



Tacky paper works extremely well for double-sided garments, because the paper sticks and stays on the first side when pressed, so the first side doesn't fade while processing the second.

Choosing a Dye Sublimation Paper

Why dye sublimation transfer paper matters

Sublimation is the transition of a substance directly from the solid to the gas phase, without passing through the intermediate liquid phase. In the dye sublimation process, the solid (dried) dye ink is heated until it vaporizes into the gas state while in contact with a polyester or polyester-coated base. The polyester, under heat, opens pores that allow the gaseous dye to bond and be encapsulated by the polyester. While there are cases, such as backlit and flag applications, where disperse dye is printed directly on a pretreated polyester fabric, most dye sublimation involves printing on a coated paper and transferring to a poly base, typically a fabric or hard substrate.

Printing on dye sublimation paper with a digital printer involves the precise placement of picoliter-sized droplets. When these droplets make contact with paper, they experience dot gain, that is, they tend to spread out. A proper coating on the paper controls the dot gain, allowing for clarity

and fine detail in the finished product. This becomes more critical with smaller droplets and higher resolutions, especially for end products like hard and rigid substrates. (Textiles tend to be more forgiving as they have a rougher texture due to the threading of the fabric.) In addition to controlling dot gain, paper coatings can determine how much ink is absorbed and then released onto the final product, affecting ink usage.

While uncoated paper may appear to be the cheapest method, it may actually be far from the least expensive. Bypassing the coating and printing on uncoated paper leaves one without the dot gain control of a coating and without the ability to control precisely how much ink can be absorbed and released. This process will result in uncontrolled output. This is counterintuitive and completely contrary to the time and energy spent buying expensive equipment, RIP software, transfer equipment and substrates to get the best output. Raw papers vary in pulp particle

Heavier papers can carry a greater ink load, which helps in printing products such as carpets and heavy fabrics.



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REGULAR PAPER



SUNPAPER



UV dye sub papers resist UV fading, prolonging usability and quality, and adding value to outdoor products. Courtesy of Kaspar Papir Sunpaper.



Blowouts and ghosting can be the result of using the incorrect paper for the application.

size, density and uniformity that will affect dot gain on the paper, absorption and adsorption of ink on the paper, and of course will affect the proper and uniform release of dye during transfer. We all understand that everyone wants predictable and repeatable sublimation results. The coatings on sublimation papers are the secret sauce of getting predictable and reliable results every time. Uncoated papers are not recommended.

Transfer Paper Costs

While often the first thought may be the price, there are a number of other considerations when calculating costs.

The origin of the paper itself is a factor in determining costs. The environmental impact of the paper is a concern to those looking to reduce their production footprint. When making paper, mills that are in-line manufacturers — those that make and coat paper in-line — produce far less waste than those who coat premade paper. The paper's origin can also impact shipping costs and add shipping and processing time, and it reflects on the quality control standards of its production.

The base weight of the paper affects its costs as well; lighter weight papers tend to be more economically priced as it typically takes less pulp to make. Coatings also influence cost. Carboxymethyl cellulose/cellulose gum (CMC) coatings are less expensive than solid surface (SS) clay coatings.

How you purchase, and how much you purchase at any given time, will affect your initial costs. Buy direct from the paper manufacturer rather than through a dealer chain, and costs will also vary. In either option, the amount purchased can yield volume discounts, as can buying in bulk rather than boxed rolls. Boxed rolls typically run 100 - 150 meters long, while mini jumbos run 1,000 - 2,500 meters in length, and master jumbos run 8,000 - 19,000 meters, depending on equipment and production needs.

One needs to consider waste factors as well. Thinner papers are more difficult to use and transfer and contribute to waste of not only paper but of substrate as well. So, it is important to pick the right paper for your product line and your production capabilities. There can be shipping waste depending on how well the paper is packaged and shipped, and there can be damage in handling and storing rolls in the shop. Another waste factor to consider is how transferring wider widths becomes harder as paper becomes thinner.

Types of Dye Sublimation Paper

High-load papers — SS clay coated, multipurpose papers — are good for applications such as ceramics, metals, glass, wood, fiber reinforced plastic, rubber koozies, soft signage, apparel, shower curtains and home furnishings. SS/high-load papers can pass through excess vapor gases, allowing for hard surface and low porosity performance without causing blowouts or hot spots. They dry quickly, handle heavier ink loads and are friendlier to unstable print room environments, which makes them ideal for small-format printing. High-load papers do not transfer as efficiently as high-release/CMC papers and are not available in a “tacky” format. They cost more than CMC papers and are not available in lighter weight grades.

CMC papers are good for textile applications like fashion, apparel, home décor and soft signage. These papers have a higher release of ink than SS papers, so they require less ink at printing and release that ink quicker, for less ghosting, shorter dwell times and higher productivity. While CMC papers are slower in drying, they are still the choice for high-speed printers. These are available in lighter weight grades that allow for more paper on a roll, requiring fewer paper changes and increasing productivity.

Thermo adhesive (tacky) paper is typically a CMC paper with a heat-activated adhesive. This allows the paper to “stick” to the polyester fabric, eliminating ghosting with slippery textiles and sports apparel. It also eliminates difficulties that can arise when using clam shell presses shifts the paper during pressing or release, causing blowouts or ghosting. Tacky paper does not stick to hard surfaces and is a bit more expensive than other CMC coated papers.

Paper Weights

Coated papers range between 39 and 150 grams per square meter (gsm). There are advantages and disadvantages to lighter papers. Lighter papers usually require less ink for the intended applications of fashion apparel, sports apparel or soft signage, and because there is more paper on a roll, there are fewer roll changes for the printer itself. That can save production costs and time. Thinner papers tend to cockle less than heavier papers, but can be difficult to handle for a single operator, making loading the paper into the printer or a calendar challenging. Papers 72 gsm and higher work well for a single operator, but papers lighter than that may require

a couple of operators to handle properly and minimize waste. Thin grades are not desirable for sheet-fed use on flat beds as the edges tend to curl.

Heavier grades of paper have found a home in the grand-format arena, which is challenged by heavier ink loads and wider fabric transfer. They can carry a greater ink load, which helps in printing products such as carpets and heavy fabrics. Industrial-grade printers are looking for output. Productivity comes with speed from the printer and the process. All grades of paper can handle the speeds of these printers.

Papers for Specific Printers and Applications

Industrial-grade printers are looking for speed and productivity. When selecting papers, these printing companies want more paper per roll, fewer changeovers, faster transfer/dwell times and a lower cost per square foot. This typically translates to thinner grades of CMC coated papers.

Many grand-format customers have become accustomed to working with clay-based papers, which were the first grades introduced to that market. Since then, CMC grades have become available at less expense, and have displaced some of the traditional grades.

Large-format printers have also displaced some small-format and desktop printer business and will print onto clay coated papers as well as CMC coated papers, but the volume is probably 85% CMC vs. 15% clay in this range.

Small-format printers are in between desktop and large-format printers, as some companies have migrated to faster output instead of using desktop printers. SS clay coated papers are a larger part of these printers' consumption.

Desktop printers in sheet-fed format always use SS coated papers. This type of paper allows consumers to transfer to most anything, hard or soft surface.

Special Function Papers

One of the issues with dye sublimation is UV fading, but there is a paper that addresses that with UV inhibitors on the paper itself. The UV inhibitors in this process actually gas with the dye sublimation dyes and encapsulate the dye around the layers of polyester fabric fibers. As such, the protection is not a surface treatment, but rather is absorbed into the polyester with the dye molecules. No additional treatments or processes are needed to get the added benefit of the UV protection — print and sublimate as normal



Desktop and small-format dye sublimation papers are clay (solid surface) coated to allow for the widest range of possible applications.

to get extended outdoor protection typically double that of unprotected processes. Some inks have better UV stability than others but typically don't fade uniformly. This paper will help keep the shade of color correct longer.

Now that you've invested in dye sublimation, buying a printer, a heat transfer unit, RIP and substrate, you now have tools to help you choose the best dye sub paper for your equipment and application.

Special thanks to Mark Freeman, President, Digital Print Solutions Inc., for providing the information on Kaspar Papir Sunpaper, and Tommy Martin, Textile Engineer, HP, for help in outlining and structuring this article.

Randy Anderson has spent 15 years with Mutoh and nearly 13 years in dye sublimation and textile printing. He finds digital printing fascinating, as it demonstrates the idea that one is only limited by their own imagination.

Rob Repasi assisted in developing multiple grades of papers used in the dye sub marketplace, including the first clay (solid surface) based paper. With 20-plus years of experience, Repasi is considered a dye sub pioneer, and introduced digital dye sub processes to several OEM partners still active in the industry.