

How to Print Plastisol Transfers

Advice from Textile Technical Service

What is Transfer Printing?

Transfer printing is an indirect printing method where, rather than printing inks directly on to a garment, inks are printed on to paper, dried, then 'transferred' under a heat press on to the garment. The printing process is thus similar to any other paper printing process, and as such a vacuum bed printing machine should be used.

The production of plastisol transfers takes advantage of the two-stage curing process of plastisol inks. Though plastisol inks require heating to 130-150°C to fully cure and develop wash resistance properties, (dependent on the ink system), there is a stage reached between 90-120°C when the ink has no resistance properties but is dry to the touch. This stage allows the ink to be dried or 'set' on the paper at a relatively low temperature. The process of transferring the print to the garment from the paper produces the second stage in the curing of the plastisol.

Is There Just One Type of Plastisol Transfer?

Transfers are produced in many different ways. Here we only deal with the two major types of plastisol transfers based on their method of application - these are Cold Peel (cold-split) transfers, and Hot-Peel (hot-split) transfers.

Cold-Peel Transfers

Cold-Peel transfers are those in which the whole of the printed film is transferred from the paper to the garment.

Printing Guidelines

Ink

Any plastisol ink can be used to produce a Cold-Peel transfer, however, best results are gained with an ink that dries at a low temperature to a tack-free surface, as with a dedicated transfer plastisol ink.

Paper

Release coated paper. This coating prevents the ink from sticking to the paper. The level and type of coating will determine the gloss of the resultant print.

Mesh

Mesh counts from 34-62T are typically used for single layer prints. Finer mesh counts can be used in conjunction with back-up layers, (see 'Tips').

Drying

Either infra-red or convection oven. Typical schedule: 120°C for 30 seconds.

Printing

Each colour is printed and dried before the next colour is added.

Design

All designs should be printed in reverse. Colours can be butt-registered or overlapped. Overlapped colours will not mix on transfer, the first colour down being the one showing on the resultant transferred print.

Transfer

This is done with a heat-press, typically set at 170-180°C. Place the garment on the lower platten of the heat-press and place the transfer on top, print side down. Close the heat-press and leave for 10-15 seconds. Open the press, carefully remove the garment with the print still in place, and allow to cool. When cold, carefully peel the paper from the garment, to leave the print attached.

Cold-Peel transfer produces prints that are usually flexible and wash-resistant but, as with all plastisol prints, they are not resistant to ironing. These properties will vary depending on the ink and printing conditions used.

Troubleshooting

Problem	Reason / Solution
1. Ink is sticky on paper.	a. Ink not fully dried. Increase dryer temperature. b. Ink not suitable for transfer printing. Change ink.
2. Poor registration.	a. Paper shrinkage. Pre-shrink paper prior to printing by passing it through the dryer.
3. Print on paper is delicate and easily damaged.	a. Ink deposit too low. Use coarser mesh.
4. Poor adhesion to garment.	a. Insufficient transfer pressure. b. Insufficient transfer temperature. c. Ink deposit too low. Use coarser mesh.

Tips

Cold-Peel Transfers

- To increase opacity, a last-down back-up layer can be printed over the relevant parts of the design. Typically white, this layer will give the print increased opacity, hold-out and strength, allowing the colours in the design to be printed through finer mesh counts for improved definition.
- A useful addition is to use a back-up adhesive layer. This allows the whole print to be transferred on to the garment at much lower temperatures, typically around 140°C, and should also give improved adhesion on to synthetic materials. The adhesive qualities, plus this reduced temperature transfer, can give the following benefits:
 - Improved adhesion on many synthetic garments.
 - Reduction of dye bleed on synthetics.
 - Improved opacity due to increased hold-out on transfer.
 - Reduced garment distortion with heat sensitive fabrics.

Adhesives are of two major types:

Adhesive Powder	Scatter over the wet ink, shake off the excess, and dry as normal. The powder will form a layer on the back of the print.
Printable Adhesives	These can be printed as a backing layer over the required area of the design.

Hot-peel Transfers

Hot-Peel transfers are produced by printing the ink on to a non-release coated paper, for which the ink has some affinity. The paper is removed immediately after the press is released whilst the ink is still hot, causing the ink film to be 'split' between the paper and the garment. This creates a softer, less 'plastic' surface to the print and thus a more appealing handle.

Printing Guidelines

Ink

A dedicated Hot-Peel transfer plastisol is required, as not all plastisols will produce the required 'split' characteristics.

Paper

Non-release coated paper. The paper will significantly affect the peel of the transfer, thus all papers should be thoroughly tested before use.

Mesh

Mesh counts from 21-43T should be used. A very thin ink film may produce poor split characteristics.

Drying

Either infra-red or convection oven. Typical schedule: 120°C for 15 seconds.

Printing

Each colour is printed and dried before the next colour is added.

Design

All designs should be printed in reverse. Colours should be butt-registered only. Overlapping colours will mix on transfer.

Transfer

When the whole image is printed, the print is ready for transfer. This should be done with a heat-press, typically set at 180-190°C. Place the garment on the non-heated platten of the heat-press with the transfer on top, print side down. Close the heat-press and leave for 15-20 seconds. Open the press and peel the paper immediately, preferably with the garment still on the base platten of the heat-press. For this reason, a press where the heated platten can be easily moved away is recommended. The ink should divide smoothly between paper and garment as the paper is peeled. This peeling technique may require plenty of practice before a production run can be undertaken.

Hot-Peel transfer produces brightly coloured prints with a soft handle, which can closely resemble direct plastisol prints. As with all plastisol prints they are non-ironable.

Troubleshooting

Problem	Reason / Solution
1. Ink is sticky on paper.	a. Ink not fully dried. Increase dryer temperature. b. Ink not suitable for transfer printing. Change ink.
2. Poor registration.	a. Paper shrinkage. Pre-shrink paper prior to printing by passing it through the dryer.
3. Print on paper is delicate and easily damaged.	a. Drying temperature too high. b. Ink deposit too low. Use coarser mesh.
4. Poor peel of paper.	a. Ink unsuitable for Hot-Peel. Use a recommended ink. b. Delay between pressing and peeling too long. Peel faster, typically within 5 seconds. c. Ink deposit too low. Use coarser mesh. Typically a deposit of around 50 microns is required. d. Drying temperature too high. Reduce temperature. Check ink film on paper does not stretch when removed from paper. e. Ink not fully dry on paper. Increase drying temperature. Check the back of the paper is not translucent in the print area; this is a symptom of under-drying.
5. Ink transfers completely.	a. Delay between pressing and peeling too long. Peel faster, typically within 5 seconds. b. Paper unsuitable for Hot-Peel. Change paper.

Tips

Hot-Peel Transfers

1. Warm the base platten of the heat-press before beginning to transfer. This prevents problems with the first few transfers failing to split properly due to the base having not heated up to production temperature.
2. The printing of opaque Hot-Peel transfers requires the use of a dedicated 'Opaque Hot-Peel' ink system. It also requires specific film weights and printing techniques and is thus restricted in its applications. The manufacturer's 'Product Information Sheet' should be thoroughly studied before printing of this type of transfer is attempted.

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