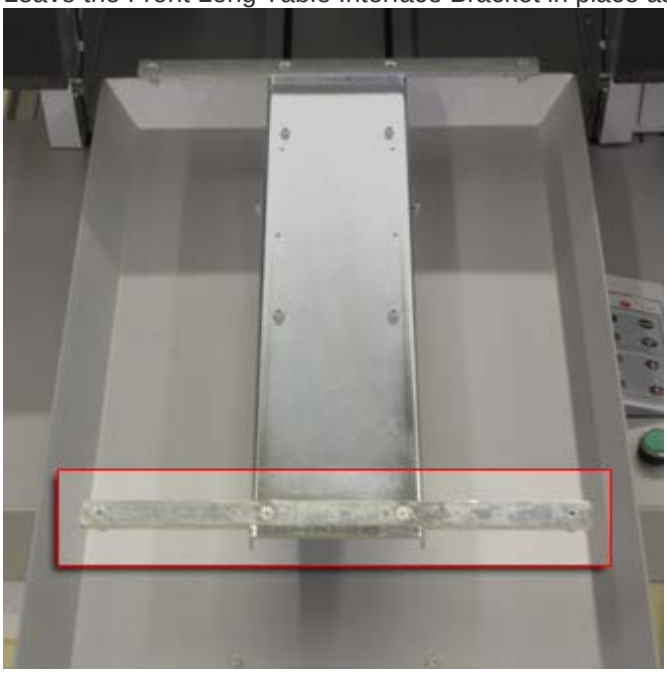


b. Remove the Standard Frame Table and store it in a secure location.

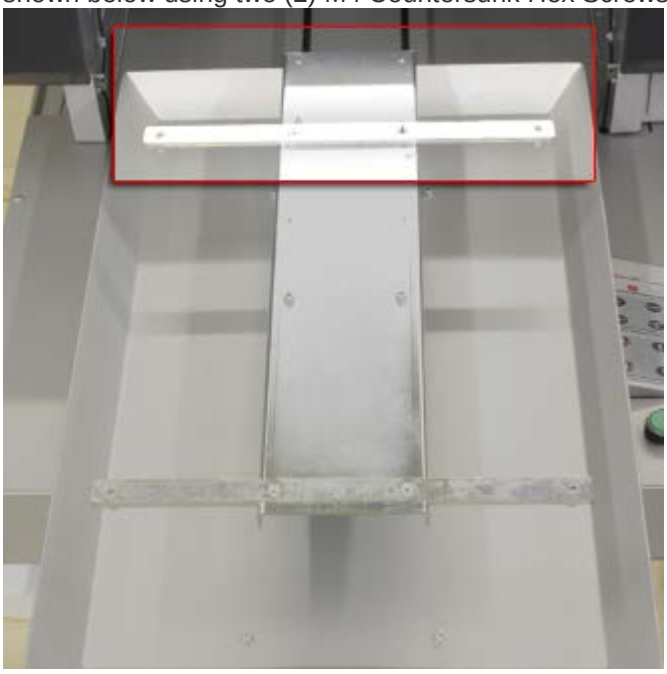
2. Remove the Rear Long Table Interface Bracket using the 2.5mm Metric Hex Driver.



3. Leave the Front Long Table Interface Bracket in place as is.



4. Mount the Rear Long Table Interface Bracket you removed in step 2 above in the location shown below using two (2) M4 Countersunk Hex Screws.



5. Align the Universal T-Shirt Table as shown in the picture below and secure it to the Table Support using four (4) M4 Countersunk Hex Screws.

When shipped, the tables may be covered in a protective film. This film should be removed before use. Most of the images in this section show the tables with the protective film.

Large T-Shirt Table, 42x60cm

Tools needed for installation:

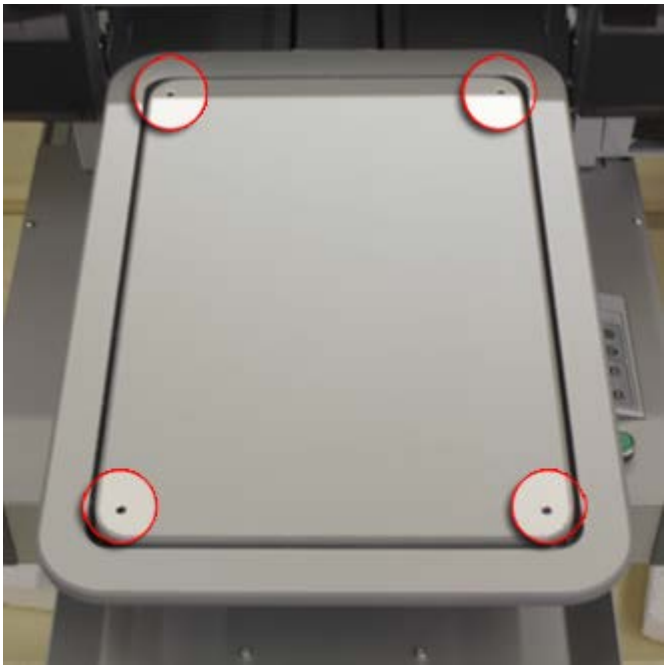
- ☑ 2.5mm Metric Hex Driver
- ☑ 3mm Metric Hex Driver

Needed Parts:

- ☑ T-Shirt Table, Large
- ☑ Four (4) M4 Countersunk Hex Screws

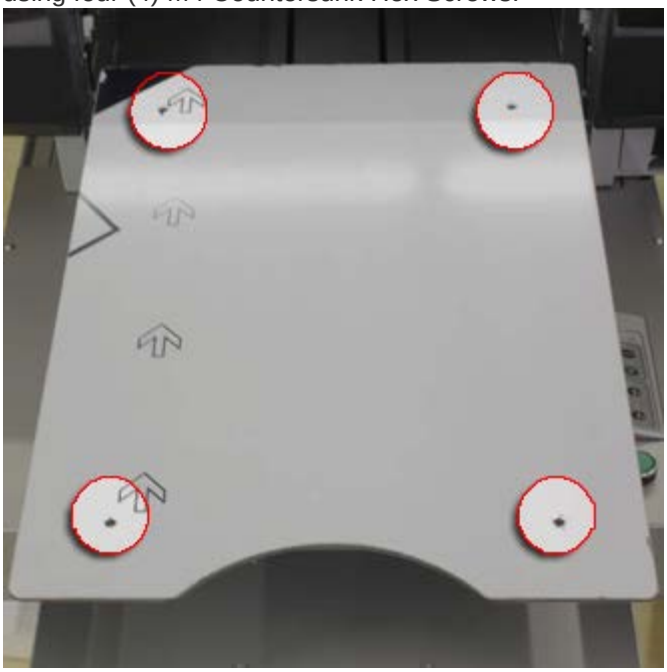
Installation Instructions

1. Remove the Standard Frame Table from the machine.
    a. Loosen and remove the hardware – 4 screws – at each corner of the table using the 3mm Metric Hex Driver.



b. Remove the Standard Frame Table and store it in a secure location.

2. Align the Large T-Shirt Table as shown in the picture below and secure it to the Table Support using four (4) M4 Countersunk Hex Screws.



When shipped, the tables may be covered in a protective film. This film should be removed before use. Most of the images in this section show the tables with the protective film.

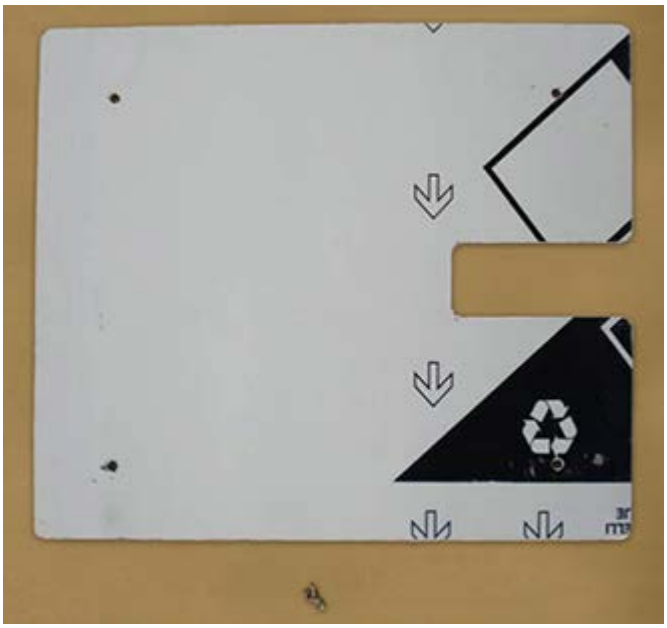
Polo Table, 42x50cm

Tools needed for installation:

- ☑ 2.5mm Metric Hex Driver
- ☑ 3mm Metric Hex Driver

Needed Parts:

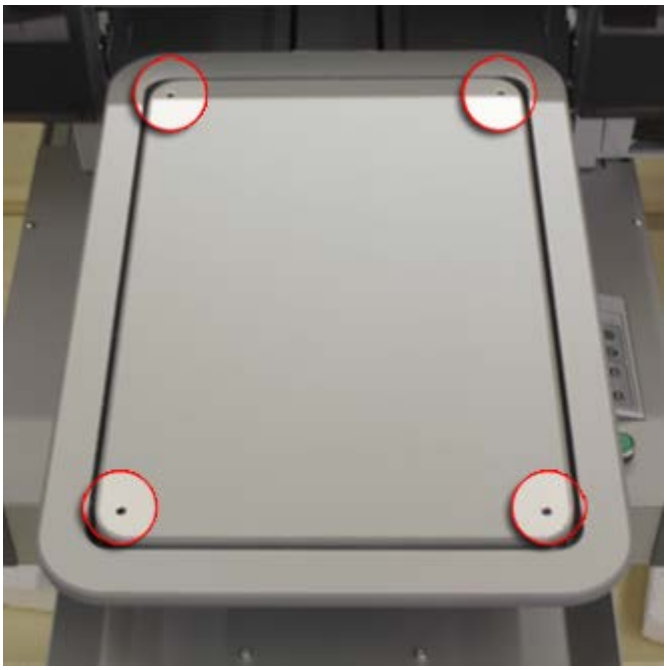
- ☑ Polo Table
- ☑ Four (4) M4 Countersunk Hex Screws



Installation Instructions

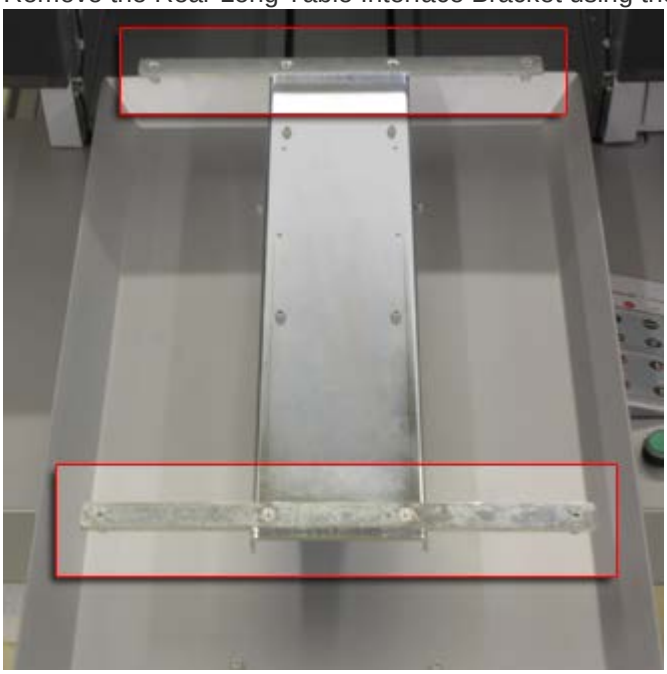
1. Remove the Standard Frame Table from the machine.

a. Loosen and remove the hardware – 4 screws – at each corner of the table using the 3mm Metric Hex Driver.

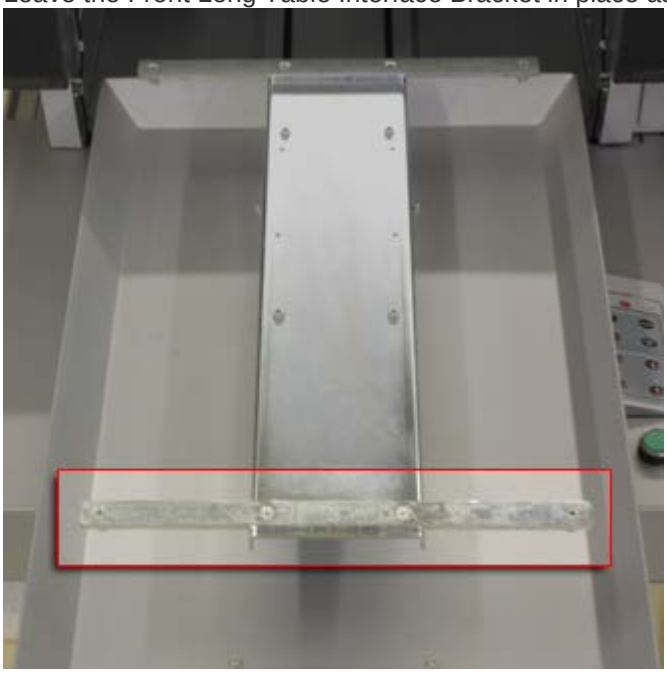


b. Remove the Standard Frame Table and store it in a secure location.

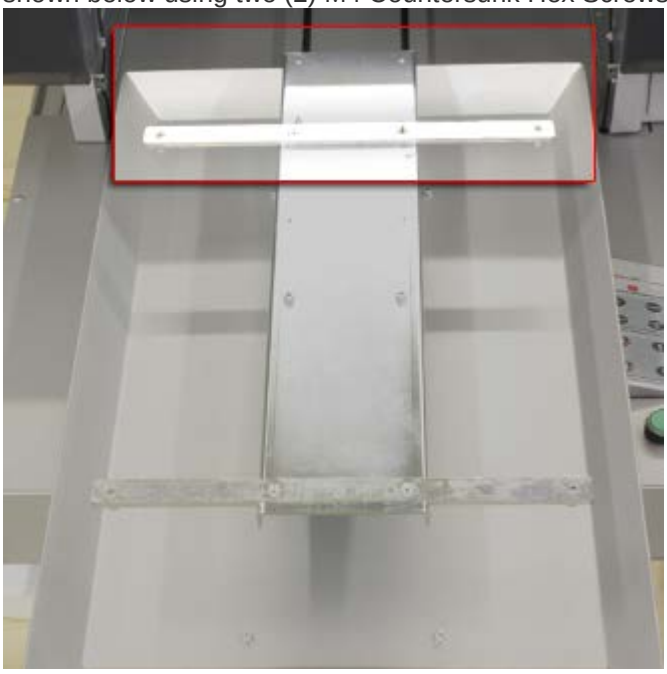
2. Remove the Rear Long Table Interface Bracket using the 2.5mm Metric Hex Driver.



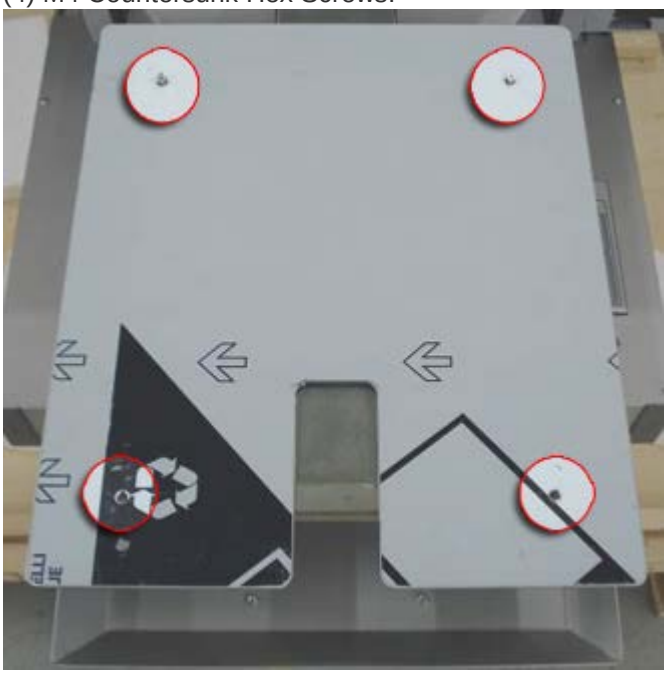
3. Leave the Front Long Table Interface Bracket in place as is.



4. Mount the Rear Long Table Interface Bracket you removed in step 2 above in the location shown below using two (2) M4 Countersunk Hex Screws.



5. Align the Polo Table as shown in the picture below and secure it to the Table Support using four (4) M4 Countersunk Hex Screws.



When shipped, the tables may be covered in a protective film. This film should be removed before use. Most of the images in this section show the tables with the protective film.

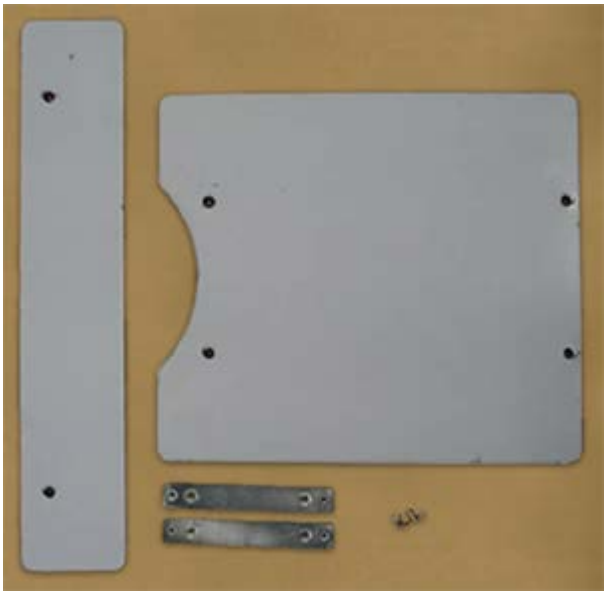
Small Table, 28x32cm

Tools needed for installation:

- ☑ 2.5mm Metric Hex Driver
- ☑ 3mm Metric Hex Driver

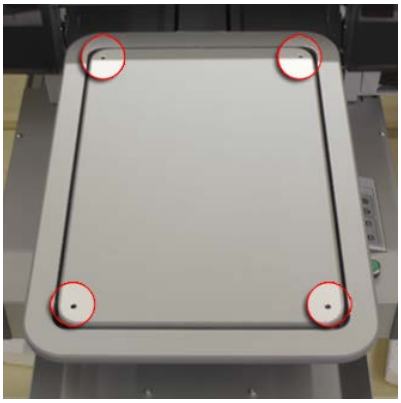
Needed Parts:

- ☑ Small Table
- ☑ Adapter Plate
- ☑ Two (2) Short Table Interface Brackets
- ☑ Six (6) M4 Countersunk Hex Screws



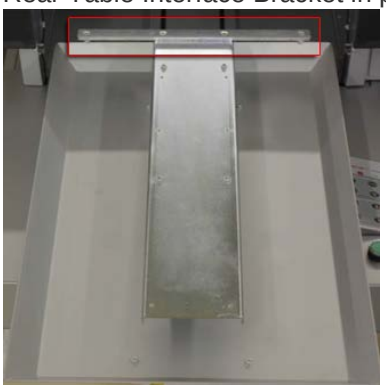
Installation Instructions

1. Remove the Standard Frame Table from the machine.
    a. Loosen and remove the hardware – 4 screws – at each corner of the table using the 3mm Metric Hex Driver.

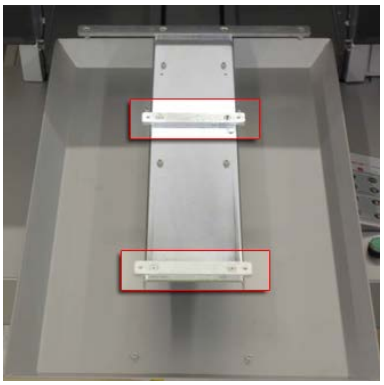


    b. Remove the Standard Frame Table and store it in a secure location.

2. Remove the front Long Table Interface Bracket using the 2.5mm Metric Hex Driver. Leave the Rear Table Interface Bracket in place as is.



3. Mount the two (2) Short Table Interface Brackets in the locations shown below using M4 Countersunk Hex Screws.



4. Align the Small T-Shirt Table and the Adapter Plate as shown in the picture below and secure them to the Table Support using six (6) M4 Countersunk Hex Screws.

When shipped, the tables may be covered in a protective film. This film should be removed before use. Most of the images in this section show the tables with the protective film.

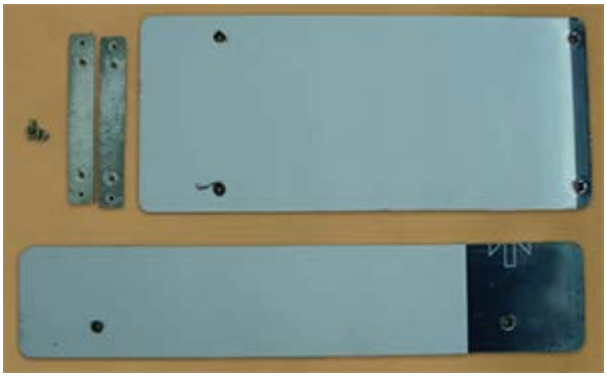
Sleeve Table, 15x34cm

Tools needed for installation:

- ☑ 2.5mm Metric Hex Driver
- ☑ 3mm Metric Hex Driver

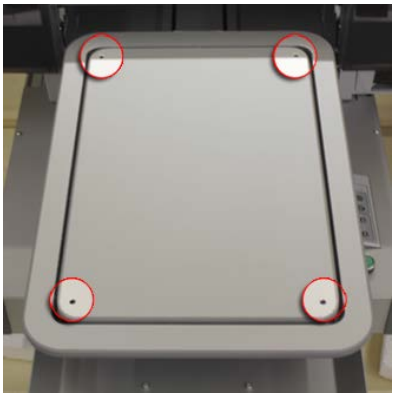
Needed Parts:

- ☑ Sleeve Table
- ☑ Adapter Plate
- ☑ Two (2) Short Table Interface Brackets
- ☑ Six (6) M4 Countersunk Hex Screws



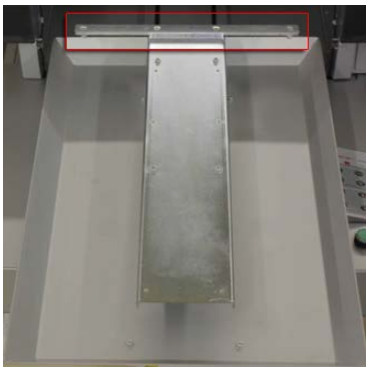
Installation Instructions

1. Remove the Standard Frame Table from the machine.
    a. Loosen and remove the hardware – 4 screws – at each corner of the table using the 3mm Metric Hex Driver.

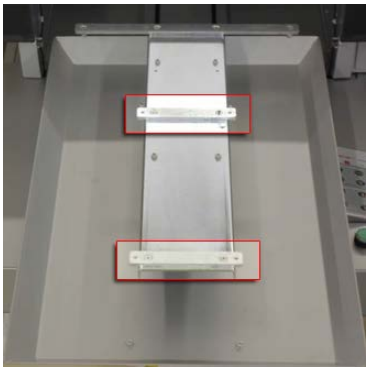


    b. Remove the Standard Frame Table and store it in a secure location.

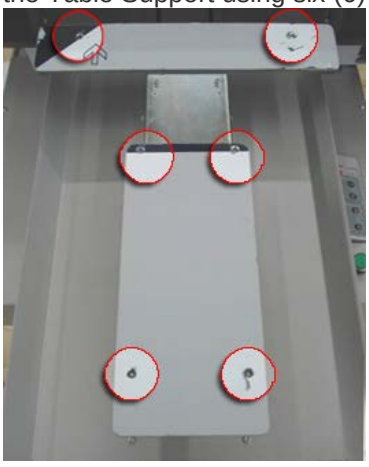
2. Remove the front Long Table Interface Bracket using the 2.5mm Metric Hex Driver. Leave the Rear Table Interface Bracket in place as is.



3. Mount the two (2) Short Table Interface Brackets in the locations shown below using M4 Countersunk Hex Screws.



4. Align the Sleeve Table and the Adapter Plate as shown in the picture below and secure them to the Table Support using six (6) M4 Countersunk Hex Screws.



When shipped, the tables may be covered in a protective film. This film should be removed before use. Most of the images in this section show the tables with the protective film.

Troubleshooting

Image Problems

With all troubleshooting it is critical to test in a controlled environment. A controlled environment is one where you start in a known good working state and only change a single variable in order to isolate the root cause of the problem All troubleshooting will require a Nozzle Check test print in order to set a baseline for testing.

This section is setup to provide both the cause and possible recovery. The order of the recovery steps is chronological to some degree, meaning, you should perform the first recommended recovery step in all cases below.

Banding in Color

Possible Causes

- ☑ Clogged print head nozzles
- ☑ Empty or near empty ink cartridge
- ☑ Foam or air in lines
- ☑ Table height incorrectly set
- ☑ Print settings are at too low of dpi (360)

Possible Solutions

- ☑ Adjust the table height
- ☑ Fill empty or low ink cartridge(s)
- ☑ Perform a nozzle check test print for evaluation of color ink output
- ☑ Adjust the print settings to a higher dpi

Banding in Underbase

Possible Causes

- ☑ Clogged print head nozzles
- ☑ Foam or air in lines
- ☑ Table height incorrectly set
- ☑ Print settings are at too low of dpi (360)

Possible Solutions

- ☑ Adjust table height
- ☑ Fill empty or low ink cartridge(s)
- ☑ Perform a nozzle check test print for evaluation of color ink output
- ☑ Adjust the print settings to a higher dpi

White Edges Appear on Color Print

Possible Causes

- ☑ Garment stretched too tight in platen frame
- ☑ Too much white ink printed
- ☑ Choke setting not correctly set in MelcoRIP

Possible Solutions

- ☑ Verify proper garment framing
- ☑ Adjust white ink settings in MelcoRIP
- ☑ Adjust choke setting in MelcoRIP

White speckles show through color print when printing on dark material

Possible Causes

- ☑ Too much white ink printed
- ☑ Not enough dry time before color pass
- ☑ Improper pre-treatment

Possible Solutions

- ☑ Adjust white ink settings in MelcoRIP
- ☑ Increase dry time of white ink before color pass
- ☑ Increase pre-treatment amount

Colors not vivid on Light Shirt

Possible Causes

- ☑ Inadequate amount of color ink output
- ☑ Empty or near empty color ink cartridge
- ☑ Air in the lines

Possible Solutions

- ☑ Change print quality setting in MelcoRIP to a higher dpi or change ink output
- ☑ Fill empty or low ink cartridge(s)
- ☑ Perform a nozzle check test print for evaluation of color ink output

Colors not vivid on Dark Shirt

Possible Causes

- ☑ Inadequate amount of white ink output during under base printing
- ☑ Inadequate amount of pretreatment solution

Possible Solutions

- ☑ White Ink Layer settings in MelcoRIP
- ☑ Change print quality setting in MelcoRIP to a higher dpi or change ink output
- ☑ Perform a nozzle check test print for evaluation of color ink output
- ☑ Increase amount of pretreatment

Print Quality Smudged

Possible Causes

- ☑ Table height set too high caused the Print Head to contact the material during printing, this is called a Print head strike
- ☑ Ink has built up on the print head guard and is dragging across the garment surface

Possible Solutions

- ☑ Verify/adjust table height
- ☑ Perform a nozzle check test print for evaluation of color ink output
- ☑ Perform monthly maintenance

If a printhead strike can be confirmed and a nozzle check and/or the end of day maintenance does not correct the problem we recommend you also soak the printhead overnight in cleaning solution.

Colors bleed together on edges

Possible Causes

- ☑ Too much ink output for either white under base or color ink
- ☑ Not enough dry time for the white ink

Possible Solutions

- ☑ Change print quality setting in MelcoRIP to a lower dpi or lower the ink output
- ☑ Increase dry time before printing color pass

Print image is blurry, hazy, or skewed

Possible Causes

- ☑ Table height too low or not level

Possible Solutions

- ☑ Verify table height and that the table is properly level. Adjust as required.

Edges of print are pixelated

Possible Causes

- ☑ Poor image resolution

Possible Solutions

- ☑ Start with a higher resolution image

Colors printed are not what was expected (different color than what was on monitor)

Generally speaking, because computer monitors use projected light to create color and printing uses inks, the colors on screen will never exactly match the printed colors. However, if you are attempting to print a color that can be accurately reproduced with CMYK, then you should be able to attain very close results. We recommend that you review the section on graphics preparation.

Possible Causes

- ☑ Empty color Ink Cartridge
- ☑ Disparate color spaces or modes (RBG vs CMYK)
- ☑ Clogged color print head nozzles

Possible Solutions

- ☑ Fill empty or low color ink cartridge(s)
- ☑ Only use colors that are able to be reproduced using 4 color process (CMYK).
- ☑ Perform the daily maintenance
- ☑ Perform power cleaning and nozzle check

Faded print before and after washing

Possible Causes

- ☑ Garment material may be water resistant
- ☑ Finished print not heat cured properly
- ☑ The garment had been laundered prior to printing (the residues from detergents and fabric softeners can prevent the inks from staying in the garment.)
- ☑ Garment material is synthetic.
- ☑ Pretreatment was improperly applied or was not dry when printed over.
- ☑ Garment was too aggressively laundered.

Possible Solutions

- ☑ Change to a hydrophilic material
- ☑ Adjust the temperature, time, and/or pressures for curing - see the section for heat-setting the inks
- ☑ Avoid printing on pre-laundered goods
- ☑ Use garments with 100% natural fibers
- ☑ Review the pretreatment procedures
- ☑ Follow the garment care instructions

Colors printed look dull after heat press

Possible Causes

- ☑ Temperature setting on the heat press is too high
- ☑ Pressure setting on the heat press is too high
- ☑ Wrong type of protective sheet used to heat press the garment

Possible Solutions

- ☑ Review the heat press settings section

Issues Covered

Error Codes and Flashing Lights

REPLACE INK CARTRIDGE SOON

Possible Causes

- ☑ The maintenance tank needs to be reset

Possible Solutions

- ☑ Reset maintenance tank according to the instructions in the maintenance tank section.

Possible Prevention

- ☑ Do not let the maintenance tank fall below 50%.

Lights are flashing on the control panel

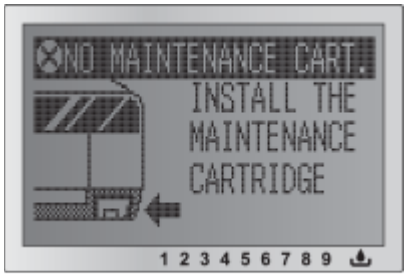
Possible Causes

- ☑ Green lights flashing mean that the printer is receiving data, charging ink, or cleaning the print head. This is a normal function.
- ☑ Red lights flashing mean that the printer has encountered a fatal operation.

Possible Solutions

- ☑ Power down the printer. Count to ten. Power the printer up again. If the problem persists, see the section on startup issues.

NO MAINTENANCE CART (but the maintenance tank is installed)



Possible Causes

- ☑ The table is in the loading position. This is a normal function.

Possible Solutions

- ☑ The message will clear with the table is moved to the print position.

Printing Problems

When printing, the print head moves, but no ink sprays out

Possible Causes and Solutions

- ☑ The printer needs a head cleaning.
  - Perform a head cleaning and nozzle check.
  - Perform a powerful cleaning cycle and a nozzle check.
- ☑ The dampers are faulty or expired.
  - Order replacement dampers and contact Melco Tech.
- ☑ Capping station is clogged.
  - The capping station may need cleaning.
  - If the print head did not seat properly, all of the nozzles may be clogged. Contact Melco Tech.
- ☑ No ink is flowing from the cartridge.
  - A vacuum can be created in the ink cartridge. Contact Melco Tech or replace with a new cartridge.
- ☑ The ribbon cable to the print head is burnt or not connected.
  - This can happen if you replaced a print head and did not ensure that the cable was properly attached.
- ☑ Main board is bad.
  - There is a chance that the main board is bad or has a defect. Contact Melco Tech.

The printer is not responding to a print job.

Possible Causes and Solutions

- ☑ The printer is not ready to print the job.
  - Check for the ready message at the printer display.
- ☑ There is a connection problem.
  - Check the USB connection. Remove the cable and reinsert it.
- ☑ There is a communication error between the printer and computer.
  - Restart the printer and the computer to ensure that all pending jobs have been deleted.

Possible Solutions

- ☑ Use shorter SB cables and avoid switches or hubs with large traffic loads.
- ☑ Properly cancel print jobs without leaving jobs in the spooler.

The print head is leaking ink

Possible Causes and Solutions

- ☑ The print head was damaged by crashing into an obstruction.
  - Order a replacement print head and contact Melco Tech.
- ☑ The capping station is dirty.
  - Thoroughly clean the capping station. This will prevent buildup on the capping station and the print head.
- ☑ Too much is in the cartridges.
  - If the cartridges are overfilled, there could be too much pressure in the ink lines and ink could be forced out of the print head. Cartridges should be filled below the maximum ink line.
- ☑ Altitude is affecting the ink pressure.
  - Higher altitudes can affect the pressure in and around the ink system. If you are experiencing a large amount of issues and are at a higher altitude, fill the ink cartridges with a lesser amount.
- ☑ The printer is not level.
  - If the printer is not level, the ink system will not be level either. This will also have an effect on the pressure in and around the ink system. Make sure the printer is level.
- ☑ Faulty cartridges.
  - Change the ink cartridges and contact Melco Tech.
- ☑ The dampers are faulty or expired.
  - Order replacement dampers and contact Melco Tech.

Possible Solutions

- ☑ Always adjust the table height.
- ☑ Clean the capping station on a regular basis.
- ☑ Clean debris from around the print head on a regular basis.
- ☑ Keep the printer level.
- ☑ Don't overfill the ink cartridges.

Print head clogging issues

Possible Causes and Solutions

- ☑ The capping station is dirty and either not cleaning the print head completely or adding more debris to the print head and causing the print head to become clogged.
    - Thoroughly clean the capping station and the wiper blade as described in the daily or weekly maintenance procedures.
- ☑ Ink in the nozzle opening has dried out from exposure to air for an extended period.
    - Perform head cleans until a decent nozzle check is achieved.
    - Perform a powerful cleaning cycle and check for a decent nozzle check.
    - A serious or permanent clog of the print head may require replacing the print head. Please contact Melco Tech.
- ☑ The print head was damaged by crashing into an obstruction.
    - Order a replacement print head and contact Melco Tech.

Possible Solutions

- ☑ Perform the daily, weekly, and monthly maintenance procedures as described.
- ☑ Perform head cleans and nozzle checks before printing on garments.

☑ ***Pretreated fabric must not contact the print head as the pretreatment will react with the print head surface and potentially block nozzles. Should contact occur, clean the print head immediately with alcohol.***

Load Paper. On the table control panel display appears preparation error 0020

Possible Causes and Solutions

- ☑ The preparation to print couldn't start correctly.
    - This message may appear after the printer has printed the white layer and before the CMYK layer. To bypass, press Shift+F1. The print job does not get lost and the garment is not damaged. It has been noted that if the maintenance tank is over 50% full, this may happen more frequently. To prevent, empty and reset the maintenance tank more often.

Cancelling a print job

Possible Causes and Solutions

1. Immediate stop to the printing - Power OFF the printer.
2. Cancel the printing - Cancel the job and all other pending jobs from the printer spooler in the windows control panel "Printers and Faxes". Ensure on the computer that all print jobs have been deleted.
3. Restart printer.

Issues Covered

Startup Problems

Platen moves and stops. The red limit light is on.

Possible Causes

- ☑ The table height has exceeded maximum

Possible Solutions

- ☑ Press the down button on the table control panel until the limit light switches off.

During printer startup, the error message service call (1601) appears. On the printer control panel, the two orange lights are flashing and the green light is on. The table control panel display reads error 0002.

Possible Causes

- ☑ Cartridge or tank problem detected.

Possible Solutions

- ☑ The message is informing the user that something is wrong with the chips and/or cartridges.
    1. Power down the printer.
    2. Start the printer in diagnostic mode (F1 + Power on)
    3. The following messages will be displayed
        - NO INK CARTRIDGE
        - NO MAINTENANCE CARTRIDGE
    4. The most common solution is to reinsert the cartridge and or the ARChip. The ARChips may also need to be cleaned from any dust or dirt. For more information on these chips, refer to the ink cartridge section of this document.
    5. This error indicates that there is a cartridge issue (cartridge not inserted properly, missing or damaged chip, or maintenance tank not reset).

Paper Error (press the down button. load paper correctly)

Possible Causes

- ☑ There is a wrong setting in the printer setup properties.

Possible Solutions

- ☑ This error appears when a setting inside the printer menu has been changed. This setting is the "Printer Setup>PPR SIZE CHECK" which always needs to be "OFF".
    1. Power down the printer.
    2. Start the printer in diagnostic mode (F1 + Power on)
    3. Locate the setting in the printer control panel menu.
    4. Enter the printer setup properties and check for the setting "PPR SIZE CHECK"
    5. Set it to "OFF"
    6. Restart the printer in normal mode.

Service call 150C

Possible Causes

- ☑ There is a wrong operation in the printer startup.

Possible Solutions

- ☑ This error message indicates that the gear system which moves the print head during the initialization cannot function properly. If after a simple restart the problem persists, contact Melco Tech for information on removing the gear system and resizing the spring inside.

Service call 1226

Possible Causes

- ☑ Wrong table movement has been detected during startup.

Possible Solutions

- ☑ This error appears when the user doesn't press SHIFT+F1 when the "load paper" message appears and instead presses the HOME button. It can also appear after the "Load Paper Correctly" message. in this case, the table will move suddenly to the back of the printer where it will reach the terminal switch.
- ☑ If the 1226 error appears during the startup, it could be caused from a pending print job.
    1. Remove the USB cable from the printer.
    2. Restart the printer.
    3. Clear all pending print jobs from the computer.
- ☑ If the error still persists, it could be cause by an over-tight movement belt of the table or table movement problem. Contact Melco Tech.

Transporting the Printer

Preparing the Printer for Transport or Shipment

Please make sure you have performed the following procedures before transporting the printer.

1. Clean all the ink cartridges and fill them with cleaning solution.
2. Perform 5 powerful cleanings until dampers and print head are clean too.
3. Perform the daily and weekly maintenance on the printer
4. Switch off the printer and remove the power cable and data cable.
5. Remove the cartridges and place them in a plastic bag.
6. Empty the maintenance tank and put it back into the printer.
7. Attach the shipping fixture to prevent the table from shifting during shipment.
8. Repack the printer in the box it was shipped in.
9. Keep the printer level while transporting it.
10. Remember that when using any common carrier, the printer is your responsibility until it is received in good condition at our facility. Be certain to insure the printer for the full value.

Two or more people are required to lift the printer.
Review all warnings in the Safety Instructions section.

Moving the Printer to Another Position

Please make sure you have performed the following procedures before moving the printer.

1. Switch off the printer and remove the power cable and data cable.
2. Empty the maintenance tank and put it back in the printer.
3. Attach the shipping fixture to prevent the table from shifting.

Two or more people are required to lift the printer.
Review all warnings in the Safety Instructions section.

Material Safety Data Sheets

MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: **ARTISTRI® P5100 CYAN PIGMENT INK**

Product Use: Ink-Jet Printing Ink

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont Ink Jet and Specialty Colorants
DuPont Electronic and Communication Technologies
Barley Mill Plaza
Wilmington, DE (USA)

PHONE NUMBERS

Product, Safety, Health and Environmental Information	: 1-302-695-9682 (8 a.m.-5 p.m. ET, M-F, U.S.A)
Transport Emergency	: CHEMTREC: 1-800-424-9300 (24 hours, U.S.A)
Medical Emergency	: 1-800-441-3637 (24 hours, U.S.A.)

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components (% by weight)

Material	CAS Number	%
Water	7732-18-5	40-93
Aliphatic Alcohol	**	1-10
*Ethylene Glycol	107-21-1	1-10
Humectant	**	1-10
Polyglycol Ether	**	1-10
Polymers	**	1-10
Melamine	**	1-5
Blue Pigment	**	1-5
Copper (as an integral part of the pigment molecule)	7440-50-8	<0.5

*Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

Components (Remarks)

**The specific identity for each component not identified by a CAS Registry Number is withheld as a trade secret.

3. HAZARDS IDENTIFICATION

Potential Health Effects

THIS PRODUCT CAN BE USED SAFELY WHEN USED AS DIRECTED AND WHEN APPLICABLE SAFETY PRECAUTIONS ARE FOLLOWED.

POTENTIAL HEALTH EFFECTS FROM PRODUCT

Potential routes of overexposure to this product are skin contact, eye contact and inhalation of vapor.

Ingestion is not expected to be a significant route of exposure for this product under normal use conditions.

There is no toxicity data available for this specific formulation. Any potential hazards are presumed to be due to exposure to the components.

ADDITIONAL HEALTH EFFECTS

Since this mixture has not been tested as a whole to determine the hazards by all routes of exposure, information is provided for each hazardous component of the mixture to meet requirements of OSHA's Hazard Communication Standard (29 CFR 1910.1200). The effects noted occur from exposure to the pure component unless otherwise noted.

INFORMATION FOR COMPONENTS

ALIPHATIC ALCOHOL

Eye Contact - May cause slight eye irritation.

Skin Contact - May cause slight skin irritation. Not expected to be absorbed through the skin.

Inhalation - Breathing of spray or mist may cause irritation of the upper respiratory tract.

Ingestion - This material has a low order of acute oral toxicity based on animal data.

ETHYLENE GLYCOL

Eye Contact - May cause slight transient (temporary) eye irritation. Corneal injury is unlikely. Vapors or mists may cause eye irritation.

Skin Contact - Essentially nonirritating to skin. Repeated skin exposure to large quantities may result in absorption of harmful amounts.

Inhalation - At room temperature, exposure to vapors are minimal due to physical properties; higher temperatures may generate vapor levels sufficient to cause adverse effects.

Ingestion - Single dose oral toxicity is considered to be moderate. Excessive exposure may cause central nervous system effects, cardiopulmonary effects (metabolic acidosis), and kidney failure. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing amounts larger than that may cause serious injury, even death.

Systemic (Other Target Organ) Effects - Excessive exposure may cause irritation to upper respiratory tract. Observations in animals include kidney and lever effects and deposition of calcium salts in various tissues after long-term dietary intake of ethylene glycol.

Cancer Information - Ethylene glycol did not cause cancer in long-term animal studies.

Teratology (Birth Defects) - Based on animal studies, ingestion of very large amounts of ethylene glycol appears to be the major and possibly only route of exposure to produce birth defects. Exposures by inhalation (tested nose-only in animals to prevent ingestion) or skin contact, the primary routes of occupational exposure, had minimal or essentially no effect on the fetus.

Reproductive Effects - Ingestion of large amounts of ethylene glycol has been shown to interfere with reproduction in animals. Specifically, growth retardation and decreased litter size in rats and mice and mating frequency in mice were observed.

HUMECTANT

Eye Contact - May cause slight transient (temporary) eye irritation. Corneal injury is unlikely.

Skin Contact - Prolonged or repeated exposure not likely to cause significant skin irritation. A single prolonged exposure is not likely to result in the material being absorbed through the skin in harmful amounts.

Inhalation - At room temperature, vapors are minimal due to physical properties. If heated or sprayed as an aerosol, airborne material may cause upper respiratory irritation.

Ingestion - Single dose oral toxicity is considered to be extremely low. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; swallowing amount larger than that may cause injury. Signs and symptoms of excessive exposure may be central nervous system effects and increased blood sugar levels.

Systemic (Other Target Organ) Effects - Repeated excessive exposure may cause increased fat levels in blood. Observations in animals include kidney, liver, and gastrointestinal effects with very large oral doses.

Cancer Information - Did not cause cancer in long-term animal studies.

Teratology - Birth defects are unlikely. Exposures having no adverse effects on the mother should have no effect on the fetus.

Reproductive Effects - Reproductive effects seen in female animals are believed to be due to altered nutritional status resulting from extremely high doses in their diets. Similar effects have been seen in animals fed synthetic diets.

POLYGLYCOL ETHER

Eye Contact - May cause slight transient (temporary) eye irritation. Corneal injury is unlikely.

Skin Contact - Prolonged or repeated exposure not likely to cause significant skin irritation. A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. Prolonged or repeated exposure to very large amounts of component(s) in this product may cause narcosis (drowsiness).

Ingestion - single dose oral toxicity is considered to be low. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; swallowing amounts larger than that may cause injury.

Inhalation - Single exposure to vapors is not likely to be hazardous.

Systemic (Other Target Organ) Effects - Signs and symptoms of excessive exposure may be anesthetic or narcotic effects.

Teratology (Birth Defects) - Birth defects are unlikely. Even exposure have an adverse effect on the mother should have no effect on the fetus.

MELAMINE

Eye Contact – Direct contact with this material may cause mild eye irritation.

Skin Contact – Direct contact with this material may cause mild skin irritation.

Inhalation – Material is not expected to be harmful if inhaled.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

4. FIRST AID MEASURES

First Aid

INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing. Consult a physician. Wash contaminated clothing before reuse.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

Ingestion is not an expected route of exposure during normal use of the product. If ingested, consult a physician.

5. FIRE FIGHTING MEASURES

Flammable Properties

Flash Point	: >93.3 °C (>200 °F)
Method	: Closed Cup
Approximate Flammable Limits in Air, % by Volume	
LEL	: Not Available
UEL	: Not Available
Autoignition Temperature	: Not Available

Product is a nonflammable water-based solution.

Hazardous combustion products (gases/vapors) produced in fire can include carbon monoxide, carbon dioxide, nitrogen oxides, oxides of copper and smoke.

Extinguishing Media

Use media appropriate for surrounding material.

Fire Fighting Instructions

This product is not flammable. Use normal firefighting procedures for the area.

6. ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Initial Containment

Dike spill.

Spill Clean Up

Soak up with absorbent material.

7. HANDLING AND STORAGE

Handling (Personnel)

Avoid contact with eyes, skin, or clothing.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal Protective Equipment

EYE/FACE PROTECTION
Wear safety glasses. Wear coverall chemical splash goggles and face shield when the possibility exists for eye and face contact due to splashing or spraying of the material.

RESPIRATORS
Respirators are not needed for normal use.

PROTECTIVE CLOTHING
If there is potential for significant dermal contact wear appropriate impervious clothing and gloves.

Applicable Exposure Limits and Exposure Data

WATER

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >90 mL/kg (RTECS)
LC_{50} (rat, inhalation/4 hr.)	: No data available

ALIPHATIC ALCOHOL

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >5,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: No data available

ETHYLENE GLYCOL

PEL (OSHA)	: None Established
TLV (ACGIH)	: Ceiling: 100 mg/m^3, aerosol
AEL * (DuPont)	: 50 ppm, 8 Hr. TWA, vapor
IEL (2000/39/EC)	: 52 mg/m^3, 20 ppm, skin STEL 104 mg/m^3, 40 ppm
LD_{50} (rat, oral)	: 4,700 mg/kg (RTECS)

LD_{50} (rabbit, dermal)	: 9,530 uL/kg (RTECS)
LC_{50} (rat, inhalation/4 hr.)	: >200 mg/m^3 (RTECS)

HUMECTANT

PEL (OSHA)	: 5 mg/m^3, 8 Hr. TWA (mist, respirable fraction) 15 mg/m^3, 8 Hr. TWA (mist, total dust)
TLV (ACGIH)	: 10 mg/m^3, 8 Hr. TWA (mist)
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >17,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: >4.9 mg/liter (supplier)

POLYGLYCOL ETHER

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >3,200 mg/kg (supplier)
LD_{50} (rabbit, dermal)	: >20 mL/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: No data available

POLYMERS

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: No data available
LC_{50} (rat, inhalation/4 hr.)	: No data available

MELAMINE

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >5,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: >20 mg/L (supplier)

BLUE PIGMENT

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >5,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: No data available

COPPER (AS AN INTEGRAL PART OF THE PIGMENT MOLECULE)

PEL (OSHA)	: 5 mg/m^3, Particulates not otherwise regulated, respirable fraction 15 mg/m^3, Particulates not otherwise regulated, total dust
TLV (ACGIH)	: 3 mg/m^3, Particulates not otherwise specified, respirable 10 mg/m^3, Particulates not otherwise specified, inhalable
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: No data available
LC_{50} (rat, inhalation/4 hr.)	: No data available

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Form	: Liquid
Color	: Cyan (Blue)
Odor	: Slight
Solubility in Water	: Miscible
pH	: About 8
Specific Gravity	: About 1

Other Information

Flash Point	: >93.3 °C (>200 °F)
Method	: Closed Cup
Approximate Flammable Limits in Air, % by Volume	
LEL	: Not Available
UEL	: Not Available
Autoignition Temperature	: Not Available

10. STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and storage conditions.

Incompatibility with Other Materials

None reasonably foreseeable.

Decomposition

Decomposition does not occur during normal use.

Polymerization

Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Animal Data

No data available for product.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

No data available for product.

13. DISPOSAL CONSIDERATIONS

Waste Disposal

DO NOT DISCARD INTO ANY SEWERS, INTO ANY BODY OF WATER, OR ON THE GROUND. Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local laws and regulations. This product contains a copper compound that might be managed by applicable waste disposal regulations.

14. TRANSPORTATION INFORMATION

(Not meant to be all inclusive)

DOT (Domestic Surface, U.S.A.)	: Not regulated
ICAO/IATA (Air)	: Not regulated
IMO/IMDG (Ocean)	: Not regulated

15. REGULATORY INFORMATION

(Not meant to be all inclusive - selected regulations represented)

U.S. Regulations

Federal Regulations

TSCA Inventory Status - All components of this product are listed, or exempt from listing, on the TSCA 8(b) chemical inventory.

TSCA Section 12(b) Export Notification - This product can contain:

Tetrahydrofuran (109-99-9)	<0.3%

State Regulations

State Right-To-Know

Warning: This product may contain substances known to the state of California to cause cancer, birth defects or other reproductive harm.

European Union Regulations

EU Inventory Status - All components of this product are listed, or are exempt from listing, on the EINECS chemical inventory.

Transport Information - This product is not classified as dangerous within the meaning of transport regulations.

Labeling - This product does not need to be labeled in accordance with EC-Directive 1999/45/EC.

Switzerland

Switzerland VOC Regulations (Ordinance 814.018, *Verordnung über die Lenkungsabgabe auf flüchtigen organischen Verbindungen*, as of 28 December 2000)

This product is exempt from Swiss VOC regulations.

16. OTHER INFORMATION

HMIS® Rating

Health	: 1
Flammability	: 1
Reactivity	: 0

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

MSDS Contact Information

Global Product Stewardship and Regulatory Affairs
DuPont Ink Jet and Specialty Colorants
DuPont Electronic and Communication Technologies
Barley Mill Plaza
Wilmington, DE (U.S.A.)
1-302-695-9682 (U.S.A.)

Revision History

18 July 2008	New MSDS

Key

ACGIH	American Conference of Governmental Industrial Hygienists
AEL	Acceptable Exposure Limit (DuPont)
Cmpds	Compounds
DOT	Department of Transportation (U.S.A.)
ET	Eastern Time (U.S.A.)
EU	European Union
HMIS®	Hazardous Material Information System (National Paint and Coatings Association)
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IEL	Indicative Exposure Limit (EU Directive 2000/39/EC)
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
LEL or LFL	Lower Explosive Limit or Lower Flammable Limit
M-F	Monday through Friday
NA	North America
NIOSH	National Institute of Occupational Safety and Health (U.S.A.)
NOHSC	National Occupational Health and Safety Commission (Worksafe Australia)
NOS	Not Otherwise Specified
NTP	National Toxicology Program (U.S.A.)
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration (U.S.A.)
PEL	Permissible Exposure Limit
RTECS	Registry of Toxic Effects of Chemical Substances (NIOSH)
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act (U.S.A)
TWA	Time-weighted Average
UEL or UFL	Upper Explosive Limit or Upper Flammable Limit
U.S.A.	United States of America
VOC	Volatile Organic Compound(s)
WEEL	Workplace Environmental Exposure Level

End of MSDS

MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: **ARTISTRI® P5200 MAGENTA PIGMENT INK**

Product Use: Ink-Jet Printing Ink

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont Imaging Technologies
DuPont Electronic and Communication Technologies
Barley Mill Plaza
Wilmington, DE (USA)

PHONE NUMBERS

Product, Safety, Health and Environmental Information	: 1-302-695-9682 (8 a.m.-5 p.m. ET, M-F, U.S.A)
Transport Emergency	: CHEMTREC: 1-800-424-9300 (24 hours, U.S.A)
Medical Emergency	: 1-800-441-3637 (24 hours, U.S.A.)

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components (% by weight)

Material	CAS Number	%
Water	7732-18-5	45-93
Aliphatic Alcohol	**	1-10
*Ethylene Glycol	107-21-1	1-10
Humectant	**	1-10
Polymers	**	1-10
Melamine	**	1-5
Red Pigment	**	1-5
*Triethylene Glycol Monobutyl Ether	143-22-6	1-5

*Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

Components (Remarks)

**The specific identity for each component not identified by a CAS Registry Number is withheld as a trade secret.

3. HAZARDS IDENTIFICATION

Potential Health Effects

THIS PRODUCT CAN BE USED SAFELY WHEN USED AS DIRECTED AND WHEN APPLICABLE SAFETY PRECAUTIONS ARE FOLLOWED.

POTENTIAL HEALTH EFFECTS FROM PRODUCT

Potential routes of overexposure to this product are skin contact, eye contact and inhalation of vapor.

Ingestion is not expected to be a significant route of exposure for this product under normal use conditions.

There is no toxicity data available for this specific formulation. Any potential hazards are presumed to be due to exposure to the components.

ADDITIONAL HEALTH EFFECTS

Since this mixture has not been tested as a whole to determine the hazards by all routes of exposure, information is provided for each hazardous component of the mixture to meet requirements of OSHA's Hazard Communication Standard (29 CFR 1910.1200). The effects noted occur from exposure to the pure component unless otherwise noted.

INFORMATION FOR COMPONENTS

ALIPHATIC ALCOHOL

Eye Contact - May cause slight eye irritation.

Skin Contact - May cause slight skin irritation. Not expected to be absorbed through the skin.

Inhalation - Breathing of spray or mist may cause irritation of the upper respiratory tract.

Ingestion - This material has a low order of acute oral toxicity based on animal data.

ETHYLENE GLYCOL

Eye Contact - May cause slight transient (temporary) eye irritation. Corneal injury is unlikely. Vapors or mists may cause eye irritation.

Skin Contact - Essentially nonirritating to skin. Repeated skin exposure to large quantities may result in absorption of harmful amounts.

Inhalation - At room temperature, exposure to vapors are minimal due to physical properties; higher temperatures may generate vapor levels sufficient to cause adverse effects.

Ingestion - Single dose oral toxicity is considered to be moderate. Excessive exposure may cause central nervous system effects, cardiopulmonary effects (metabolic acidosis), and kidney failure. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing amounts larger than that may cause serious injury, even death.

Systemic (Other Target Organ) Effects - Excessive exposure may cause irritation to upper respiratory tract. Observations in animals include kidney and lever effects and deposition of calcium salts in various tissues after long-term dietary intake of ethylene glycol.

Cancer Information - Ethylene glycol did not cause cancer in long-term animal studies.

Teratology (Birth Defects) - Based on animal studies, ingestion of very large amounts of ethylene glycol appears to be the major and possibly only route of exposure to produce birth defects. Exposures by inhalation (tested nose-only in animals to prevent ingestion) or skin contact, the primary routes of occupational exposure, had minimal or essentially no effect on the fetus.

Reproductive Effects - Ingestion of large amounts of ethylene glycol has been shown to interfere with reproduction in animals. Specifically, growth retardation and decreased litter size in rats and mice and mating frequency in mice were observed.

HUMECTANT

Eye Contact - May cause slight transient (temporary) eye irritation. Corneal injury is unlikely.

Skin Contact - Prolonged or repeated exposure not likely to cause significant skin irritation. A single prolonged exposure is not likely to result in the material being absorbed through the skin in harmful amounts.

Inhalation - At room temperature, vapors are minimal due to physical properties. If heated or sprayed as an aerosol, airborne material may cause upper respiratory irritation.

Ingestion - Single dose oral toxicity is considered to be extremely low. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; swallowing amount larger than that may cause injury. Signs and symptoms of excessive exposure may be central nervous system effects and increased blood sugar levels.

Systemic (Other Target Organ) Effects - Repeated excessive exposure may cause increased fat levels in blood. Observations in animals include kidney, liver, and gastrointestinal effects with very large oral doses.

Cancer Information - Did not cause cancer in long-term animal studies.

Teratology - Birth defects are unlikely. Exposures having no adverse effects on the mother should have no effect on the fetus.

Reproductive Effects - Reproductive effects seen in female animals are believed to be due to altered nutritional status resulting from extremely high doses in their diets. Similar effects have been seen in animals fed synthetic diets.

TRIETHYLENE GLYCOL MONOBUTYL ETHER

Eye Contact - Causes severe irritation, experienced as discomfort or pain, excess blinking and tear production, with marked excess redness and swelling of the conjunctiva. Causes corneal injury.

Skin Contact - May cause slight irritation with discomfort and local redness. Prolonged or widespread contact may result in the absorption of potentially harmful amounts of material.

Inhalation - Short-term harmful health effects are not expected from vapor generated at ambient temperature.

Ingestion - Slightly toxic. Abdominal discomfort, nausea and vomiting may occur.

MELAMINE

Eye Contact – Direct contact with this material may cause mild eye irritation.

Skin Contact – Direct contact with this material may cause mild skin irritation.

Inhalation – Material is not expected to be harmful if inhaled.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

4. FIRST AID MEASURES

First Aid

INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing. Consult a physician. Wash contaminated clothing before reuse.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

Ingestion is not an expected route of exposure during normal use of the product. If ingested, consult a physician.

5. FIRE FIGHTING MEASURES

Flammable Properties

Flash Point	: >93.3 °C (>200 °F)
Method	: Closed Cup
Approximate Flammable Limits in Air, % by Volume	
LEL	: Not Available
UEL	: Not Available
Autoignition Temperature	: Not Available

Product is a nonflammable water-based solution.

Hazardous combustion products (gases/vapors) produced in fire can include carbon monoxide, carbon dioxide, nitrogen oxides and smoke.

Extinguishing Media

Use media appropriate for surrounding material.

Fire Fighting Instructions

This product is not flammable. Use normal firefighting procedures for the area.

6. ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Initial Containment

Dike spill.

Spill Clean Up

Soak up with absorbent material.

7. HANDLING AND STORAGE

Handling (Personnel)

Avoid contact with eyes, skin, or clothing.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal Protective Equipment

EYE/FACE PROTECTION
Wear safety glasses. Wear coverall chemical splash goggles and face shield when the possibility exists for eye and face contact due to splashing or spraying of the material.

RESPIRATORS
Respirators are not needed for normal use.

PROTECTIVE CLOTHING
If there is potential for significant dermal contact wear appropriate impervious clothing and gloves.

Applicable Exposure Limits and Exposure Data

WATER

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >90 mL/kg (RTECS)
LC_{50} (rat, inhalation/4 hr.)	: No data available

ALIPHATIC ALCOHOL

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >5,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: No data available

ETHYLENE GLYCOL

PEL (OSHA)	: None Established
TLV (ACGIH)	: Ceiling: 100 mg/m^3, aerosol
AEL * (DuPont)	: 50 ppm, 8 Hr. TWA, vapor
IEL (2000/39/EC)	: 52 mg/m^3, 20 ppm, skin STEL 104 mg/m^3, 40 ppm
LD_{50} (rat, oral)	: 4,700 mg/kg (RTECS)
LD_{50} (rabbit, dermal)	: 9,530 uL/kg (RTECS)
LC_{50} (rat, inhalation/4 hr.)	: >200 mg/m^3 (RTECS)

HUMECTANT

PEL (OSHA)	: 5 mg/m^3, 8 Hr. TWA (mist, respirable fraction) 15 mg/m^3, 8 Hr. TWA (mist, total dust)
TLV (ACGIH)	: 10 mg/m^3, 8 Hr. TWA (mist)
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >17,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: >4.9 mg/liter (supplier)

POLYMERS

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: No data available
LC_{50} (rat, inhalation/4 hr.)	: No data available

MELAMINE

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >5,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: >20 mg/L (supplier)

RED PIGMENT

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >2,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: No data available

TRIETHYLENE GLYCOL MONOBUTYL ETHER

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: 5,300 mg/kg (RTECS)
LD_{50} (rabbit, dermal)	: 3,540 uL/kg (RTECS)
LC_{50} (rat, inhalation/4 hr.)	: No data available

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Form	: Liquid
Color	: Magenta (Red)
Odor	: Slight
Solubility in Water	: Miscible
pH	: About 8
Specific Gravity	: About 1

Other Information

Flash Point	: >93.3 °C (>200 °F)
Method	: Closed Cup
Approximate Flammable Limits in Air, % by Volume	
LEL	: Not Available
UEL	: Not Available
Autoignition Temperature	: Not Available

10. STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and storage conditions.

Incompatibility with Other Materials

None reasonably foreseeable.

Decomposition

Decomposition does not occur during normal use.

Polymerization

Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Animal Data

No data available for product.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

No data available for product.

13. DISPOSAL CONSIDERATIONS

Waste Disposal

DO NOT DISCARD INTO ANY SEWERS, INTO ANY BODY OF WATER, OR ON THE GROUND. Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local laws and regulations.

14. TRANSPORTATION INFORMATION

(Not meant to be all inclusive)

DOT (Domestic Surface, U.S.A.)	: Not regulated
ICAO/IATA (Air)	: Not regulated
IMO/IMDG (Ocean)	: Not regulated

15. REGULATORY INFORMATION

(Not meant to be all inclusive - selected regulations represented)

U.S. Regulations

Federal Regulations

TSCA Inventory Status - All components of this product are listed, or exempt from listing, on the TSCA 8(b) chemical inventory.

TSCA Section 12(b) Export Notification - This product can contain:

None above the deminimus value.

State Regulations

State Right-To-Know

Warning: This product may contain substances known to the state of California to cause cancer, birth defects or other reproductive harm.

European Union Regulations

EU Inventory Status - All components of this product are listed, or are exempt from listing, on the EINECS chemical inventory.

Transport Information - This product is not classified as dangerous within the meaning of transport regulations.

Labeling - This product does not need to be labeled in accordance with EC-Directive 1999/45/EC.

Switzerland

Switzerland VOC Regulations (Ordinance 814.018, *Verordnung über die Lenkungsabgabe auf flüchtigen organischen Verbindungen*, as of 28 December 2000)

This product is exempt from Swiss VOC regulations.

16. OTHER INFORMATION

HMIS® Rating

Health	: 1
Flammability	: 1
Reactivity	: 0

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

MSDS Contact Information

Global Product Stewardship and Regulatory Affairs
DuPont Imaging Technologies
DuPont Electronic and Communication Technologies
Barley Mill Plaza
Wilmington, DE (U.S.A.)
1-302-695-9682 (U.S.A.)

Revision History

18 July 2008	New MSDS

Key

ACGIH	American Conference of Governmental Industrial Hygienists
AEL	Acceptable Exposure Limit (DuPont)
Cmpds	Compounds
DOT	Department of Transportation (U.S.A.)
ET	Eastern Time (U.S.A.)
EU	European Union
HMIS®	Hazardous Material Information System (National Paint and Coatings Association)
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IEL	Indicative Exposure Limit (EU Directive 2000/39/EC)
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
LEL or LFL	Lower Explosive Limit or Lower Flammable Limit
M-F	Monday through Friday
NA	North America
NIOSH	National Institute of Occupational Safety and Health (U.S.A.)
NOHSC	National Occupational Health and Safety Commission (Worksafe Australia)
NOS	Not Otherwise Specified
NTP	National Toxicology Program (U.S.A.)
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration (U.S.A.)
PEL	Permissible Exposure Limit
RTECS	Registry of Toxic Effects of Chemical Substances (NIOSH)
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act (U.S.A)
TWA	Time-weighted Average
UEL or UFL	Upper Explosive Limit or Upper Flammable Limit
U.S.A.	United States of America
VOC	Volatile Organic Compound(s)
WEEL	Workplace Environmental Exposure Level

End of MSDS

MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: **ARTISTRI® P5300 YELLOW PIGMENT INK**

Product Use: Ink-Jet Printing Ink

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont Ink Jet and Specialty Colorants
DuPont Electronic and Communication Technologies
Barley Mill Plaza
Wilmington, DE (USA)

PHONE NUMBERS

Product, Safety, Health and Environmental Information	: 1-302-695-9682 (8 a.m.-5 p.m. ET, M-F, U.S.A)
Transport Emergency	: CHEMTREC: 1-800-424-9300 (24 hours, U.S.A)
Medical Emergency	: 1-800-441-3637 (24 hours, U.S.A.)

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components (% by weight)

Material	CAS Number	%
Water	7732-18-5	40-93
Aliphatic Alcohol	**	1-10
*Ethylene Glycol	107-21-1	1-10
Humectant	**	1-10
Polyglycol Ether	**	1-10
Polymers	**	1-10
Melamine	**	1-5
Yellow Pigment	**	1-5

*Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

Components (Remarks)

**The specific identity for each component not identified by a CAS Registry Number is withheld as a trade secret.

3. HAZARDS IDENTIFICATION

Potential Health Effects

THIS PRODUCT CAN BE USED SAFELY WHEN USED AS DIRECTED AND WHEN APPLICABLE SAFETY PRECAUTIONS ARE FOLLOWED.

POTENTIAL HEALTH EFFECTS FROM PRODUCT

Potential routes of overexposure to this product are skin contact, eye contact and inhalation of vapor.

Ingestion is not expected to be a significant route of exposure for this product under normal use conditions.

There is no toxicity data available for this specific formulation. Any potential hazards are presumed to be due to exposure to the components.

ADDITIONAL HEALTH EFFECTS

Since this mixture has not been tested as a whole to determine the hazards by all routes of exposure, information is provided for each hazardous component of the mixture to meet requirements of OSHA's Hazard Communication Standard (29 CFR 1910.1200). The effects noted occur from exposure to the pure component unless otherwise noted.

INFORMATION FOR COMPONENTS

ALIPHATIC ALCOHOL

Eye Contact - May cause slight eye irritation.

Skin Contact - May cause slight skin irritation. Not expected to be absorbed through the skin.

Inhalation - Breathing of spray or mist may cause irritation of the upper respiratory tract.

Ingestion - This material has a low order of acute oral toxicity based on animal data.

ETHYLENE GLYCOL

Eye Contact - May cause slight transient (temporary) eye irritation. Corneal injury is unlikely. Vapors or mists may cause eye irritation.

Skin Contact - Essentially nonirritating to skin. Repeated skin exposure to large quantities may result in absorption of harmful amounts.

Inhalation - At room temperature, exposure to vapors are minimal due to physical properties; higher temperatures may generate vapor levels sufficient to cause adverse effects.

Ingestion - Single dose oral toxicity is considered to be moderate. Excessive exposure may cause central nervous system effects, cardiopulmonary effects (metabolic acidosis), and kidney failure. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing amounts larger than that may cause serious injury, even death.

Systemic (Other Target Organ) Effects - Excessive exposure may cause irritation to upper respiratory tract. Observations in animals include kidney and lever effects and deposition of calcium salts in various tissues after long-term dietary intake of ethylene glycol.

Cancer Information - Ethylene glycol did not cause cancer in long-term animal studies.

Teratology (Birth Defects) - Based on animal studies, ingestion of very large amounts of ethylene glycol appears to be the major and possibly only route of exposure to produce birth defects. Exposures by inhalation (tested nose-only in animals to prevent ingestion) or skin contact, the primary routes of occupational exposure, had minimal or essentially no effect on the fetus.

Reproductive Effects - Ingestion of large amounts of ethylene glycol has been shown to interfere with reproduction in animals. Specifically, growth retardation and decreased litter size in rats and mice and mating frequency in mice were observed.

HUMECTANT

Eye Contact - May cause slight transient (temporary) eye irritation. Corneal injury is unlikely.

Skin Contact - Prolonged or repeated exposure not likely to cause significant skin irritation. A single prolonged exposure is not likely to result in the material being absorbed through the skin in harmful amounts.

Inhalation - At room temperature, vapors are minimal due to physical properties. If heated or sprayed as an aerosol, airborne material may cause upper respiratory irritation.

Ingestion - Single dose oral toxicity is considered to be extremely low. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; swallowing amount larger than that may cause injury. Signs and symptoms of excessive exposure may be central nervous system effects and increased blood sugar levels.

Systemic (Other Target Organ) Effects - Repeated excessive exposure may cause increased fat levels in blood. Observations in animals include kidney, liver, and gastrointestinal effects with very large oral doses.

Cancer Information - Did not cause cancer in long-term animal studies.

Teratology - Birth defects are unlikely. Exposures having no adverse effects on the mother should have no effect on the fetus.

Reproductive Effects - Reproductive effects seen in female animals are believed to be due to altered nutritional status resulting from extremely high doses in their diets. Similar effects have been seen in animals fed synthetic diets.

POLYGLYCOL ETHER

Eye Contact - May cause slight transient (temporary) eye irritation. Corneal injury is unlikely.

Skin Contact - Prolonged or repeated exposure not likely to cause significant skin irritation. A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. Prolonged or repeated exposure to very large amounts of component(s) in this product may cause narcosis (drowsiness).

Ingestion - single dose oral toxicity is considered to be low. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; swallowing amounts larger than that may cause injury.

Inhalation - Single exposure to vapors is not likely to be hazardous.

Systemic (Other Target Organ) Effects - Signs and symptoms of excessive exposure may be anesthetic or narcotic effects.

Teratology (Birth Defects) - Birth defects are unlikely. Even exposure have an adverse effect on the mother should have no effect on the fetus.

MELAMINE

Eye Contact – Direct contact with this material may cause mild eye irritation.

Skin Contact – Direct contact with this material may cause mild skin irritation.

Inhalation – Material is not expected to be harmful if inhaled.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

4. FIRST AID MEASURES

First Aid

INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing. Consult a physician. Wash contaminated clothing before reuse.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

Ingestion is not an expected route of exposure during normal use of the product. If ingested, consult a physician.

5. FIRE FIGHTING MEASURES

Flammable Properties

Flash Point	: >93.3 °C (>200 °F)
Method	: Closed Cup
Approximate Flammable Limits in Air, % by Volume	
LEL	: Not Available
UEL	: Not Available
Autoignition Temperature	: Not Available

Product is a nonflammable water-based solution.

Hazardous combustion products (gases/vapors) produced in fire can include carbon monoxide, carbon dioxide, nitrogen oxides and smoke.

Extinguishing Media

Use media appropriate for surrounding material.

Fire Fighting Instructions

This product is not flammable. Use normal firefighting procedures for the area.

6. ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Initial Containment

Dike spill.

Spill Clean Up

Soak up with absorbent material.

7. HANDLING AND STORAGE

Handling (Personnel)

Avoid contact with eyes, skin, or clothing.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal Protective Equipment

EYE/FACE PROTECTION
Wear safety glasses. Wear coverall chemical splash goggles and face shield when the possibility exists for eye and face contact due to splashing or spraying of the material.

RESPIRATORS
Respirators are not needed for normal use.

PROTECTIVE CLOTHING
If there is potential for significant dermal contact wear appropriate impervious clothing and gloves.

Applicable Exposure Limits and Exposure Data

WATER

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >90 mL/kg (RTECS)
LC_{50} (rat, inhalation/4 hr.)	: No data available

ALIPHATIC ALCOHOL

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >5,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: No data available

ETHYLENE GLYCOL

PEL (OSHA)	: None Established
TLV (ACGIH)	: Ceiling: 100 mg/m^3, aerosol
AEL * (DuPont)	: 50 ppm, 8 Hr. TWA, vapor
IEL (2000/39/EC)	: 52 mg/m^3, 20 ppm, skin STEL 104 mg/m^3, 40 ppm
LD_{50} (rat, oral)	: 4,700 mg/kg (RTECS)
LD_{50} (rabbit, dermal)	: 9,530 uL/kg (RTECS)
LC_{50} (rat, inhalation/4 hr.)	: >200 mg/m^3 (RTECS)

HUMECTANT

PEL (OSHA)	: 5 mg/m^3, 8 Hr. TWA (mist, respirable fraction) 15 mg/m^3, 8 Hr. TWA (mist, total dust)
TLV (ACGIH)	: 10 mg/m^3, 8 Hr. TWA (mist)
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >17,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: >4.9 mg/liter (supplier)

POLYGLYCOL ETHER

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >3,200 mg/kg (supplier)
LD_{50} (rabbit, dermal)	: >20 mL/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: No data available

POLYMERS

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: No data available
LC_{50} (rat, inhalation/4 hr.)	: No data available

MELAMINE

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >5,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: >20 mg/L (supplier)

YELLOW PIGMENT

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >5,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: No data available

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Form	: Liquid
Color	: Yellow
Odor	: Slight

Solubility in Water	: Miscible
pH	: About 8
Specific Gravity	: About 1

Other Information

Flash Point	: >93.3 °C (>200 °F)
Method	: Closed Cup
Approximate Flammable Limits in Air, % by Volume	
LEL	: Not Available
UEL	: Not Available
Autoignition Temperature	: Not Available

10. STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and storage conditions.

Incompatibility with Other Materials

None reasonably foreseeable.

Decomposition

Decomposition does not occur during normal use.

Polymerization

Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Animal Data

No data available for product.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

No data available for product.

13. DISPOSAL CONSIDERATIONS

Waste Disposal

DO NOT DISCARD INTO ANY SEWERS, INTO ANY BODY OF WATER, OR ON THE GROUND. Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local laws and regulations.

14. TRANSPORTATION INFORMATION

(Not meant to be all inclusive)

DOT (Domestic Surface, U.S.A.)	: Not regulated
ICAO/IATA (Air)	: Not regulated
IMO/IMDG (Ocean)	: Not regulated

15. REGULATORY INFORMATION

(Not meant to be all inclusive - selected regulations represented)

U.S. Regulations

Federal Regulations

TSCA Inventory Status - All components of this product are listed, or exempt from listing, on the TSCA 8(b) chemical inventory.

TSCA Section 12(b) Export Notification - This product can contain:

Tetrahydrofuran (109-99-9)	<0.08%

State Regulations

State Right-To-Know

Warning: This product contains substances known to the state of California to cause cancer, birth defects or other reproductive harm.

European Union Regulations

EU Inventory Status - All components of this product are listed, or are exempt from listing, on the EINECS chemical inventory.

Transport Information - This product is not classified as dangerous within the meaning of transport regulations.

Labeling - This product does not need to be labeled in accordance with EC-Directive 1999/45/EC.

Switzerland

Switzerland VOC Regulations (Ordinance 814.018, *Verordnung über die Lenkungsabgabe auf flüchtigen organischen Verbindungen*, as of 28 December 2000)

This product is exempt from Swiss VOC regulations.

16. OTHER INFORMATION

HMIS® Rating

Health	: 1
Flammability	: 1
Reactivity	: 0

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

MSDS Contact Information

Global Product Stewardship and Regulatory Affairs
DuPont Ink Jet and Specialty Colorants
DuPont Electronic and Communication Technologies
Barley Mill Plaza
Wilmington, DE (U.S.A.)
1-302-695-9682 (U.S.A.)

Revision History

18 July 2008	New MSDS

Key

ACGIH	American Conference of Governmental Industrial Hygienists
AEL	Acceptable Exposure Limit (DuPont)

Cmpds	Compounds
DOT	Department of Transportation (U.S.A.)
ET	Eastern Time (U.S.A.)
EU	European Union
HMIS®	Hazardous Material Information System (National Paint and Coatings Association)
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IEL	Indicative Exposure Limit (EU Directive 2000/39/EC)
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
LEL or LFL	Lower Explosive Limit or Lower Flammable Limit
M-F	Monday through Friday
NA	North America
NIOSH	National Institute of Occupational Safety and Health (U.S.A.)
NOHSC	National Occupational Health and Safety Commission (Worksafe Australia)
NOS	Not Otherwise Specified
NTP	National Toxicology Program (U.S.A.)
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration (U.S.A.)
PEL	Permissible Exposure Limit
RTECS	Registry of Toxic Effects of Chemical Substances (NIOSH)
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act (U.S.A)
TWA	Time-weighted Average
UEL or UFL	Upper Explosive Limit or Upper Flammable Limit
U.S.A.	United States of America
VOC	Volatile Organic Compound(s)
WEEL	Workplace Environmental Exposure Level

End of MSDS

MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: **ARTISTRI® P5400 BLACK PIGMENT INK**

Product Use: Ink-Jet Printing Ink

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont Ink Jet and Specialty Colorants
DuPont Performance Coatings
Barley Mill Plaza
Wilmington, DE (USA)

PHONE NUMBERS

Product, Safety, Health and Environmental Information	: 1-302-695-9682 (8 a.m.-5 p.m. ET, M-F, U.S.A)
Transport Emergency	: CHEMTREC: 1-800-424-9300 (24 hours, U.S.A)
Medical Emergency	: 1-800-441-3637 (24 hours, U.S.A.)

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components (% by weight)

Material	CAS Number	%
Water	7732-18-5	50-94
Aliphatic Alcohol	**	1-10
*Ethylene Glycol	107-21-1	1-10
Polyglycol Ether	**	1-10
Polymers	**	1-10
Melamine	**	1-5
Carbon Black Pigment	1333-86-4	1-5

*Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

Components (Remarks)

**The specific identity for each component not identified by a CAS Registry Number is withheld as a trade secret.

3. HAZARDS IDENTIFICATION

Potential Health Effects

THIS PRODUCT CAN BE USED SAFELY WHEN USED AS DIRECTED AND WHEN APPLICABLE SAFETY PRECAUTIONS ARE FOLLOWED.

POTENTIAL HEALTH EFFECTS FROM PRODUCT

Potential routes of overexposure to this product are skin contact, eye contact and inhalation of vapor.

Ingestion is not expected to be a significant route of exposure for this product under normal use conditions.

There is no toxicity data available for this specific formulation. Any potential hazards are presumed to be due to exposure to the components.

ADDITIONAL HEALTH EFFECTS

Since this mixture has not been tested as a whole to determine the hazards by all routes of exposure, information is provided for each hazardous component of the mixture to meet requirements of OSHA's Hazard Communication Standard (29 CFR 1910.1200). The effects noted occur from exposure to the pure component unless otherwise noted.

INFORMATION FOR COMPONENTS

ALIPHATIC ALCOHOL

Eye Contact - May cause slight eye irritation.

Skin Contact - May cause slight skin irritation. Not expected to be absorbed through the skin.

Inhalation - Breathing of spray or mist may cause irritation of the upper respiratory tract.

Ingestion - This material has a low order of acute oral toxicity based on animal data.

ETHYLENE GLYCOL

Eye Contact - May cause slight transient (temporary) eye irritation. Corneal injury is unlikely. Vapors or mists may cause eye irritation.

Skin Contact - Essentially nonirritating to skin. Repeated skin exposure to large quantities may result in absorption of harmful amounts.

Inhalation - At room temperature, exposure to vapors are minimal due to physical properties; higher temperatures may generate vapor levels sufficient to cause adverse effects.

Ingestion - Single dose oral toxicity is considered to be moderate. Excessive exposure may cause central nervous system effects, cardiopulmonary effects (metabolic acidosis), and kidney failure. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing amounts larger than that may cause serious injury, even death.

Systemic (Other Target Organ) Effects - Excessive exposure may cause irritation to upper respiratory tract. Observations in animals include kidney and lever effects and deposition of calcium salts in various tissues after long-term dietary intake of ethylene glycol.

Cancer Information - Ethylene glycol did not cause cancer in long-term animal studies.

Teratology (Birth Defects) - Based on animal studies, ingestion of very large amounts of ethylene glycol appears to be the major and possibly only route of exposure to produce birth defects. Exposures by inhalation (tested nose-only in animals to prevent ingestion) or skin contact, the primary routes of occupational exposure, had minimal or essentially no effect on the fetus.

Reproductive Effects - Ingestion of large amounts of ethylene glycol has been shown to interfere with reproduction in animals. Specifically, growth retardation and decreased litter size in rats and mice and mating frequency in mice were observed.

POLYGLYCOL ETHER

Eye Contact - May cause slight transient (temporary) eye irritation. Corneal injury is unlikely.

Skin Contact - Prolonged or repeated exposure not likely to cause significant skin irritation. A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. Prolonged or repeated exposure to very large amounts of component(s) in this product may cause narcosis (drowsiness).

Ingestion - single dose oral toxicity is considered to be low. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; swallowing amounts larger than that may cause injury.

Inhalation - Single exposure to vapors is not likely to be hazardous.

Systemic (Other Target Organ) Effects - Signs and symptoms of excessive exposure may be anesthetic or narcotic effects.

Teratology (Birth Defects) - Birth defects are unlikely. Even exposure have an adverse effect on the mother should have no effect on the fetus.

MELAMINE

Eye Contact – Direct contact with this material may cause mild eye irritation.

Skin Contact – Direct contact with this material may cause mild skin irritation.

Inhalation – Material is not expected to be harmful if inhaled.

Carcinogenicity Information

The following components are listed by IARC, NTP, OSHA or ACGIH as carcinogens.

Material	IARC	NTP	OSHA	ACGIH
CARBON BLACK	2B			

4. FIRST AID MEASURES

First Aid

INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing. Consult a physician. Wash contaminated clothing before reuse.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

Ingestion is not an expected route of exposure during normal use of the product. If ingested, consult a physician.

5. FIRE FIGHTING MEASURES

Flammable Properties

Flash Point	: >93.3 °C (>200 °F)
Method	: Closed Cup
Approximate Flammable Limits in Air, % by Volume	
LEL	: Not Available
UEL	: Not Available
Autoignition Temperature	: Not Available

Product is a nonflammable water-based solution.

Hazardous combustion products (gases/vapors) produced in fire can include carbon monoxide, carbon dioxide, nitrogen oxides and smoke.

Extinguishing Media

Use media appropriate for surrounding material.

Fire Fighting Instructions

This product is not flammable. Use normal firefighting procedures for the area.

6. ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Initial Containment

Dike spill.

Spill Clean Up

Soak up with absorbent material.

7. HANDLING AND STORAGE

Handling (Personnel)

Avoid contact with eyes, skin, or clothing.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal Protective Equipment

EYE/FACE PROTECTION
Wear safety glasses. Wear coverall chemical splash goggles and face shield when the possibility exists for eye and face contact due to splashing or spraying of the material.

RESPIRATORS
Respirators are not needed for normal use.

PROTECTIVE CLOTHING

If there is potential for significant dermal contact wear appropriate impervious clothing and gloves.

Applicable Exposure Limits and Exposure Data

WATER

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >90 mL/kg (RTECS)
LC_{50} (rat, inhalation/4 hr.)	: No data available

ALIPHATIC ALCOHOL

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >5,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: No data available

ETHYLENE GLYCOL

PEL (OSHA)	: None Established
TLV (ACGIH)	: Ceiling: 100 mg/m^3, aerosol
AEL * (DuPont)	: 50 ppm, 8 Hr. TWA, vapor
IEL (2000/39/EC)	: 52 mg/m^3, 20 ppm, skin STEL 104 mg/m^3, 40 ppm
LD_{50} (rat, oral)	: 4,700 mg/kg (RTECS)
LD_{50} (rabbit, dermal)	: 9,530 uL/kg (RTECS)
LC_{50} (rat, inhalation/4 hr.)	: >200 mg/m^3 (RTECS)

POLYGLYCOL ETHER

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >3,200 mg/kg (supplier)
LD_{50} (rabbit, dermal)	: >20 mL/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: No data available

POLYMERS

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: No data available
LC_{50} (rat, inhalation/4 hr.)	: No data available

MELAMINE

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >5,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: >20 mg/L (supplier)

CARBON BLACK PIGMENT

PEL (OSHA)	: 3.5 mg/m^3, 8 Hr. TWA
TLV (ACGIH)	: 3.5 mg/m^3, 8 Hr. TWA, A4 (“Not Classifiable

As a Human Carcinogen")

AEL * (DuPont)	: 0.5 mg/m^3, 8 & 12 Hr. TWA, (Polynuclear Aromatic Hydrocarbon Content <0.1%)
LD_{50} (rat, oral)	: >8,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: No data available

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Form	: Liquid
Color	: Black
Odor	: Slight
Solubility in Water	: Miscible
pH	: About 8
Specific Gravity	: About 1

Other Information

Flash Point	: >93.3 °C (>200 °F)
Method	: Closed Cup
Approximate Flammable Limits in Air, % by Volume	
LEL	: Not Available
UEL	: Not Available
Autoignition Temperature	: Not Available

10. STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and storage conditions.

Incompatibility with Other Materials

None reasonably foreseeable.

Decomposition

Decomposition does not occur during normal use.

Polymerization

Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Animal Data

No data available for product.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

No data available for product.

13. DISPOSAL CONSIDERATIONS

Waste Disposal

DO NOT DISCARD INTO ANY SEWERS, INTO ANY BODY OF WATER, OR ON THE GROUND. Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local laws and regulations.

14. TRANSPORTATION INFORMATION

(Not meant to be all inclusive)

DOT (Domestic Surface, U.S.A.)	: Not regulated
ICAO/IATA (Air)	: Not regulated
IMO/IMDG (Ocean)	: Not regulated

15. REGULATORY INFORMATION

(Not meant to be all inclusive - selected regulations represented)

U.S. Regulations

Federal Regulations

TSCA Inventory Status - All components of this product are listed, or exempt from listing, on the TSCA 8(b) chemical inventory.

TSCA Section 12(b) Export Notification - This product can contain: None

State Regulations

State Right-To-Know

Warning: This product may contain substances known to the state of California to cause cancer, birth defects or other reproductive harm.

European Union Regulations

EU Inventory Status - All components of this product are listed, or are exempt from listing, on the EINECS chemical inventory.

Transport Information - This product is not classified as dangerous within the meaning of transport regulations.

Labeling - This product does not need to be labeled in accordance with EC-Directive 1999/45/EC.

Switzerland

Switzerland VOC Regulations (Ordinance 814.018, *Verordnung über die Lenkungsabgabe auf flüchtigen organischen Verbindungen*, as of 28 December 2000)

This product is exempt from Swiss VOC regulations.

16. OTHER INFORMATION

HMIS® Rating

Health	: 1
Flammability	: 1
Reactivity	: 0

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

MSDS Contact Information

Global Product Stewardship and Regulatory Affairs
DuPont Ink Jet and Specialty Colorants
DuPont Performance Coatings
Barley Mill Plaza

Wilmington, DE (U.S.A.)
1-302-695-9682 (U.S.A.)

Revision History

18 July 2008	New MSDS

Key

ACGIH	American Conference of Governmental Industrial Hygienists
AEL	Acceptable Exposure Limit (DuPont)
Cmpds	Compounds
DOT	Department of Transportation (U.S.A.)
ET	Eastern Time (U.S.A.)
EU	European Union
HMIS®	Hazardous Material Information System (National Paint and Coatings Association)
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IEL	Indicative Exposure Limit (EU Directive 2000/39/EC)
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
LEL or LFL	Lower Explosive Limit or Lower Flammable Limit
M-F	Monday through Friday
NA	North America
NIOSH	National Institute of Occupational Safety and Health (U.S.A.)
NOHSC	National Occupational Health and Safety Commission (Worksafe Australia)
NOS	Not Otherwise Specified
NTP	National Toxicology Program (U.S.A.)
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration (U.S.A.)
PEL	Permissible Exposure Limit
RTECS	Registry of Toxic Effects of Chemical Substances (NIOSH)
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act (U.S.A)
TWA	Time-weighted Average
UEL or UFL	Upper Explosive Limit or Upper Flammable Limit
U.S.A.	United States of America
VOC	Volatile Organic Compound(s)
WEEL	Workplace Environmental Exposure Level

End of MSDS

MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: **ARTISTRI® P5910 WHITE PIGMENT INK**

Product Use: Ink-Jet Printing Ink

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont Digital Printing
DuPont ImagingTechnologies
Barley Mill Plaza
Wilmington, DE (USA)

PHONE NUMBERS

Product, Safety, Health and Environmental Information	: 1-302-695-9682 (8 a.m.-5 p.m. ET, M-F, U.S.A)
Transport Emergency	: CHEMTREC: 1-800-424-9300 (24 hours, U.S.A)
Medical Emergency	: 1-800-441-3637 (24 hours, U.S.A.)

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components (% by weight)

Material	CAS Number	%
Water	7732-18-5	49-79
*Ethylene Glycol	107-21-1	10-20
Humectant	**	1-10
Titanium Dioxide Pigment	13463-67-7	5-15
Polymer	**	5-15

*Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

Components (Remarks)

**The specific identity for each component not identified by a CAS Registry Number is withheld as a trade secret.

3. HAZARDS IDENTIFICATION

Potential Health Effects

THIS PRODUCT CAN BE USED SAFELY WHEN USED AS DIRECTED AND WHEN APPLICABLE SAFETY PRECAUTIONS ARE FOLLOWED.

POTENTIAL HEALTH EFFECTS FROM PRODUCT

Potential routes of overexposure to this product are skin contact, eye contact and inhalation of vapor.

Ingestion is not expected to be a significant route of exposure for this product under normal use conditions.

There is no toxicity data available for this specific formulation. Any potential hazards are presumed to be due to exposure to the components.

ADDITIONAL HEALTH EFFECTS

Since this mixture has not been tested as a whole to determine the hazards by all routes of exposure, information is provided for each hazardous component of the mixture to meet requirements of OSHA's Hazard Communication Standard (29 CFR 1910.1200). The effects noted occur from exposure to the pure component unless otherwise noted.

INFORMATION FOR COMPONENTS

ETHYLENE GLYCOL

Eye Contact - May cause slight transient (temporary) eye irritation. Corneal injury is unlikely. Vapors or mists may cause eye irritation.

Skin Contact - Essentially nonirritating to skin. Repeated skin exposure to large quantities may result in absorption of harmful amounts.

Inhalation - At room temperature, exposure to vapors are minimal due to physical properties; higher temperatures may generate vapor levels sufficient to cause adverse effects.

Ingestion - Single dose oral toxicity is considered to be moderate. Excessive exposure may cause central nervous system effects, cardiopulmonary effects (metabolic acidosis), and kidney failure. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing amounts larger than that may cause serious injury, even death.

Systemic (Other Target Organ) Effects - Excessive exposure may cause irritation to upper respiratory tract. Observations in animals include kidney and lever effects and deposition of calcium salts in various tissues after long-term dietary intake of ethylene glycol.

Cancer Information - Ethylene glycol did not cause cancer in long-term animal studies.

Teratology (Birth Defects) - Based on animal studies, ingestion of very large amounts of ethylene glycol appears to be the major and possibly only route of exposure to produce birth defects. Exposures by inhalation (tested nose-only in animals to prevent ingestion) or skin contact, the primary routes of occupational exposure, had minimal or essentially no effect on the fetus.

Reproductive Effects - Ingestion of large amounts of ethylene glycol has been shown to interfere with reproduction in animals. Specifically, growth retardation and decreased litter size in rats and mice and mating frequency in mice were observed.

HUMECTANT

Eye Contact - May cause slight transient (temporary) eye irritation. Corneal injury is unlikely.

Skin Contact - Prolonged or repeated exposure not likely to cause significant skin irritation. A single prolonged exposure is not likely to result in the material being absorbed through the skin in harmful amounts.

Inhalation - At room temperature, vapors are minimal due to physical properties. If heated or sprayed as an aerosol, airborne material may cause upper respiratory irritation.

Ingestion - Single dose oral toxicity is considered to be extremely low. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; swallowing amount larger than that may cause injury. Signs and symptoms of excessive exposure may be central nervous system effects and increased blood sugar levels.

Systemic (Other Target Organ) Effects - Repeated excessive exposure may cause increased fat levels in blood. Observations in animals include kidney, liver, and gastrointestinal effects with very large oral doses.

Cancer Information - Did not cause cancer in long-term animal studies.

Teratology - Birth defects are unlikely. Exposures having no adverse effects on the mother should have no effect on the fetus.

Reproductive Effects - Reproductive effects seen in female animals are believed to be due to altered nutritional status resulting from extremely high doses in their diets. Similar effects have been seen in animals fed synthetic diets.

Carcinogenicity Information

The following components are listed by IARC, NTP, OSHA or ACGIH as carcinogens.

None

4. FIRST AID MEASURES

First Aid

INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing. Consult a physician. Wash contaminated clothing before reuse.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

Ingestion is not an expected route of exposure during normal use of the product. If ingested, consult a physician.

5. FIRE FIGHTING MEASURES

Flammable Properties

Flash Point	: >93.3 °C (>200 °F)
Method	: Closed Cup
Approximate Flammable Limits in Air, % by Volume	
LEL	: 3.2
UEL	: 15.3
Autoignition Temperature	: 398 °C

Product is a nonflammable water-based solution.

Hazardous combustion products (gases/vapors) produced in fire can include carbon monoxide, carbon dioxide and smoke.

Extinguishing Media

Use media appropriate for surrounding material.

Fire Fighting Instructions

This product is not flammable. Use normal firefighting procedures for the area.

6. ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Initial Containment

Dike spill.

Spill Clean Up

Soak up with absorbent material.

7. HANDLING AND STORAGE

Handling (Personnel)

Avoid contact with eyes, skin, or clothing.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal Protective Equipment

EYE/FACE PROTECTION
Wear safety glasses. Wear coverall chemical splash goggles and face shield when the possibility exists for eye and face contact due to splashing or spraying of the material.

RESPIRATORS
Respirators are not needed for normal use.

PROTECTIVE CLOTHING
If there is potential for significant dermal contact wear appropriate impervious clothing and gloves.

Applicable Exposure Limits and Exposure Data

WATER

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >90 mL/kg (RTECS)
LC_{50} (rat, inhalation/4 hr.)	: No data available

ETHYLENE GLYCOL

PEL (OSHA)	: None Established
TLV (ACGIH)	: Ceiling: 100 mg/m^3, aerosol
AEL * (DuPont)	: 50 ppm, 8 Hr. TWA, vapor
IEL (2000/39/EC)	: 52 mg/m^3, 20 ppm, skin STEL 104 mg/m^3, 40 ppm
LD_{50} (rat, oral)	: 4,700 mg/kg (RTECS)
LD_{50} (rabbit, dermal)	: 9,530 uL/kg (RTECS)
LC_{50} (rat, inhalation/4 hr.)	: >200 mg/m^3 (RTECS)

HUMECTANT

PEL (OSHA)	: 5 mg/m^3, 8 Hr. TWA (mist, respirable fraction) 15 mg/m^3, 8 Hr. TWA (mist, total dust)
TLV (ACGIH)	: 10 mg/m^3, 8 Hr. TWA (mist)
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >17,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: >4.9 mg/liter (supplier)

TITANIUM DIOXIDE PIGMENT

PEL (OSHA)	: 15 mg/m^3 8 Hr. TWA (total dust)
TLV (ACGIH)	: 10 mg/m^3 8 Hr. TWA (total dust), A4
AEL * (DuPont)	: 10 mg/m^3 8 Hr. TWA (total dust)
LD_{50} (rat, oral)	: >24,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: >10,000 mg/kg (supplier)

POLYMER

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: No data available
LC_{50} (rat, inhalation/4 hr.)	: No data available

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Form	: Liquid
Color	: White
Odor	: Slight
Solubility in Water	: Miscible
pH	: About 7-8
Specific Gravity	: About 1.1

Other Information

Flash Point	: >93.3 °C (>200 °F)
Method	: Closed Cup
Approximate Flammable Limits in Air, % by Volume	
LEL	: 3.2
UEL	: 15.3
Autoignition Temperature	: 398 °C

10. STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and storage conditions.

Incompatibility with Other Materials

None reasonably foreseeable.

Decomposition

Decomposition does not occur during normal use.

Polymerization

Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Animal Data

No data available for product.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

No data available for product.

13. DISPOSAL CONSIDERATIONS

Waste Disposal

DO NOT DISCARD INTO ANY SEWERS, INTO ANY BODY OF WATER, OR ON THE GROUND. Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local laws and regulations.

14. TRANSPORTATION INFORMATION

(Not meant to be all inclusive)

DOT (Domestic Surface, U.S.A.)	: Not regulated
ICAO/IATA (Air)	: Not regulated
IMO/IMDG (Ocean)	: Not regulated

15. REGULATORY INFORMATION

(Not meant to be all inclusive - selected regulations represented)

U.S. Regulations

Federal Regulations

TSCA Inventory Status - All components of this product are listed, or exempt from listing, on the TSCA 8(b) chemical inventory.

State Regulations

State Right-To-Know

This product does contain substances known to the state of California to cause cancer, birth defects or other reproductive harm.

European Union Regulations

EU Inventory Status - All components of this product are listed, or are exempt from listing, on the EINECS chemical inventory.

Transport Information - This product is not classified as dangerous within the meaning of transport regulations.

Labeling - This product does not need to be labeled in accordance with EC-Directive 1999/45/EC.

Switzerland

Switzerland VOC Regulations (Ordinance 814.018, *Verordnung über die Lenkungsabgabe auf flüchtigen organischen Verbindungen*, as of 28 December 2000)

This product is exempt from Swiss VOC regulations.

16. OTHER INFORMATION

HMIS® Rating

Health	: 1
Flammability	: 1
Reactivity	: 0

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

MSDS Contact Information

Global Product Stewardship and Regulatory Affairs
DuPont Digital Printing
DuPont Imaging Technologies
Barley Mill Plaza
Wilmington, DE (U.S.A.)
1-302-695-9682 (U.S.A.)

Revision History

July 11, 2007	New MSDS

May 2, 2008	Regulatory review
July 18 2008	Regulatory review

Key

ACGIH	American Conference of Governmental Industrial Hygienists
AEL	Acceptable Exposure Limit (DuPont)
Cmpds	Compounds
DOT	Department of Transportation (U.S.A.)
ET	Eastern Time (U.S.A.)
EU	European Union
HMIS®	Hazardous Material Information System (National Paint and Coatings Association)
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IEL	Indicative Exposure Limit (EU Directive 2000/39/EC)
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
LEL or LFL	Lower Explosive Limit or Lower Flammable Limit
M-F	Monday through Friday
NA	North America
NIOSH	National Institute of Occupational Safety and Health (U.S.A.)
NOHSC	National Occupational Health and Safety Commission (Worksafe Australia)
NOS	Not Otherwise Specified
NTP	National Toxicology Program (U.S.A.)
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration (U.S.A.)
PEL	Permissible Exposure Limit
RTECS	Registry of Toxic Effects of Chemical Substances (NIOSH)
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act (U.S.A)
TWA	Time-weighted Average
UEL or UFL	Upper Explosive Limit or Upper Flammable Limit
U.S.A.	United States of America
VOC	Volatile Organic Compound(s)
WEEL	Workplace Environmental Exposure Level

End of MSDS

MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: **ARTISTRI® P5001 PIGMENT PRETREATMENT SOLUTION**

Product Use: Ink-Jet Printing

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont Ink Jet and Specialty Colorants
DuPont Performance Coatings
Barley Mill Plaza
Wilmington, DE (USA)

PHONE NUMBERS

Product, Safety, Health and Environmental Information	: 1-302-695-9682 (8 a.m.-5 p.m. ET, M-F, U.S.A)
Transport Emergency	: CHEMTREC: 1-800-424-9300 (24 hours, U.S.A)
Medical Emergency	: 1-800-441-3637 (24 hours, U.S.A.)

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components (% by weight)

Material	CAS Number	%
Water	7732-18-5	80-94
Inorganic salt	**	5-10
Acrylic Polymer	**	1-10
Formaldehyde	50-00-0	<0.02

Components (Remarks)

**The specific identity for each component not identified by a CAS Registry Number is withheld as a trade secret.

3. HAZARDS IDENTIFICATION

Potential Health Effects

THIS PRODUCT CAN BE USED SAFELY WHEN USED AS DIRECTED AND WHEN APPLICABLE SAFETY PRECAUTIONS ARE FOLLOWED.

POTENTIAL HEALTH EFFECTS FROM PRODUCT

Potential routes of overexposure to this product are skin contact, eye contact and inhalation of vapor.

Ingestion is not expected to be a significant route of exposure for this product under normal use conditions.

There is no toxicity data available for this specific formulation. Any potential hazards are presumed to be due to exposure to the components.

ADDITIONAL HEALTH EFFECTS

Since this mixture has not been tested as a whole to determine the hazards by all routes of exposure, information is provided for each hazardous component of the mixture to meet requirements of OSHA's Hazard Communication Standard (29 CFR 1910.1200). The effects noted occur from exposure to the pure component unless otherwise noted.

INFORMATION FOR COMPONENTS

INORGANIC SALT

Eye Contact - Immediate effects of overexposure may include eye irritation with tearing, pain or blurred vision.

Skin Contact - Short-term overexposure may cause irritation with itching, burning, redness, swelling or rash. Prolonged contact may cause irritation with burns or possibly blisters.

Inhalation - Short-term overexposure may cause irritation of the nose and throat with sneezing, sore throat or runny nose.

Ingestion - Short-term overexposure may cause irritation of the digestive tract with stomach pain, heartburn, nausea, vomiting or diarrhea; however there may be no symptoms at all.

FORMALDEHYDE

Eye Contact - Can cause irritation or tearing at levels below STEL.

Skin Contact - May cause allergic skin reaction.

Inhalation - May cause respiratory disorders (sensitization). Persons with sensitive airways may react to vapors.

Ingestion – May cause throat irritation.

Carcinogenicity Information

The following components are listed by IARC, NTP, OSHA or ACGIH as carcinogens.

Material	IARC	NTP	OSHA	ACGIH
Formaldehyde	1	X	X	A2

4. FIRST AID MEASURES

First Aid

INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing. Consult a physician. Wash contaminated clothing before reuse.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

Ingestion is not an expected route of exposure during normal use of the product. If ingested, consult a physician.

5. FIRE FIGHTING MEASURES

Flammable Properties

Flash Point	: >93.3 °C (>200 °F)
Method	: Closed Cup
Approximate Flammable Limits in Air, % by Volume	
LEL	: Not Available
UEL	: Not Available
Autoignition Temperature	: Not Available

Product is a nonflammable water-based solution.

Hazardous combustion products (gases/vapors) produced in fire can include carbon monoxide, carbon dioxide, nitrogen oxides and smoke.

Extinguishing Media

Use media appropriate for surrounding material.

Fire Fighting Instructions

This product is not flammable. Use normal firefighting procedures for the area.

6. ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Initial Containment

Dike spill.

Spill Clean Up

Soak up with absorbent material.

7. HANDLING AND STORAGE

Handling (Personnel)

Avoid contact with eyes, skin, or clothing.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal Protective Equipment

EYE/FACE PROTECTION
Wear safety glasses. Wear coverall chemical splash goggles and face shield when the possibility exists for eye and face contact due to splashing or spraying of the material.

RESPIRATORS
Respirators are not needed with proper ventilation. Wear an approved respirator (e.g., an organic vapor respirator or a self-breathing apparatus whenever exposure to aerosol, mist, spray, fume or vapor exceed the exposure limit(s) of any chemical substance listed in this MSDS.

PROTECTIVE CLOTHING
If there is potential for significant dermal contact wear appropriate impervious clothing and gloves.

Applicable Exposure Limits and Exposure Data

WATER

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: None Established
LD_{50} (rat, oral)	: >90 mL/kg (RTECS)
LC_{50} (rat, inhalation/4 hr.)	: No data available

INORGANIC SALT

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: 7 mg/m^3, 8 & 12 Hr. TWA
LD_{50} (rat, oral)	: 900-2,100 mg/kg (supplier)
LD_{50} (rabbit, dermal)	: >5,000 mg/kg (supplier)
LC_{50} (rat, inhalation/4 hr.)	: No data available

FORMALDEHYDE

STEL (OSHA)	: 2 ppm
TWA (OSHA)	: 0.75 ppm
ACTION LEVEL (OSHA)	: 0.5 ppm
STEL (ACGIH)	: 0.3 ppm CEILING
AEL * (DuPont)	: 0.5 ppm 8 and 12 Hr. TWA
	: 1.0 ppm 15 minute TWA
LD_{50} (rat, oral)	: 100 mg/kg (supplier)
LD_{50} (rabbit, dermal)	: 270 mg/kg (supplier)

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Form	: Liquid
Color	: Clear
Odor	: Odorless
Solubility in Water	: Miscible
pH	: 5.9
Specific Gravity	: About 1

Other Information

Flash Point	: >93.3 °C (>200 °F)
Method	: Closed Cup
Approximate Flammable Limits in Air, % by Volume	
LEL	: Not Available
UEL	: Not Available
Autoignition Temperature	: Not Available

10. STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and storage conditions.

Incompatibility with Other Materials

None reasonably foreseeable.

Decomposition

Decomposition does not occur during normal use.

Polymerization

Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Animal Data

No data available for product.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

No data available for product.

13. DISPOSAL CONSIDERATIONS

Waste Disposal

DO NOT DISCARD INTO ANY SEWERS, INTO ANY BODY OF WATER, OR ON THE GROUND. Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local laws and regulations.

14. TRANSPORTATION INFORMATION

(Not meant to be all inclusive)

DOT (Domestic Surface, U.S.A.)	: Not regulated
ICAO/IATA (Air)	: Not regulated
IMO/IMDG (Ocean)	: Not regulated

15. REGULATORY INFORMATION

(Not meant to be all inclusive - selected regulations represented)

U.S. Regulations

Federal Regulations

TSCA Inventory Status - All components of this product are listed, or exempt from listing, on the TSCA 8(b) chemical inventory.

State Regulations

State Right-To-Know

WARNING - SUBSTANCES KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM (California Proposition 65)

Formaldehyde (50-00-0)	< 0.02 wt. %

European Union Regulations

EU Inventory Status - All components of this product are listed, or are exempt from listing, on the EINECS chemical inventory.

Transport Information - This product is not classified as dangerous within the meaning of transport regulations.

Labeling - This product does not need to be labeled in accordance with EC-Directive 1999/45/EC.

Switzerland

Switzerland VOC Regulations (Ordinance 814.018, *Verordnung über die Lenkungsabgabe auf flüchtigen organischen Verbindungen*, as of 28 December 2000)

This product is exempt from Swiss VOC regulations.

16. OTHER INFORMATION

HMIS® Rating

Health	: 2
Flammability	: 0
Reactivity	: 0

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

MSDS Contact Information

Global Product Stewardship and Regulatory Affairs
DuPont Ink Jet and Specialty Colorants
DuPont Performance Coatings
Barley Mill Plaza
Wilmington, DE (U.S.A.)
1-302-695-9682 (U.S.A.)

Revision History

July 15, 2008	New MSDS

Key

ACGIH	American Conference of Governmental Industrial Hygienists
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Cmpds	Compounds
DOT	Department of Transportation (U.S.A.)
ET	Eastern Time (U.S.A.)
EU	European Union
HMIS®	Hazardous Material Information System (National Paint and Coatings Association)
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization

IEL	Indicative Exposure Limit (EU Directive 2000/39/EC)
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
LEL or LFL	Lower Explosive Limit or Lower Flammable Limit
M-F	Monday through Friday
NA	North America
NIOSH	National Institute of Occupational Safety and Health (U.S.A.)
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NOS	Not Otherwise Specified
NTP	National Toxicology Program (U.S.A.)
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration (U.S.A.)
PEL	Permissible Exposure Limit
RTECS	Registry of Toxic Effects of Chemical Substances (NIOSH)
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act (U.S.A)
TWA	Time-weighted Average
UEL or UFL	Upper Explosive Limit or Upper Flammable Limit
U.S.A.	United States of America
VOC	Volatile Organic Compound(s)
WEEL	Workplace Environmental Exposure Level

End of MSDS

Section 1. Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name	ARTISTRI F700 CLEANING SOLUTION
Product code	6000- 4064

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses

The product is only for industrial and/or professional use, not for any private consumer use.

1.3. Details of the supplier of the safety data sheet

Company/Undertaking Identification

Producer/Supplier	DuPont Digital Printing
Street/Box	Barley Mill Plaza
Nat.-Code/Postal code/City	US Wilmington, DE

Product Information

Telephone	+1 302 695 9682

Information on SDS

Responsible Department	Regulatory Affairs
Telephone	+49 (0)202 529-2385
Telefax	+49 (0)202 529-2804
E-mail address	sds-competence@deu.dupont.com

For further information, please also consult our Internet site

http://www.dupont.com

Section 2. Hazards identification

The mixture is non-dangerous in accordance with Directive 1999/45/EC.

2.1. Classification of the substance or mixture

Classification of the mixture

Not applicable.

2.2. Label elements

S-phrase(s)

S23	Do not breathe vapour.
S38	In case of insufficient ventilation, wear suitable respiratory equipment.

Section 3. Composition/information on ingredients

3.1. Substances

This product is a mixture. Health hazard information is based on its components.

3.2. Mixtures

Chemical characterization

Mixture of synthetic resins, pigments, and solvents

Hazardous components

Substances presenting a health or environmental hazard within the meaning of the DSD 67/548/EEC and/or (EC) 1272/ 2008 title II and annex VI as amended by (EC) 790/2009

CAS 107-21-1		ethanediol	
EC 203-473-3		REACh no registration number available	5.00 - < 7.00 %
Classification		Xn: R22	
	[VI*]	Acute Tox. 4, H302;	
CAS 27306-78-1		Polyalkyleneoxide modified heptamethyltrisiloxane	
EC		REACh no registration number available	0.10 - < 0.20 %
Classification		Xn: R20; Xi: R36; Xn: R48/20; N: R51/53	
		Eye Irrit. 2, H319; Acute Tox. 4, H332; STOT RE 2, H373; STOT RE 2, H373; Aquatic Chronic 2, H411;	

Up to the given revision date of this safety data sheet no REACh registration numbers are assigned to the chemical substances used in this preparation.

Additional advice

See full text of R-phrases in chapter 16.
See full text of H-phrases in chapter 16.

[VI*]: Harmonised classification given by Annex VI of Regulation (EC) No 1272/2008 in its latest amended form

Section 4. First aid measures

4.1. Description of first aid measures

General advice

When symptoms persist or in all cases of doubt seek medical advice. Never give anything by mouth to an unconscious person.

Inhalation

Avoid inhalation of vapour or mist. Move to fresh air in case of accidental inhalation of vapours. If breathing is irregular or stopped, administer artificial respiration. If unconscious place in recovery position and seek medical advice. If symptoms persist, call a physician.

Skin contact

Do NOT use solvents or thinners. Take off all contaminated clothing immediately. Wash skin thoroughly with soap and water or use recognized skin cleanser. If skin irritation persists, call a physician.

Eye contact

Remove contact lenses. Irrigate copiously with clean, fresh water for at least 15 minutes, holding the eyelids apart. Seek medical advice.

Ingestion

If swallowed, seek medical advice immediately and show this container or label. Do NOT induce vomiting. Keep at rest.

4.2. Most important symptoms and effects, both acute and delayed

Please see practical experience in section 11.

4.3. Indication of any immediate medical attention and special treatment needed

If unconscious place in recovery position and seek medical advice.

Section 5. Fire-fighting measures

5.1. Extinguishing media

Suitable extinguishing media

Water spray, Dry chemical, Foam.

Extinguishing media which shall not be used for safety reasons

High volume water jet

5.2. Special hazards arising from the substance or mixture

Hazardous combustion products

Fire will produce dense black smoke containing hazardous combustion products. Exposure to decomposition products may be a hazard to health.

Hazardous decomposition products

When exposed to high temperatures may produce hazardous decomposition products such as carbon monoxide and dioxide, smoke, oxides of nitrogen.

5.3. Advice for firefighters

Fire and Explosion Hazards

The product is not flammable. Avoid heating above flash point.

Special Protective Equipment and Fire Fighting Procedures

Wear as appropriate: Full protective flameproof clothing. Wear self contained breathing apparatus for fire fighting if necessary. In the event of fire, cool tanks with water spray. Do not allow run-off from fire fighting to enter drains or water courses.

Section 6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Keep in a well-ventilated place. Keep away from sources of ignition. Do not inhale vapours.

6.2. Environmental precautions

Do not let product enter drains. Notify the respective authorities in accordance with local law in the case of contamination of rivers, lakes or waste water systems. Please avoid any emission of volatile organic compounds as possible.

6.3. Methods and materials for containment and cleaning up

Contain and collect spillage with non-combustible absorbent materials, e.g. sand, earth, vermiculite, diatomaceous earth and place in container for disposal according to local regulations. Clean preferably with a detergent; avoid use of solvents.

6.4. Reference to other sections

Comply with safety directives (see chapters 7 and 8).

Section 7. Handling and storage

7.1. Precautions for safe handling

Safe handling advice

Prevent the creation of flammable or explosive concentrations of vapour in air and avoid vapour concentration higher than the occupational exposure limits. The product should only be used in areas from which all naked lights and other sources of ignition have been excluded. Operators should wear antistatic footwear and clothing. No sparking tools should be used. Avoid skin and eye contact. Do not breathe vapours or spray mist. Smoking, eating and drinking should be prohibited in the application area. For personal protection see section 8. Comply with the health and safety at work laws. If material is a coating, do not sand, flame cut, braze or weld dry coating without an appropriate respirator or appropriate ventilation, and gloves.

Advice on protection against fire and explosion

Solvent vapours are heavier than air and may spread along floors. Vapours may form explosive mixtures with air. Never use pressure to empty container: container is not a pressure vessel. Always keep in containers of same material as the original one.

7.2. Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers

Observe label precautions. Store between 5 and 25 °C in a dry, well ventilated place away from sources of heat, ignition and direct sunlight. No smoking. Prevent unauthorized access. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Advice on common storage

Store separately from oxidizing agents and strongly alkaline and strongly acidic materials.

Do not store together with explosives, compressed, liquefied and pressurised gases, aerosols, flammable liquids, oxidizing products, non combustible toxic products and infectious products.

Section 8. Exposure controls/personal protection

8.1. Control parameters

DNEL

CAS-No.	Chemical Name	End Use	Exposure routes	Frequency of exposure	Type	Value
107-21-1	ethanediol	Workers	Dermal	Long term	Systemic effects	106 mg/kg
		Workers	Inhalative	Long term	Local effects	35 mg/m3

PNEC

CAS-No.	Chemical Name	Compartment	Type	Value
107-21-1	ethanediol	Aquatic	Sediment	1.53 mg/kg
		Aquatic	Fresh water	10 mg/l
		Aquatic	Sea-water	1 mg/l

Occupational exposure limits

CAS-No.	Chemical Name	Source	Time	Type	Value	Note
107-21-1	ethanediol		15 min	IOELV15	104 mg/cm3	Skin
			15 min	IOELV15	40 ppm	Skin
			8 hr	IOELV8	52 mg/cm3	Skin
			8 hr	IOELV8	20 ppm	Skin

8.2. Exposure controls

Additional technical information on the plant

Provide adequate ventilation. This should be achieved by a good general extraction and -if practically feasible- by the use of a local exhaust ventilation. If these are not sufficient to maintain concentrations of particulates and solvent vapour below the OEL, suitable respiratory protection must be worn. Mask with gas filter, type A (EN 141)

Protective equipment

Personal protective equipment should be worn to prevent contact with eyes, skin or clothing.

Respiratory protection

When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

Hand protection

The breakthrough time of gloves is unknown for the product itself. The glove material given is recommended on basis of the substances in the preparation.

Glove material	Glove thickness	Break through time
Nitrile rubber	0.33 mm	60 min

The protective glove should be checked in each case for their work specific suitability (e.g. mechanical stability, product compatibility, and anti-static properties). When the intended use is for spray application a nitrile glove of the chemical resistance group 3 (e.g. Dermatril® glove) is to be used. After contamination, the glove has to be changed. If immersing the hands into the product is not avoidable (e.g. maintenance work) a butyl or fluorocarbon rubber glove should be used. When skin exposure may occur to materials specified in section 3 of this SDS, advice should be sought from the glove supplier as to appropriate type to use with this product and the permeation breakthrough times. Care should be taken when working with sharp edged articles as

these can easily damage the gloves and make them ineffective. The instructions and information provided by the glove supplier on use, storage, maintenance and replacement must be followed. Damaged gloves or those showing signs of wear should be replaced immediately.

Eye protection

Wear protective eyewear for protection against solvent spatter.

Skin and body protection

Wear suitable protective clothing. Personnel should wear antistatic clothings made of natural fiber or of high temperature resistant synthetic fiber.

Hygiene measures

Wash skin thoroughly with soap and water or use recognized skin cleanser. Do not use organic solvents!

Environmental exposure controls

Do not let product enter drains. For ecological information refer to section 12.

Section 9. Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance

Form: liquid Colour: clear Odour: Odour is not perceptible.

Important health, safety and environmental information

Property	Value	Method
pH	No data available.	
Melting point/freezing point	Not applicable.	
Boiling point/boiling range	100 °C	
Flash point	100 °C	ISO 3679 Does not sustain combustion.
Evaporation rate	Slower than Ether	
Flammability (solid, gas)	not relevant as product is liquid	
Lower explosion limit	no data available	
Upper explosion limit	no data available	
Vapour pressure	0.0 hPa	
Vapour density	no data available	
Relative density	1 g/cm^3	20 °C - DIN 53217/ISO 2811
Solubility(ies)		
Water solubility	completely miscible	
Solubility in other solvents	miscible with most organic solvents Listed in: Section 3. Composition/information on ingredients	
Partition coefficient: n-octanol/water	This product is a mixture. For ingredient details see section 12	
Autoignition temperature	201 °C	DIN 51794 based on organic solvent content
Decomposition temperature	This product is a mixture. For further information see section 10.	
Viscosity (23 °C)	20 s	ISO 2431 - 1993 6 mm
Explosive properties	Not explosive	
Oxidizing properties	not oxidizing	

9.2. Other data

Solvent separation test	< 3%	ADR/RID
Content of volatile components (including water)	99.6 %	Basis Vapour pressure >= 0.01 kPa
organic solvent content	10.0 %	Basis Vapour pressure >= 0.01 kPa

Section 10. Stability and reactivity

10.1. Reactivity

Keep away from oxidising agents, strongly alkaline and strongly acid materials in order to avoid exothermic reactions.

10.2. Chemical stability

The product is chemically stable.

10.3. Possibility of hazardous reactions

No dangerous reaction known under conditions of normal use.

10.4. Conditions to avoid

Stable under recommended storage and handling conditions (see section 7).

10.5. Incompatible materials to avoid

not required under normal use

10.6. Hazardous decomposition products

None known.

Section 11. Toxicological information

11.1. Information on toxicological effects

General observations

There is no data available on the product. The preparation has been assessed following the conventional method of the Dangerous Preparations Directive 1999/45/EC and classified for toxicological hazards accordingly. See sections 2 and 3 for details.

Practical experience

Swallowing may cause nausea, diarrhoea and vomiting.

Acute toxicity

Acute inhalation toxicity

EINECS-No.	Chemical Name	Species	Type	Exposure time	Value	Method
	Polyalkyleneoxide modified heptamethyltrisiloxane	rat	LC50	4 h	2 mg/l	

Acute oral toxicity

EINECS-No.	Chemical Name	Species	Type	Exposure time	Value	Method
203-473-3	ethanediol	rat	LD50		> 2,000 mg/kg	

Section 12. Ecological information

There are no data available on the product itself. The product should not be allowed to enter drains or watercourses. The data in this section is consistent with data from chemical safety reports available at the date of revision.

12.1. Toxicity

Aquatic toxicity

Acute toxicity aquatic invertebrates

EINECS-No.	Chemical Name	Species	Type	Exposure time	Value	Method
	Polyalkyleneoxide modified heptamethyltrisiloxane	Daphnia	EC50	48 h	22.6 mg/l	

Acute and extended toxicity of fishes

EINECS-No.	Chemical Name	Species	Type	Exposure time	Value	Method
	Polyalkyleneoxide modified heptamethyltrisiloxane	Danio rerio (zebra fish)	LC50	96 h	2.75 mg/l	

Toxicity with aquatic plants

EINECS-No.	Chemical Name	Species	Type	Exposure time	Value	Method
	Polyalkyleneoxide modified heptamethyltrisiloxane	Scenedesmus pannonicus	LC50	96 h	5.5 mg/l	

12.2. Persistence and degradability

No information available.

12.3. Bioaccumulative potential

No information available.

12.4. Mobility in soil

No information available.

12.5. Results of PBT and vPvB assessment

Based on available data no ingredient is classified for this hazard property (please see section 3).

12.6. Other adverse effects

The preparation was evaluated in accordance with the conventional method of the preparations directive 1999/45/EC, and it was not classified as dangerous for the environment, but it does contain environmentally dangerous materials. For details, see section 3

Adsorbed organic bound halogens (AOX)

Product does not contain organic linked halogens contributing to AOX.

Section 13. Disposal considerations

13.1. Waste treatment methods

Dispose of in accordance with local regulations.

Product

Recommendation:
A disposal process that converts the waste into energy is recommended. If this is not possible the hazardous waste must be disposed of by incineration.

Waste Key Number	Description
08 01 11	waste paint and varnish containing organic solvents or other dangerous substances

Uncleaned packaging

Recommendation:
Properly emptied containers are to be scrap processed or reconditioned. Improperly emptied containers are considered hazardous waste (waste key number 150110).

Section 14. Transport information

Not classified as dangerous in the meaning of transport regulations.

ADR/RID:in accordance with nota 1 of chapter 2.2.3.1.1
IMDG:in accordance with chapter 2.3.1.3
ICAO/IATA:in accordance with chapter 3.3.1.3

14.1. UN number

Not applicable.

14.2. UN proper shipping name

Not applicable.

14.3. Transport hazard class(es)

Not applicable.

14.4. Packaging group

Not applicable.

14.5. Environmental hazards

ADR/RID; IMDG; ICAO/IATA: none

Marine pollutant

IMDG: no

14.6. Special precautions for user

please see section 6 - 8

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Deliveries shall only be made based on appropriate packaging and in compliance with traffic laws.

Section 15. Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

The mixture is non-dangerous in accordance with Directive 1999/45/EC.

15.2. Chemical Safety Assessment

No safety checks were carried out on the mixture.

Section 16. Other information

Full text of R phrases with no. appearing in section 3

R20	Harmful by inhalation.
R22	Harmful if swallowed.
R36	Irritating to eyes.
R48/20	Harmful: danger of serious damage to health by prolonged exposure through inhalation.
R51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Full text of H phrases with no. appearing in section 3

H302	Harmful if swallowed.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H373	May cause damage to the kidneys/ liver/ eyes/ brain/ respiratory system/ central nervous system through prolonged or repeated exposure in contact with skin.
H411	Toxic to aquatic life with long lasting effects.

Information taken from reference works and the literature.

Substance No.	CAS no: www.cas.org./EO/regsys.html EC no: http://ecb.jrc.it/esis/index.php?PGM=ein
Substances presenting a health or environmental hazard within the meaning of Directive 67/548/EEC.	http://ecb.jrc.it/existing-chemicals/ http://ecb.jrc.it/classification-labelling/ http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB http://www.cdc.gov/niosh/ipcs/icstart.html
Other directives, limitations and prohibitory regulations	Directive 76/769/EC Directive 98/24/EC Directive 90/394/EC Directive 793/93/EC Directive 1999/45/EC Directive 2006/8/EC EUR-LEX: http://europa.eu.int/eur-lex/lex
Exposure limit for the pure substance	http://osha.europa.eu/OSHA

Training advice

Directive 76/769/EC
Directive 98/24/EC

Further information

The information of this SDS is based on the present state of our knowledge and meets the requirements of EU regulations and/or directives. The product is not to be used for purposes other than those specified under section 1 without a written permission. It remains the responsibility of the user to ensure that the necessary steps are taken to meet the laws and regulations. Handling of the product may only be done by people above 18 years of age, who are satisfactorily informed of how to do the work, the hazardous properties and necessary safety precautions. The information given in this SDS is to describe the product only in terms of health and safety requirements and should not, therefore, be construed as guaranteeing specific properties.

Report version

Version	Changes
1.0	

Revision Date: 2012-07-09