DuPont™ Artistri® P1600 Series Ink

Direct to Film Pigment Inks – General Applications Guide

Application Properties

DuPont™ Artistri® P1600 pigment inks are formulated with proprietary DuPont technology and are compatible with industry standard drying technologies. DuPont™ Artistri® P1600 pigment inks yield excellent color and are specifically designed for Direct-to-Film (DTF) printing processes. Contact DuPont Technical Support for details on process recommendations.

Printhead Compatibility

DuPont™ Artistri® P1600 ink is compatible with the following piezo printheads:

- EPSON DX4
- EPSON DX5
- EPSON DX7
- EPSON i3200

Flushing Solution

DuPont™ Artistri® P1600 inks should be used with DuPont™ KF200 Flushing Solution.

Installing DuPont™ Artistri® P1600 inks on your printer

It is important that proper procedures are followed when loading a new ink system on your printer. Experienced pigment ink users should have no problem performing the ink changeover themselves. Less experienced users can request technical support through their OEM, ink distributor or DuPont.

When loading Artistri® P1600 on your printer, schedule adequate time to complete the process. Keep the following points in mind:

a. Pigment inks by different manufacturers are not necessarily compatible and should not be considered miscible or interchangeable. Even pigment inks supplied by the same manufacturer may not be compatible, so it is important that transition from one ink to another is done carefully and in a way that minimizes chances of contamination.

   It is recommended that filters and/or dampers be always replaced when loading a new ink on your printer. Do not rinse and reuse filters and dampers that have been used with another ink, as this practice may lead to retention of incompatible ink components in these items and potentially cause damage to expensive printer components.

b. Always use the ink supplier's recommended flushing solution when loading or removing their ink from your printer. Flushing solutions from one supplier are not necessarily compatible with inks from another supplier. To avoid any costly mishaps, only use the manufacturer's recommended flushing solution.

c. Before removing the incumbent ink from a printer/print head, print a last nozzle check on paper (if possible) and retain it as a proof of the print head status. Then follow the supplier's guidelines to flush the ink with the proper flushing solution. Next flush the lines with deionized water. Using a lint-free cloth soaked in flush compatible with the incumbent ink, clean the nozzle plate, wiper, and capping station of all remains of the incumbent ink to avoid contamination. Replace the water in the wiper station and capping station containers. Remove all remains and deposits of the incumbent ink from the nozzle plate and all parts that come in contact with the nozzle plate during regular maintenance procedures. Repeat the cleaning steps with deionized water, then flush the lines with DuPont™ KF200 Flushing Solution. Load the Artistri® P1600 inks and perform several purges to remove air from the system. Let the inks stand in the system for at least 4-8 hours to allow degassing and removal of trapped air pockets in feed lines. For additional help on the proper procedure for loading and using the Artistri® P1600 inks on your printer, please consult **DuPont Artistri® Ink Conversion Procedure** and your printer OEM's Operations Manual.

Film Selection and Profiling

DuPont™ Artistri® P1600 inks have been tested on a range of commercially available films and were found to produce clear image definition and outstanding colors. Nevertheless, the film used will impact print quality and end-use properties such as:

- Color brightness, image sharpness
- Wash fastness

The printed ink interacts with the top layer of the film and must be able to spread adequately for optimum results. Too much or too little spreading could negatively impact the image quality. Test more than one film to identify the best fit with your printer and application.

Due to the interplay between the ink and film, it is important to determine the optimum ink laydown for the film. DuPont recommends that the printer be profiled with DuPont™ Artistri® P1600 inks on the desired film prior to the start of production. The profiling process entails:

- Identification of total ink limit
- Linearization
- Identifications of individual channel limits

Good linearization is key as the dot gain is high on DTF films. A final confirmation image should be printed after the completion of the profiling process to confirm final desired print quality. These images are typically included in the RIP software used.

With proper profiling, DTF printing can yield the same color intensity as DTG printing with less ink. Bright images can be printed with as much as 50% less white ink and color ink.

Production Process

Printing and Applying the Adhesive Powder

There is a well-known tradeoff between quality and throughput of the printer. Increasing the number of passes and the target resolution generally improves print quality but require longer to print. This must be considered when choosing the print mode of the printer.

The complete printing, powdering, and drying process is done inline in roll-to-roll machines. These printers often pre and post heat the film, control the powder amount and dry/melt the ink/powder layer. Please follow the printer manufacturer's recommendations for setting the various parameters involved in the process.

If DuPont™ Artistri® P1600 inks are used on a platen printer, it is recommended that the powder be dispensed manually within 30 seconds of printing. The ink will have to be partially dried to achieve the desired printed image results. It needs to be tacky to receive the powder, but not so wet that the powder will agglomerate.

The choice of powder will have an impact on the resulting wash fastness and hand feel of the laminated image. Ensure the entire image is covered in powder – any portion of the image not covered will have poor wash fastness. Shake off any excess powder especially from the areas of the film that were not printed on as this will lead to a halo effect on the shirt. Excess powder will lead to a stiffer image and a worse hand feel. Excess powder on an overly wet ink will lead to clumping and uneven lamination.

Drying

If drying is not done inline, some experimentation will be needed to determine the optimum temperature and time in the oven. For short times (i.e., 1 to 2 minutes in the oven) temperatures of 110 to 130°C (230 to 265°F) are recommended. Good results can also be obtained with longer times at lower temperatures.

Press and Peel

The transfer process involves pressing for 15 to 30 seconds at 130 to 165 ° C (265 to 330 °F) using medium to high pressure onto your garment. Check the film manufacturer's instructions for hot peel (right off the press) or cold peel (cooling the sheet to reach room temperature). The image should be transferred completely to your garment following this transfer process.

Note: the image and related amount of ink used will impact which peel and press process parameters to be used.

If the image is not completely transferred, you may:

- Not have used enough white ink for the powder to stick to
- Have dried the white ink too much not allowing the powder to adhere
- Need a different curing time and/or temperature during the press and peel step.

Safety

Please refer to the appropriate DuPont-supplied SDS prior to handling, storage, use and disposal of DuPont™ Artistri® P1600 inks and to the SDS and/or other usage guidelines provided by the manufacturer(s) of the powder and film prior to handling and use of these materials.

DuPont™ Artistri® P1600 Series Ink

Direct to Film Pigment Inks – General Applications Guide

Technical Data

Storage Temperature and Shelf Life

It is recommended that Artistri® P1600 inks Pigment Inks be stored in sealed containers in a clean, dry area, with temperatures regulated between 10 - 40 °C (50 - 104 °F). Improper storage temperatures or storage of open ink containers in dusty ambient conditions may shorten the ink's shelf life. When properly stored your DuPont inks should last at least 12 months.

Ink Physical Properties

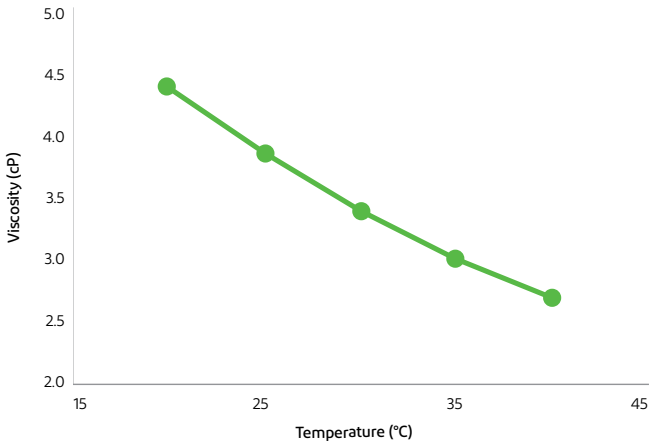
The table below lists typical values of Artistri® P1600 inks' physical properties.

Physical Properties	Cyan	Magenta	Yellow	Black	White
pH, as made	8.25	8.25	8.25	8.25	8.25
Viscosity at 25°C (cP)	4	4	4	4	4.75
Surface tension (mN/m)	28	28	28	28	28
D50 (nm)	< 150	< 150	< 150	< 150	< 300

Jetting Properties

Effect of Head Temperature on Viscosity

The graph below showing the average viscosity across all colors of Artistri® P1600 can be used to aid your selection of operating parameters for your print head.



For more information on DuPont™ Artistri® or other DuPont products, please visit our website.

Artistri.DuPont.com

NA-P1600-EN-APP (05/23)