EPSON
EXCEED YOUR VISION

Polyester Garment Printing

Polyester Garment Printing Guide with the
Epson SureColor F-Series Direct-to-Garment Printers

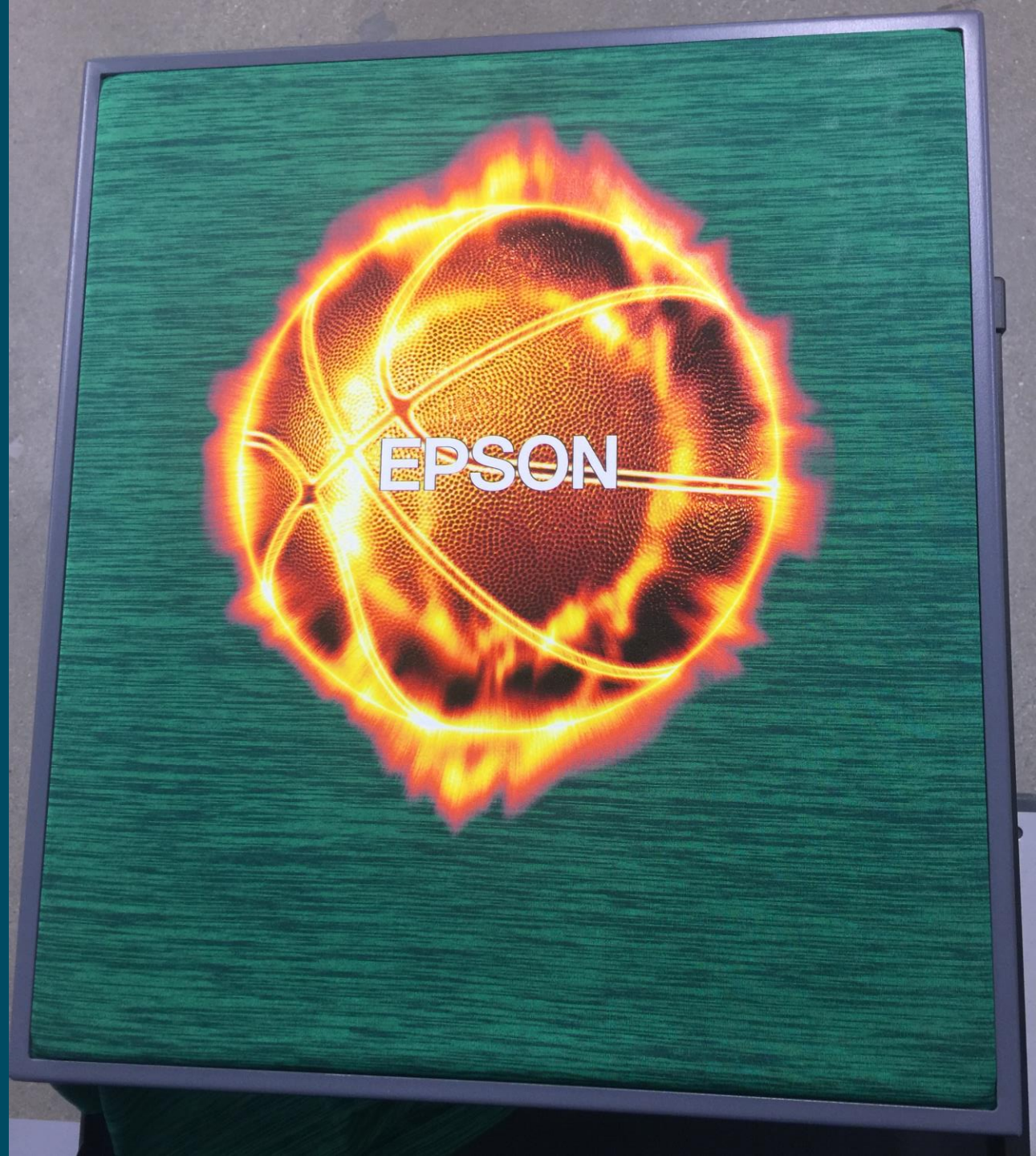
January 2019

EPSON
EXCEED YOUR VISION

Foreword

Epson SureColor F2000 and F2100 users can now print onto 100% polyester garments using Epson's Pretreatment for Polyester. The information in this document is intended to be used as a guide, not as rules.

- Print quality and durability are affected by many factors, including but not limited to fabric construction, fabric coatings, pretreatment equipment and application method, and heat curing equipment and parameters.
- Printing on Polyester is more complex than printing on cotton due to the nature of the material and dyes used to color the garment.
- Using the recommended equipment, and having proper training along with prior experience printing cotton garments is necessary for success.



EPSON
EXCEED YOUR VISION

Print Applications

Polyester based garments are popular for active wear due to the ability to wick moisture from the body and ventilate heat. These garments are marketed as performance apparel or active wear with many different brand names.

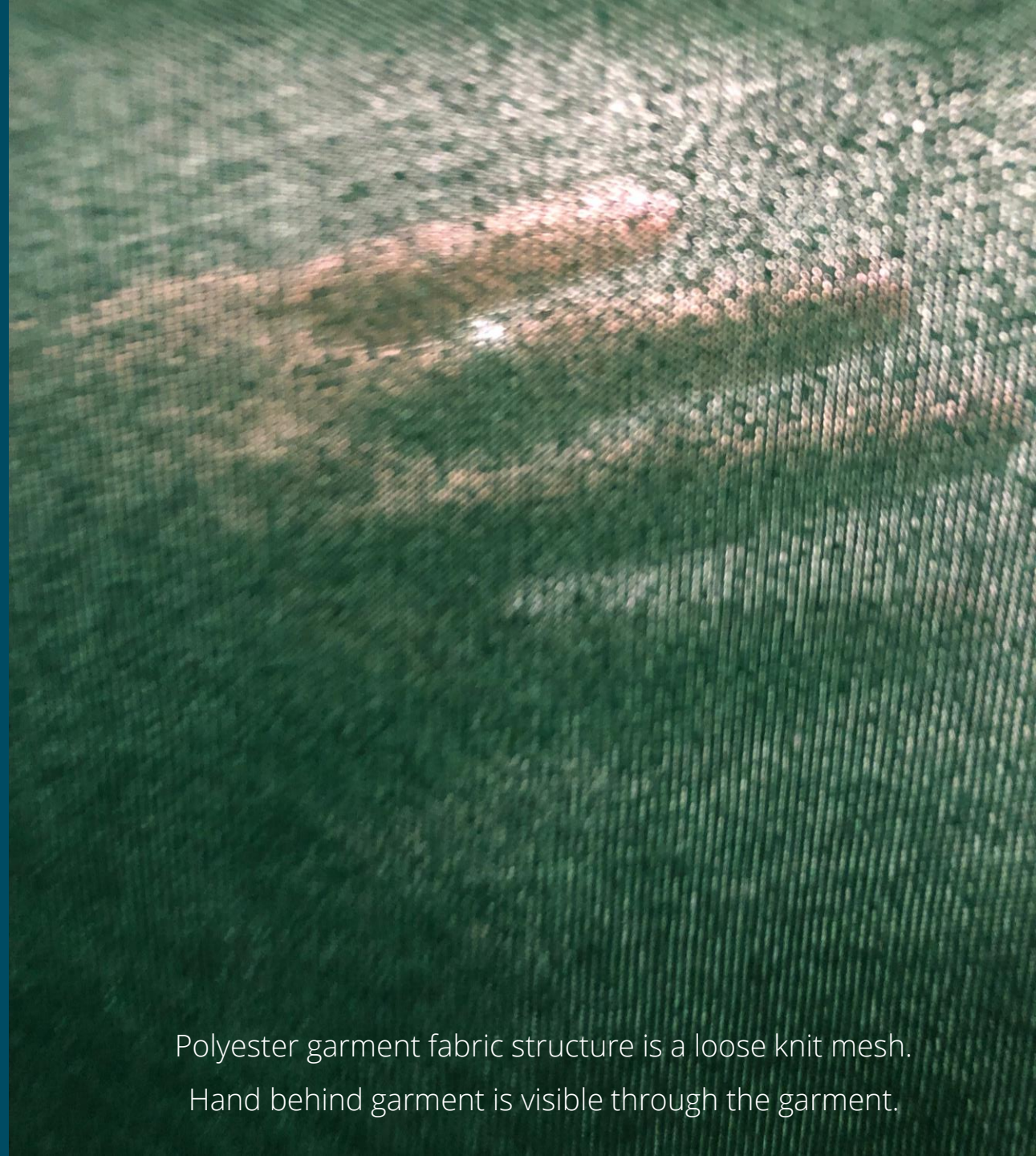
Common uses for printed polyester garments includes:

- Running Apparel
- Gym Apparel
- Yoga Apparel
- Fishing Apparel
- Warm-up Clothing
- Event Apparel
- Hot Climate Casual Clothing

EPSON
EXCEED YOUR VISION

Polyester Challenges

- Polyester garments typically use a loose knit construction that allows for greater ventilation. Digital printed inks will only adhere to the fibers. Ink not attached to the fibers will be washed out resulting in a garment with lower brightness than a comparable cotton garment. While cotton garments can reach a white brightness of plain paper, polyester garments will only reach a brightness similar to newspaper.
- Colored blank polyester garments use dyes that can migrate when exposed to heat. Exposing printed garments to high heat can cause the dyes to migrate and tint the printed inks with the garment color.
- Some polyester garments have been treated with special coatings to enhance certain properties, such as stain resistance. These coatings may prevent ink from adhering properly. Test garments prior to production.



Polyester garment fabric structure is a loose knit mesh.

Hand behind garment is visible through the garment.

EPSON
EXCEED YOUR VISION

Recommended Equipment

The following equipment has been tested for Polyester Garment Printing

Pretreatment Machine

- Equipment Zone SpeedTreater-TX
- Lawson Zoom AE
- Schulze PRETREATmaker IV

Printer & Supplies

- Epson SureColor F2000 Printer
- Epson SureColor F2100 Printer
- Epson UltraChrome DG Inks (T725xxx)
- Epson Polyester Pretreatment (C13T43R200)

Heat Press and Tunnel Dryer

- Hotronix Heat Presses
- GeoKnight Heat Presses
- Insta Graphic Heat Presses
- Lawson Digi-Star 2412 Tunnel Dryer

Other

- Cooper-Atkins AquaTuff 35100 Thermal Measurement Instrument
- Cooper-Atkins AquaTuff 50008-K Thermal Probe for tunnel dryers
- Cooper-Atkins AquaTuff 50012-K Surface Thermal Probe for heat presses

Polyester Garment Printing Workflow

Polyester garment printing workflow consists of three steps:

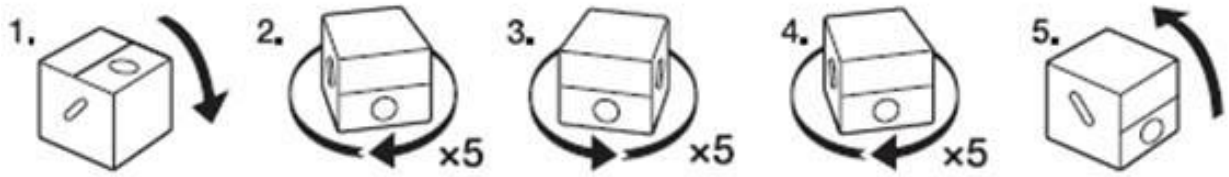
Garment Preparation
Applying pretreatment, drying, and pressing the garment

Garment Printing
Printing inks onto the prepared garment

Garment Finishing
Heat curing the inks to ensure durable garments with high wash-fastness

Preparing Pretreatment Liquid

The pretreatment liquid needs to be stirred before opening the box. Using quick movements, rotate the box as illustrated below.



The Pretreatment Liquid for Polyester (C13T43R200) can be used on both light and dark garments when properly diluted with distilled water.

Dark Garments (When using White ink)

- Do not dilute with water.

Light Garments (When using only CMYK inks)

- Mix 1 part pretreatment liquid with 6 parts water.

Applying Pretreatment Liquid

The polyester pretreatment must be applied to the garment to allow the ink to adhere. An enclosed pretreatment machine is strongly recommend to ensure consistent quality and a clean work environment.

Please note: Pretreatment liquid for polyester has a higher viscosity than pretreatment liquid for cotton. Not all pretreatment machines are able to properly spray the pretreatment liquid for polyester. Follow manufactures recommended daily maintenance and nozzle cleaning procedures.

How to Apply:

Measure using a digital gram scale to determine appropriate speed setting:

- Apply 0.15 to 0.20 grams of pretreatment per square inch of coverage
  - 30-40 grams for a full shirt coverage (A3-size area)
  - 15-20 grams for a ½ shirt coverage (A4-size area)
  - Lawson Zoom AE Speed dial set to 6

Drying Pretreated Garment

The pretreated garment needs to be dried and pressed prior to printing.

Allow garments to dry to ambient humidity using:

- Tunnel Dryer – Garment should be slightly damp upon exiting dryer
- Heat Press – Combines drying and pressing in a single step
  - 285°F Temperature
  - 60 seconds or until dry
  - Medium pressure (4)

Press garments prior to printing:

Pressing the garment with slight moisture will flatten the fibers on the Surface and allow the pretreatment liquid to “hold” the fibers in place. Press using a heat press at the following settings:

- 285°F Temperature
- 10-15 seconds (until dry)
- Medium pressure (4)

Printing Polyester Garments

Polyester performance garments are not as tightly knitted as cotton garments, which can allow for greater moisture wicking. The openness of the fabric will allow ink to go through the fabric and soil the print platen. Do not use the grip-pad platen cover when printing polyester garments.

Loading Garments on Platen:

Sleeve/Thread the garment on the printer platen so that only the print side is above the platen. Place the hoop over the garment to secure in place. Ensure the platen print height is set correctly. The platen height level usually will be at 1 to 1.5 for a typical performance shirt.

Printing from Epson Garment Creator:

The printing software settings for printing on polyester is very similar to cotton with only following adjustments recommended:

For garment printing that will NOT utilize white ink:

- Preset: Light Colored T-Shirt
- F2000 Print Quality: Level 1
- F2100 Print Quality: Level 3

For garment printing that will utilize white ink:
Preset: Dark Color T-Shirt
F2000 Print Quality: Level 1
F2100 Print Quality: Level 4 or 5 (Highlight White Off/On)
Ink Density: White +25%, Color +25%

Curing Polyester Garments with a Heat Press

Heat needs to be applied to properly cure the inks to ensure good wash-fastness.

Set the Heat Press to a temperature of 285°F.

Step 1: Place garment on heat press and hover under heating element (no contact) for 30 seconds

Step 2: Place sheet of parchment paper on top of the garment and close press with lowest pressure. Press for 45 seconds (white ink not used) or 90 seconds (white ink used).

Curing Polyester Garments with a Tunnel Dryer

Heat needs to be applied to cure the inks and ensure good wash-fastness. The target curing temperature of the inks is 265°F to 285°F. To avoid possible dye-migration, the garment temperature should not exceed 285°F.

Conveyor Dryer:

Variations in dryer construction and number heat zones will affect the curing times. The temperature displayed on the dryer is a measure of the air exiting the heating element, not the temperature of the garment. The use of a temperature measurement device is recommended to determine the time required for the ink on the garment to reach 265°F.

Settings used with the Lawson Digi-Star 2412 dryer:

- Air Temperature: 340°F
- Time: 165 seconds

Printed Polyester Garments Care

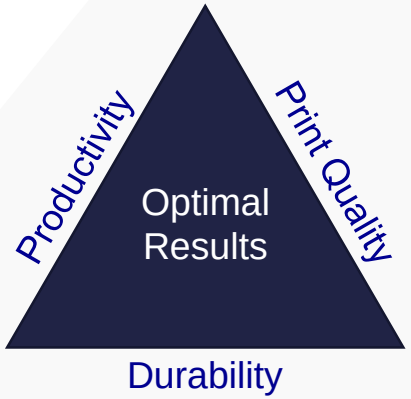
The garment may feel stiff after curing. The stiffness will go away after a few moments as the garment absorbs moisture from the environment. As the garment acclimates, the cured ink may feel tacky. The tacky feel of the ink and any discoloration from the pretreatment can be removed by rinsing with cold water.

Garment Washing Instructions:

- Machine wash inside-out in cold water with like colors
- Do not wring excess water
- Tumble dry clothing on low heat or air/hang dry
- Do not use bleach, dryer sheets or fabric softener
- Do not dry clean

Optimizing Garment Print Settings

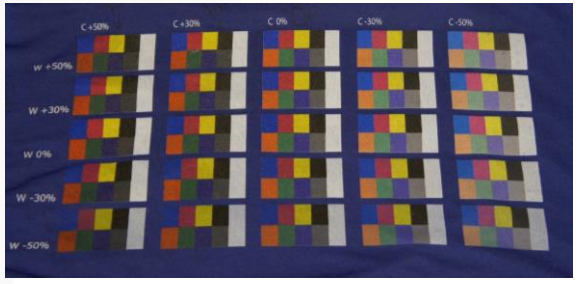
Using optimal print settings will result in prints with the best balance of quality, durability, and productivity. Optimizing for only one aspect will reduce the other two aspects.



Warning: Applying too much ink may result in poor wash fastness, increased cost, and lower productivity.

To determine the appropriate ink density adjustments

1. Print an Ink Density Chart using Garment Creator with the recommended mode.
2. Cure the garment
3. Looking at the center column, determine the lowest white ink density that offers good color density without mottling.
4. Looking at the row selected in step 3, determine the lowest color ink density that offers good color density without feathering/bleeding.
5. Lastly, rub the selected patch with plain paper to ensure little to no ink transfers. If ink does transfer, either review the curing process or lower the ink density.
6. Save the print settings as a preset for easy use in the future.



Frequently Asked Questions

1. **How can I remove the discoloration from the pretreatment?**
   Pretreatment liquid is necessary for the ink to adhere to the garment. The area that pretreatment liquid is applied may be noticeably darker on lighter colored garment. After printing and curing the garment, the discoloration can be removed by rinsing the garment in cold water.

2. **Why does the ink feel sticky on the garment and how do I get rid of it?**
   Digital Textile Inks contain glycerin which readily absorb water, and has a boiling point over 500°F. Unlike cotton garments that absorb the glycerin from the ink, polyester does not. During the curing process, the water is evaporated but the glycerin remains on the surface as the ink cures. After curing the glycerin will reabsorb the ambient moisture in the environment and feel “sticky”. The glycerin can be removed by rinsing the garment in cold water.

3. **Can any synthetic garment be printed on?**
   No. While 100% polyester garments can now be used with DTG, there are many blends of materials that contain spandex, nylon, and other materials that will effect the durability and print quality results. Some sport jersey garments are coated with stain repellents to prevent grass and mud stains. The stain repellent coating unfortunately also prevents ink from adhering to the garment. Always test the garment for compatibility before starting production

Frequently Asked Questions

4. **Should I used polyester pretreatment for a 50% Polyester / 50% cotton garment?**
   No. The polyester pretreatment liquid should be used only on garments composed predominantly of polyester. The cotton pretreatment liquid is optimized to produce minimal garment discoloration even on 50/50 blends. Garments with 50/50 blends will result in muted colors compared to a 100% cotton or polyester.

5. **Why does the printed white areas have a tint?**
   The garment is being cured at too high of a temperature. The dyes in the garment fabric can migrate when exposed to high heat and cause the ink to take on a tint of the garment (i.e. whites turn pink on a red garment). The dye migration may not be noticeable immediately after curing, but can appear up to 48 hours.

6. **Is it normal to have ink on the printer platen after printing?**
   Yes. Most polyester “performance” garments are knitted as a loose mesh to allow for breathability. The inks applied during the printing step will reach the polyester fibers, but some ink will fall through the garment and land on the platen. After the printed garment is removed, wipe the platen with a damp towel to remove any residual ink. For stubborn stains, use soapy water. Do not use glass cleaner or alcohol based cleaners.

EPSON
EXCEED YOUR VISION

Recommendations based on internal testing conducted at Epson America Technology Center using Gildan 100% Polyester garments (model 42000, 46000 and 99500) as of December 2018.