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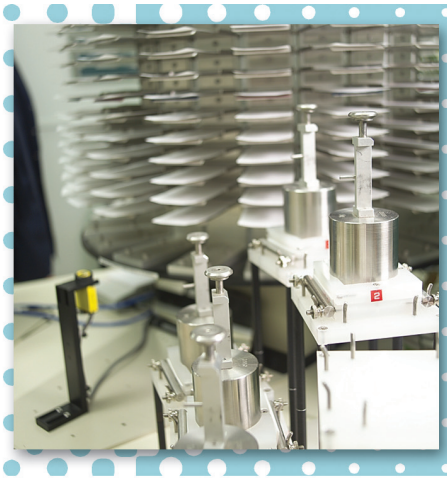
Xerox Supplies

Helpful Facts About Paper...

What You Need To Know!



Helpful Facts About Paper

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Introduction

Helpful Facts About Paper will help you obtain the best productivity and output quality from your Xerox Digital printer. Xerox Digital printers are at work in business, industrial settings, and commercial print environments throughout the world.

After your choice of a Xerox Digital printing system, the next most significant decision you will make is the paper or specialty media to be used in that system. The output quality and the productivity of the system rest on your paper/specialty media decision. As you will learn in reading *Helpful Facts About Paper*, paper may be plain, but it is never simple and specialty media comes in a great variety of products. The proper match-up of digital print technology, print application, and paper is essential to achieving the best possible performance.

Purpose Of This Guide

The purpose of this guide is to assist you in understanding the many facets of paper and specialty media that affect your digital printing system. Armed with this information, you will be able to choose papers that enhance the quality of the output from your system, while maximizing the throughput.

It is this combination of high quality and high productivity that defines optimal performance.

- **Chapter 1** describes the papermaking process, with special emphasis on those factors that have the greatest impact on the runnability of paper produced for use in digital printers.
- **Chapter 2** discusses how printing conditions affect paper and dictate the need for papers that meet certain criteria if jams, improper stacking, degraded image quality, and other problems are to be minimized.
- **Chapter 3** examines a variety of paper properties, including weight, grade, curl, contamination, acidity/alkalinity, moisture, stiffness, grain, caliper, smoothness, porosity, opacity, and electrical conductivity. You will learn what effect each of these factors has on a sheet of paper, and how some of these factors can be controlled, either by setting certain specifications for the paper you purchase, or by your handling of the paper after purchase.
- **Chapter 4** looks at many aspects of the preparations for digital printing, from paper storage and moisture control to proper paper tray loading to minimize paper curl problems.
- **Chapter 5** offers information on preprinted forms—forms that have unchanging information printed on them from another print technology such as offset print prior to the time they are introduced into a Xerox Digital monochrome printing system. This chapter discusses factors that you and your pre-print supplier need to be aware of about the paper and ink used for these documents.
- **Chapter 6** explains specialty media, from labels and transparencies to recycled papers and vellum that can be used in many Xerox printers.
- **Chapter 7** discusses digital color printing, print applications, paper requirements, and equipment hints and tips.
- **Chapter 8** examines the nature of paper after it has been through the printer, and the effect that process has on post-processing equipment.

- **Chapter 9** focuses on Xerox brand papers and specialty media, and discusses how Xerox Quality requirements and digital optimization will help improve the performance of your digital printer.

Xerox Digital Printing Systems

Xerox makes digital printing systems in a variety of sizes and with a wide range of capabilities, thus enabling businesses to accommodate their varied needs.

Xerox DocuTech and DocuColor printers, are xerographic printers. They produce an image by placing a positive charge on a photosensitive drum or belt, then remove the charge from the non-image areas with an electronically-driven laser beam. The remaining positive charge is then used to attract negatively-charged dry ink, which is then fused to the paper through a combination of heat and pressure. This guide uses the term *digital printing* for this xerographic process.

For information about the input, output, and throughput capabilities and machine/paper handling capabilities of the various Xerox digital printing systems refer to appendix A of this guide.

Obtaining Optimum Performance

Optimum performance is the Xerox goal in building every digital printing system.

The importance of proper paper selection in obtaining optimum performance cannot be overemphasized. The digital printing process involves extremes of heat and pressure that place great demands on a sheet of paper. This is a very different process and technology than offset printing. Coupled with the high speeds attained by many of these printers, even small imperfections can become problems. Even the most sophisticated digital printer or copier can deliver substandard performance if a poor quality paper or the wrong type of paper is used.

Using paper that does not meet your digital printer’s requirements as described in this guide can lead to loss of productivity, decrease in the quality of the output, increased service calls, and even physical damage to the printer.

Some Notes On Terminology

Xerox is the largest distributor of digital paper and specialty media under one brand in the world. Xerox Supplies operates throughout the world.

The paper and specialty media offered in the various regions differ in some regards; these differences are discussed in this guide where appropriate.

Paper

Paper weights are given in pounds as well as grams per square meter (g/m^2). Grams per square metre is in general use throughout the world except in the United States and Canada. For a discussion of paper types and grades, refer to appendix B of this guide; for a chart showing weights in g/m^2 and pounds for each category of paper product, refer to appendix C. Although 20-pound paper converts mathematically to 75 g/m2, the functional equivalent of 20-pound paper that is used in Europe is 80 g/m^2, and is referred to that way throughout this guide.

High-Volume, Mid-Volume, Office

To improve readability, digital printers and copiers are distinguished in tables and figures as either high volume, mid volume or office. It is useful to define mid-to high-volume (35 to 180 pages per minute), and office (less than 35 pages per minute).

A Note On The Information In This Book

The information presented in this edition of *Helpful Facts About Paper* is current as of the publication date. However, all specifications, machine-specific information, and other data is subject to change at any time. Your Xerox Supplies Representative can provide you the latest available performance, pricing, and product information about Xerox papers and specialty media. If you have any questions about the suitability of any particular paper or specialty media for your application, please consult your sales or service representative.

Making Paper

Papermaking is a complex chemical and physical process. The product—a seemingly simple sheet of paper—is a function of many decisions and variables made at each step of the production process.

Understanding these factors enables you to select papers that produce the highest quality output while minimizing jams and other problems that lower productivity.

Pulp And Paper

Paper is made from cellulose fiber. Most of this is derived from trees; some finer grades of paper are made partially or entirely of cellulose fibers from cotton or old rags (thus the term “rag papers”).

The characteristics of the finished sheet of paper are determined by many factors, beginning with the type of trees used in the papermaking process. Softwood trees (those with needles, rather than leaves) such as pine produce paper that is strong, but somewhat rougher in finish than paper produced from hardwoods, which yield a weaker but smoother paper. Location of the mill is the major determinant in what type of wood is used to create a given sheet of paper. Economics have historically dictated that the mills use the tree species closest to their site, however, global trade flows in pulp are resulting in more variety and flexibility in pulp utilization.

Most mills use some mixture of soft- and hardwoods, while striving to produce a uniform sheet with the desired characteristics for the grade. Papermaking, however, is a high-speed process with inherent manufacturing variations.

To help comprehend the process described below – it is important to understand that papermaking is both complex and challenging. For example, an average modern paper machine that makes multipurpose xerographic papers averages 300 inches/6-8 metres across and most operate at 3500 feet/minute / 1000 m/minute.

Also consider that the base material—trees—is itself quite variable. This places a premium on the mill's ability to monitor and control the quality and consistency of its papermaking efforts.

The Papermaking Process

The first stage in processing is the removal of bark from the tree, and the reduction of the remaining wood to small chips. At this point – the end-use of the product actually determines the way in which these chips are processed. In papermaking – there are two basic classifications of paper grades based on the manufacturing process – groundwood or freesheet (also known as woodfree).

The whitening process is critical in the production of “freesheet or woodfree” grades. This process is essential as it removes other impurities from the wood fibers that can affect the overall performance and appearance of the finished product.

Elemental chlorine-free (ECF) indicates that either chlorine dioxide or sodium hypochlorite is used to whiten the wood fibers. Total chlorine-free (TCF) indicates that no chlorine or chlorine-compounds were used in the process. Both ECF and TCF products are environmentally responsible and the selection is really a matter of personal preference. While ECF products are broadly available, products manufactured with TCF pulps may be more limited.

At the refining stage, refiners work to separate and develop the strength properties of the fibers. This has a significant effect on the curl, opacity, porosity and stiffness (discussed in more detail in Chapter 3) of the paper that will eventually be produced. After this stage fillers and chemicals are added to the mixture; these additives have an impact on both the appearance and the physical properties of the paper. They are one of the major determinants in how bright the paper is, which in turn establishes the paper’s *grade*. For more information about paper grades and weights, refer to appendix B and C in this guide.

The pulp slurry is now ready to go to the paper machine. The pulp slurry enters the *wet end*, flowing through a pressurized chamber called the *head box*, which distributes the pulp mixture evenly on an endless screen of very fine mesh.

The pulp slurry is gradually de-watered on this fine mesh by gravity and suction. When the fibers become capable of supporting their own weight, they have become paper. Additional water is removed with pressure before the paper enters the dryer section.

Sizing

The drying stage consists of two sections of steam-heated cylinders that continually remove water. The mill adds surface *sizing* after the first drying section. Surface sizing, which serves to bond the surface fibers and increase the paper’s surface strength, is a critical factor in the suitability of a sheet for the xerographic digital printing process. If not well-sized, loose fibers on the paper surface cause machine contamination and other problems that result in the need for increased service calls.

In a second drying section, the paper is brought to its final moisture content. This is an extremely critical phase, as papers with high moisture contents tend to cause problems with post fuser curl, while papers with low moisture contents have a tendency to experience static, which causes problems with feeding and post-printing operations such as

stacking. A variation of as little as 1% from the ideal value of 4.5% moisture content can cause problems.

Cutting And Wrapping

The final product emerges from the machine and is wound temporarily onto large machine rolls that can weigh more than 30 tons (35 metric tonnes). These machine rolls accommodate the high-speed papermaking process. The paper is then slit and rewound onto smaller rolls, and delivered to a high-speed sheeter in the mills converting operations.

The high-speed sheeter precision-cuts the product to size and wraps the reams. All Xerox papers are sealed in moisture-proof wrappers that maintain the moisture content of the paper.

Boxing And Palletizing

In a final step, the reams of paper are inserted into cartons, placed on wooden pallets, and wrapped with a protective plastic to ensure load integrity for shipping.

From Pulp To Printer

Knowledge of how paper is made comes in handy when evaluating papers and paper suppliers. Understanding the many factors that affect the papermaking process enables you to make a more educated decision, and to select papers that will increase the productivity of a printer system.

Paper and Xerox Printers

Although it takes only seconds, a piece of paper's trip through a digital printing system subjects it to a tremendous number of demands. To ensure the best quality and productivity a number of requirements must be met.

Paper Requirements To Ensure Best Performance

While many types and grades of paper can be run in Xerox digital printing systems, there are a common set of characteristics and quality criteria that must be built into papers that are optimized for performance in digital printing systems – either monochrome (black & white) or color.

Digital optimization is the process by which paper and specialty media products are developed, designed and produced to ensure optimum performance on digital printing systems. This process includes stringent product specifications, quality control and assurance criteria, converting or finishing requirements and supplier training and education.

While some bond and offset sheets may also function, they may not perform as reliably, or produce the same image quality as papers specifically designed for use in digital printing systems.

To ensure high quality and performance from Xerox printers, the paper should be optimized for printing in digital systems and must meet the following requirements:

- Paper must be as free as possible of the paper dust that can result from cutting and wrapping operations. If not strictly controlled, contamination from paper dust eventually causes difficulties, downtime, and a need for service. Build up of paper dust and loose fibers is one of the leading causes of service calls and correspondingly lost productivity.
- The Xerox paper path through the printer demands that the paper bends in order to pass around drums, feed rollers, and other portions of the transport mechanism. Paper with excessive curl, due to high moisture content or other causes, is likely to jam. Paper with excessive curl is another leading cause of service calls.
- Xerox printing systems use both friction-feed and vacuum-feed mechanisms to feed the paper from the various trays. Paper must have the correct frictional properties or misfeeds may result. Additionally, the sheet must have adequate porosity to ensure reliable performance in the vacuum mechanism.
- During the image-transfer process, the paper is subjected to electrostatic charges. If the paper lacks the proper electrical characteristics, dry ink may not transfer properly or completely, causing image quality defects or other failures.
- The dry ink is fused to the paper by a combination of heat and pressure. Paper with an excessively rough surface can cause fusing failures, preprinted forms with incorrect inks can cause smearing or offsetting of the preprinted portions of the image, and paper that contains traces of contaminants can cause spotting of the photoreceptor (this is where the image is transferred) and poor imaging of subsequent prints.

  Suitable smoothness levels are also required to prevent image graininess and achieve acceptable toner adhesion results.

- The high temperature used for fusing in most printers, combined with the friction of paper being moved at high speeds through the system can generate static electricity. This tendency is exacerbated by paper whose moisture content is too low. Static produces problems with output operations such as stacking and sorting, as well as difficulties in a wide variety of post-processing applications.

Cost Effectiveness

The cost of a printed document has many components. Paper price is one of several elements, but is typically not the dominant one.

Runnability—the ability to be processed through a print system without interruption, while producing a print of acceptable quality—is the primary consideration in determining cost effectiveness. In printing systems, especially, high-speed machines, interruptions in production are costly. These costly interruptions can include, but are not limited to, labor and machine downtime and missed deadlines.

Paper prices vary widely between different types and brands of paper. To maximize performance, and achieve maximum cost effectiveness, you should always purchase high quality paper that is designed to meet your printer specifications.

Attempts to use “bargain” papers, or papers that are not designed for Digital printing can cost far more in production problems and increased service calls than they save in purchase price. Use of the proper paper is the best investment you can make in securing optimal performance from your Xerox digital printing system.

A Word About Vendors

Many manufacturers market multipurpose and digital papers to satisfy what is a very substantial and growing market. A number of these manufacturers offer products that provide satisfactory performance in Xerox printing systems.

As you will find in reading *Helpful Facts About Paper*, there are many factors that affect how well paper performs. Many of these are difficult, or impossible, for the end user to determine. Your best assurance of paper that performs properly is to purchase it from a source that is prepared to monitor these factors on your behalf, thus ensuring they remain within the specifications and tolerances set for Xerox printing systems.

While you do not have to use Xerox brand paper to achieve satisfactory performance, doing so offers you the security of using papers that have been designed to maximize the performance and image quality of your Xerox printing systems. You also benefit from the efforts of the most robust quality assurance program, one that qualifies each mill and each piece of paper-making equipment individually, and then constantly monitors the paper produced to see that it meets all the necessary specifications.

Paper Properties and Xerox Printers

Paper is both physically and chemically complex. For a paper to perform properly in your Xerox digital printing systems, its properties must be within specified limits.

Failure to understand these paper properties, and to assure that the paper you use is within specified limits for each factor, can result in problems ranging from misfeeds and jams to poor print quality, excessive service calls, and damage to printer components.

A sheet of paper is defined by its weight, type, finish, and grade.

Weight

Paper weight is generally expressed as grams per square metre (g/m^2), a measure that makes it easy to compare any two pieces of paper, even if the papers are of different types such as offset and index.

In North America, paper weights are given as the weight in pounds of 500 sheets of a particular size; the size of the *basis sheet*, however, varies with the type of paper, thus making it difficult to compare weights between different types of paper. A 50-pound xerographic bond is not the same as a 50-pound offset paper, and both are different from a 50-pound index stock. For a further explanation of paper weights, and a chart that permits conversion from one weight to the nearest comparable weight of another type, refer to Appendix C.

For the list of Xerox paper and specialty media suitable for use in your equipment, consult your digital printer's Recommended Media List. (www.xerox.com/supplies)

Grade

Paper may be defined in terms of its use. Each grade serves a purpose, usually suggested by its grade name. Some of the most common classifications of printing papers are bond, coated, text, cover, book, offset, index, and label.

Brightness

Brightness is a measure of the amount of light, of a specific wavelength, a sheet reflects. The more light it reflects, the higher the brightness. Brightness, to a large extent, dictates the cost of the sheet, but has no relationship with functionality. *Brightness has no bearing on Performance but does have a significant impact on image quality.* High-brightness papers give more contrast, allowing colors to stand out; low brightness papers are easier on the eyes for periods of extended viewing or reading. Higher brightness papers do not necessarily perform better in your digital printing system but add value to your print jobs. Adequate paper brightness enhances the contrast between the paper and the image, thus improving readability. Brightness is especially important for color printing to ensure images are vivid.

A further explanation of paper grades is found in Appendix B.

Contamination

Contamination is usually a direct result of adhesive residue or paper dust/fibers from paper that has poor cut quality.

Paper dust is a pervasive problem that causes a substantial number of service calls. The major drivers of paper dust are high filler content and poor finishing practices. Paper dust causes difficulty by accumulating in the fuser area creating image quality issues, contaminating components, and causing a variety of difficult-to diagnose problems.

For best performance, purchase only mill-cut and mill-sealed reams obtained from a vendor whose quality assurance procedures provide for strict control of paper dust.

Acid vs. Alkaline Papers

The acidity (or alkalinity) of a paper is determined primarily by the internal sizing methodology employed in its manufacture. Paper produced using rosin/alum chemistry is often referred to as acid sized.

Most manufacturers have now converted to synthetic internal sizing, enabling paper to be produced under slightly alkaline conditions.

Either process can yield a perfectly acceptable product. The major drawback of the acid sized paper is sheet life. Acid sized sheets age quicker than their alkaline counterparts, eventually becoming yellow and brittle.

In North America, the American Society for Testing and Materials (ASTM) has established standards of permanence for papers. Paper with a pH of 5.5 or higher lasts 50 to 100 years (ASTM Type III). Paper with a pH of 7.5 to 9.5 lasts several hundred years (ASTM Type I). All Xerox paper, with the exception of 90 and 110 lb. Tabs, is manufactured in an acid free environment and meets the requirements for ASTM Type I permanence.

In Europe, the International Organisation for Standardisation established ISO 9706: 1994 for paper permanence. Tearing resistance of papers above 70 g/m^2 must be at least 350mN in any direction. Alkali reserve expressed as % calcium carbonate must be 2% minimum. Kappa number must be less than 5 and pH must be 7.5-10, ie. alkaline.

Moisture Content

Moisture content directly affects reliability and print quality. Too much moisture can cause excessive curl, jams, and print quality problems. Moisture levels that are too low may cause static problems, which can also lead to jams and misfeeds as well as causing difficulties in post-processing paper handling.

The best performance in Xerox digital printing systems comes with papers that have nominal moisture content of 4.5%. Offset papers normally have much higher moisture content than papers designed for digital printing.

Moisture content must be uniform within the ream. The ream should be packaged to ensure moisture integrity. Moisture-proof ream wrappers are essential to maintaining the correct moisture level of the paper.

Xerox papers are packaged in a moisture-proof ream wrapper, which has a demonstrated ability to resist the migration of moisture into and out of the package. These ream wrappers can be a paper-poly-paper, paper-poly, or clear poly constructions.

Refer to Chapter 4, “Preparation for Printing” for suggestions on controlling moisture in stored reams of paper.

Curl

Excess post fuser curl is one of the most common paper problems in digital printing, and a very frequent cause of paper jams. Selection of a low curl paper with proper moisture content will make a significant difference in your system's productivity.

The best-performing papers exhibit a low amount of curl after being run through the printer. A trial run quickly demonstrates how much post fuser curl is likely with any particular paper, and is the best curl test. When there is too much curl, paper jams can occur within the machine or in post-processing equipment. For more information on evaluating and controlling paper curl, refer to Chapter 4, “Preparation for Printing.”

Moisture And Curl

Generally speaking, high moisture content—above 5.3%—and a greater tendency to curl go hand in hand.

Papers with very low moisture content tend to absorb water when exposed to the environment for extended periods of time. This can cause wavy edges that may lead to runnability problems.

While a test run in your equipment is the best means of evaluating paper curl, successful operation is most likely if you specify a paper that has been manufactured for digital printing with the correct moisture content and packaged to maintain that moisture level. Offset papers are manufactured to a higher moisture content and tend to curl in digital printers.

Curl-controlled Papers

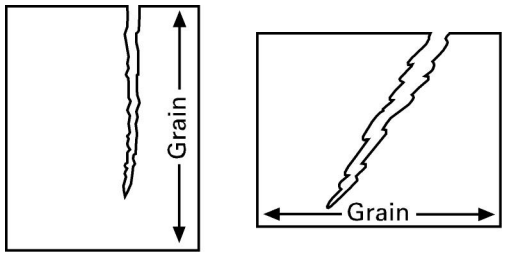
Some digital papers are manufactured with built-in curl control to counteract their tendency to curl when exposed to the heat and/or pressure used in digital printers and copiers. Xerox papers are manufactured with built-in curl control. These papers work well in all Xerox digital printers when attention is paid to correct orientation of the paper during loading.

Grain

The *grain* of a paper is the direction in which most of its fibers lie. There are three methods that can be used to determine grain direction of a sheet:

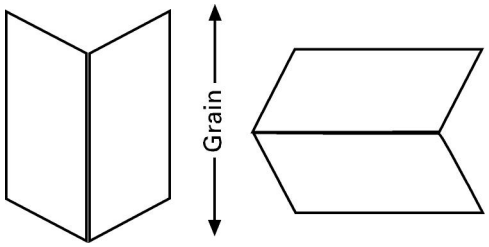
- Tear a sheet part way lengthwise; repeat crosswise. Compare the two tears. Paper always tears straighter with the grain (refer to figure 3-1).

  Figure 3-1. **Paper tears straighter with the grain**



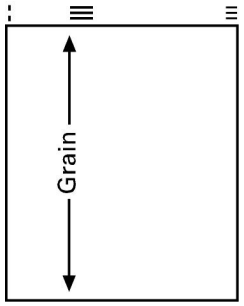
- Fold a sheet lengthwise, then crosswise. Compare the evenness of the folds. Paper folds smoothly with the grain. Cross-grain folds tend to be rough and cracked (refer to figure 3-2).

  Figure 3-2. **Paper folds more easily with the grain**



- Moisten two adjacent edges of the sheet. The grain-long direction is perpendicular to the edge that is wavy (refer to figure 3-3).

  Figure 3-3. **When moistened, the edge perpendicular to the grain direction will become wavy**



Paper with the grain parallel to the long side of the sheet are said to be *grain* long or long grain. Grain-long papers are about twice as stiff in the long direction (refer to “Stiffness,” in the next section).

Grain-short papers are about twice as stiff in the short direction. Therefore they do not flex as readily along the long edge as do grain long papers.

Grain direction is commonly indicated through the sheet size dimension on the paper packaging – 11x17 / 297 x 420 mm means long grain and 17x11 / 420 x 297 mm means short grain. Another way to indicate grain direction is to underline one of the dimensions, 11x17 / 297 x 420 mm means long grain and 17x11 / 420 x 297 mm means short grain. In Europe, “SG” for short grain and “LG” for long grain indicate grain direction.

Most 8.5x11/A4 sheets are long grain. Digital color printing and in-line finishing has required the use of short grain products especially in the larger sized sheets 17x11/A3 and 18x12/SRA3. Short grain is essential when full-color printed documents are folded, since grain direction will minimize toner crack on the fold. Brochure, books and marketing material are examples of applications where short grain paper would be required.

In certain specialized situations, post-processing equipment impacts the necessary grain direction of the paper. For further discussion, refer to Chapter 8, “Post-processing Considerations.”

Stiffness

Stiffness refers to the rigidity, or bending resistance, of paper. Thicker papers are usually stiffer, and papers are normally stiffer in the grain-short direction. In general, lightweight papers do not have the stiffness of heavier stock and are more likely to bunch up or wrinkle in the printer, causing jams. Heavier weight papers, such as cover and index stock, may have runnability problems as well as print quality defects (skips, blurs, deletions) due to their reduced ability to bend around rollers and drums.

Abrasiveness

As a result of coatings and other additives, some papers can be highly abrasive. Such sheets can cause photoreceptor damage during a jam, or as a result of particulate contamination. Abrasive papers are not recommended for use in Xerox digital printing systems.

Smoothness

A paper’s smoothness has a significant impact on image quality. If paper is too rough, image quality degrades; with increasing roughness, expect a loss of print quality in solids and halftones resulting in graininess. Extremely rough paper does not allow toner to fuse properly, which results in an image that may rub or flake off.

Since surface irregularities must be filled with ink, rough papers require a higher density setting, and thus more dry ink, to achieve a given level of image density.

Xerox has conducted extensive image quality testing on digital, xerographic, bond, and offset papers. *The smoother digital, xerographic and bond grade papers provide the best image quality*.

For general monochrome use, xerographic and multi-purpose papers with a nominal value of 150 on the Sheffield or 180 on the Bendtsen scale produce the best results. Digital color grades are smoother to meet the more demanding print quality requirements with coated paper being the smoothest grade.

Formation

Formation is descriptive of a paper's fiber structure and uniformity or lack of it in the distribution of fibers. Good formation is essential in digital printing to ensure good image quality.

Whiteness (Shade)

Whiteness is an important property of paper as it relates strongly to the visual appeal of the printed product. Xerox digital printers and copiers calibrate their color performance based on the shade of a standard Xerox paper product.

Whiteness is a measure of the light reflectance of paper across the whole visible spectrum as opposed to brightness, which is measured at only one wavelength. In this way it more closely matches the viewers perception of how white a sheet of paper is. Colors are measured using different scales. The "L*, a*, b*" scale is the most common. Within this scale, "L*" measures degree of lightness, "a*" measures red/green, and "b*" measures blue/yellow. The terms "blue-white" and "yellow-white come from this scale. Whiteness has no impact on sheet performance but whiteness and brightness do play an important role in the visual appeal of the sheet and printed product.

Gloss Level

The gloss level of paper is measured as the ratio of reflected to incident light. It is the reflectance of the surface responsible for its shiny or lustrous appearance. A higher gloss is achieved by making the surface more reflective through a combination of calendering (pressing) and/or coating choices.

Caliper

Caliper (thickness) of a sheet of paper depends mainly on its weight and the amount of calendering (pressing) during manufacturing. Thinner paper is usually smoother than a thicker sheet at a given basis weight. More calendering makes the sheet thinner, smoother, less stiff, and less opaque. As a general rule, the higher the caliper, the stiffer the paper.

Thickness is expressed in mils (thousandths of an inch) or microns (millionths of a meter).

Caliper is important because:

- Low-caliper papers can have low stiffness and opacity. Their relative lack of rigidity results inwrinkling or bunching up in your copier or printer increasing jam rates.
- High-caliper papers, in heavier weights, have high stiffness. Their relative inflexibility can increase jam rates due to an inability to bend around the photoreceptor, cylinders, inverters, and other portions of the transport mechanism. Depending on the digital printer or copier specifications, there can also be print quality problems with these papers due to their reluctance to conform to the photoreceptor or image/ pressure cylinders, leading to blurred images and deletions.
- The capacity of paper trays can be altered by using papers of differing caliper.

Electrical Conductivity/Resistivity

Xerography uses electrostatic forces to print the image and to control the movement of paper through the machine. Electrical properties of the paper must be balanced to prevent deletions under humid conditions as well as background (spots and streaks) and static under dry conditions.

Paper that is highly conductive may lead to prints with low image density and other imaging defects. Highly resistive paper, on the other hand, can cause static buildup between paper sheets, leading to multi-feeds, jams, and problems in stacking the printed sheets.

Porosity

Paper porosity (measured in terms of the ease with which air passes through a sheet of paper) is a significant consideration when using printers with vacuum feed mechanisms. A paper that is too porous may cause misfeeds or double-sheet feeds.

Friction

Sheets of paper need to separate easily during feeding. The friction between adjacent sheets in the ream must be controlled for satisfactory feeding in friction-feed machines. If friction is too high or too low, misfeeds, multi-sheet feeds, and jams can result.

Opacity

Opacity is an important consideration in duplex/perfecting (two-sided) printing. Good digital paper must be sufficiently opaque to prevent show-through from the reverse side of a duplexed page, or from the subsequent pages in a set. Usually, the lighter in weight a paper is, the less opacity it has.

Opacity is especially important when printing color since multiple layers of toner are placed on the paper.

Cut Quality/Finished-Product Quality

Poorly cut paper can be a source of dust/fiber contamination, poor back-to-front registration that results in a productivity loss, jams and misfeeds. All sheets should be cut to size with no more than 0.031-inch (0.75mm) variation.

The physical condition of the paper is very important to printer performance. Make certain paper is free of the following defects:

- Paper dust or fiber from cutting, wrapping, or fillers and other material used in paper production. Find out what your vendor has done to control and limit paper dust
- Edges stuck together (edge padding or welding)
- Creased, folded, or bent sheets
- Holes, wrinkles, or tears
- Turned-over corners and damaged edges
- Scraps of foreign material that could interfere with reliable feeding and paper transport
- Wrapper glue

- Plugs (scraps of paper cut when holes are made) in pre-punched paper can cause jams. Holes should be punched cleanly and sheets should not interlock.
- Perforated paper should be as free as possible of paper dust and chaff, which can cause machine contamination.
- Underside bulge around perforations should be flattened as much as possible to avoid feeding problems and stacker jams from papers that do not lie flat.
- Using paper specifically designed for digital printing will ensure high-quality images and proper printer maintenance.

Packaging

The best-produced paper can be rendered unusable if it is improperly packed and shipped. Proper packaging protects the paper from moisture, contamination, and physical damage.

Packaging methods include:

- **Packaging in moisture-proof wrapper.** Reams should be packaged in moisture-proof wrapper, and then sealed in strong, protective cartons. Xerox uses polyethylene laminated and clear plastic wrappers because they are most effective in resisting moisture and maintaining the moisture level of the ream at its manufactured level.
- **Shrink wrapping with chipboard top and bottom (North America only).** Stiff chipboard sheets are placed above and below the paper stack. A plastic wrap is then wrapped around the entire stack, heated and sealed. The offset printer usually packages preprinted forms this way. This type of packaging must be done with a low shrink force to avoid distorting the edges, especially the corners.
- **Loose packed cartons.** Only accept paper that has been packaged in a moisture proof carton with sealed lid to ensure moisture integrity.

Preferred Paper Type For Xerox Printers

Papers designed and manufactured for digital printing should be used in Xerox Digital printers and copiers for best results.

Preparation for Printing

Once the paper or specialty media product has been selected, it has to be stored, handled, conditioned, and loaded properly in order to maximize performance and machine productivity.

Proper Storage

Paper is normally shipped in cartons, if a large quantity has been ordered; the paper arrives on wooden pallets.

These pallets and cartons should be handled carefully. Although designed to withstand the demands of normal shipping, the cartons do not afford protection against damage if they are thrown, shoved, dropped, struck, or poked by a forklift. Mishandling of the cartons can result in physical damage to the paper, some of which may not be immediately obvious; that, in turn, increases the rate of jams and other feeding and imaging problems.

Do not store paper directly on the floor, since that increases the possibility of moisture absorption. Paper should be stored on pallets, shelves, or in cabinets in an area protected from extremes of temperature and humidity.

Do not open sealed reams of paper until you are ready to load them into the printer. Leave paper in the original ream wrapper, and leave the reams in the shipping carton. The ream wrapper contains an inner lining that protects the paper from moisture. Removing the ream wrapper eliminates that protective moisture barrier which, depending on the environment can result in the paper losing or absorbing moisture. Paper is very sensitive to moisture changes and this fluctuation can result in excessive curl, wavy edges, tight edges, and other quality issues.

Stacking

If cartons or individual reams are to be stacked, they should be placed carefully on top of one another, in order to avoid crushing the edges or causing any other damage.

Temperature

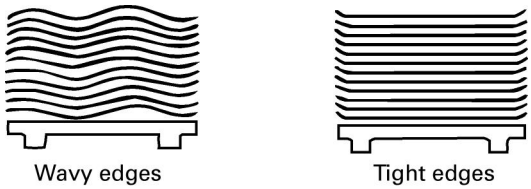
The temperature of the room where paper is stored can have a significant effect on how that paper performs in the machine. Optimum paper storage and printer operating temperature is 68 to 76 degrees F (20 to 25 degrees C).

Humidity

Humidity control is essential to ensure proper paper handling and performance. Optimum storage conditions include areas with a relative humidity of 35% to 55%. Automatic control devices are not always reliable. The areas must be continually double-checked, using an accurate instrument. Even when functioning properly, overloading of the storage or work area with external air from open doors and excessive in-and-out traffic can defeat environmental control systems. Upward or downward adjustments in relative humidity (and sometimes temperature) may be needed to compensate for environmental variations.

An increase in humidity can cause paper to develop wavy edges resulting in jams and misfeeds. This can occur because the edges absorb moisture while the rest of the ream remains unaffected.

Figure 4-1. **Wavy or tight edges**



When there is a decrease in humidity, the edges can lose moisture. They then contract, causing “tight edges.” This, too, leads to jams, as well as faulty registration and wrinkles during printing.

If paper shows signs of waviness or tight edges, a change in relative humidity may help. In general, it is best to adjust the relative humidity in increments of no more than 5 to 10%, allowing time for any alteration to be fully effective before making further changes.

Conditioning Paper

If paper is moved from a storage area to a location with a different temperature and humidity, the paper should be conditioned to the new location before use.

The following chart will assist you in determining the amount of time needed to condition stacked, unopened cartons of paper.

Note: The top row of numbers indicate the degrees of *difference* between the storage area and the operating environment with the first number being the number of degrees Fahrenheit and the second number being the number of degrees Centigrade.

Table 4.1 **Paper Conditioning Chart**

	TEMPERATURE DIFFERENCE (Degrees F/C)						
	10/5.5	**15/8.5**	**20/11**	**25/13**	**30/17**	**40/22**	**50/28**
Cartons	**HOURS TO CONDITION**						
1	4	8	11	14	17	24	34
5	5	9	12	15	18	25	35
10	8	14	18	22	27	38	51
20	11	16	23	28	35	48	67
40	14	19	26	32	38	54	75

Example: If you want to move 10 cartons from a storage area with a temperature of 20 degrees C. to an operating area where the temperature is 33 degrees C. (a differential of 13 degrees C.), the 10 cartons should stand unopened in the printing room for a minimum of 22 hours prior to use.

The chart refers to moving paper cartons loaded together on a pallet. Separating the cartons or reams from each other can accelerate conditioning. *However, do not unseal the reams until you are ready to load them into the machine.*

Follow The Arrow (North America Only)

As the front and back surfaces of the paper, as determined during the papermaking process, differ slightly, one side is preferred as the side to image first. The primary determinant of which side to print first is the paper's curl characteristics.

If you are using a quality paper intended for digital printing, the ream wrapper will be marked with an arrow that points to the preferred printing side. Print on this side when printing one side only; print this side *first* when printing on both sides of a sheet.

Whether this side is to be loaded UP or DOWN in the paper tray has to be determined for each machine (and sometimes for each paper tray) by reading the system's operator guide. Once you've determined the correct orientation, marking each paper tray with a label indicating the correct loading direction helps avoid operator error and lost productivity.

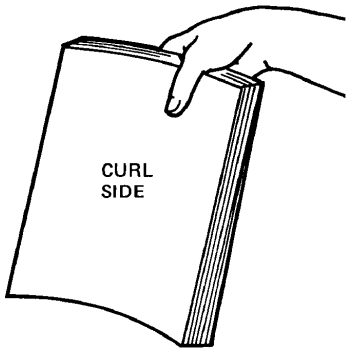
Determining Curl

In the event a paper ream is *not* marked for correct print-side orientation, it may be necessary to determine the curl direction yourself. Do this by holding a 1/2-inch stack of paper by one of its *short edges* (refer to figure 4-2). Let the paper hang with the long edge parallel to your body. Either the lower edge or the two side edges will be curling slightly toward the center. Observe which way the edge(s) curl. This is the curl side. Load the paper into the tray such that the side opposite the direction of curl is imaged first.

Note: If the ream had an arrow marking, it would point to the OPPOSITE side.

Load into the paper tray in the appropriate direction

Figure 4-2. **Determining the curl side**



Built-in Curl

Xerox papers are manufactured with a small amount of "reverse curl," so that they will be very close to flat after processing – this will facilitate any post-processing that needs to occur, such as binding, trimming or folding. Load according to the arrow direction for best results.

Loading The Paper Tray

Carefully unwrap the reams of paper to be loaded, taking care not to bend any of the sheets or otherwise damage the paper. Inspect the paper for any obvious signs of damage (bends, folds, crumpled or wavy edges, tight edges), or defects. *Fan the paper as necessary to avoid sticking edges. Do not* handle the paper any more than necessary.

Load the reams into the paper tray one at a time, taking care to observe the correct orientation, as indicated by the ream wrapper arrow.

Figure 4-3. **Wrapper Arrow**

When more than one ream is being loaded, it is important to make certain the reams are aligned atop one another. It is easy to wrinkle, bend, or otherwise alter the top sheet of a lower ream when placing another one on top of it. *The interface between reams in the paper tray is a frequent source of jams.* It is particularly important to avoid loading successive reams inconsistently (some arrow up, some arrow down).

Observe the paper fill line marked on all paper trays and do not load paper above this line.

Storage and Conditioning for Specialty Media

Specialty media such as carbonless, labels, tabs and transparencies also have proper loading, storage, and handling requirements. Please carefully review instruction sheets contained in the product packages.

In particular, it is recommended that Xerox Carbonless paper be imaged and the form used within one year of the date of manufacture.

Preprinted Materials

Pre-Printing: Best Results and Precautions

Xerox equipment does an outstanding job imaging preprinted materials. Many ink and coating manufacturers offer laser-compatible inks that withstand the high fuser temperatures of high volume copiers and printers. Many paper manufacturers offer laser-compatible coated and uncoated stocks. Count on doing great things with preprinted materials when you follow the guidelines outlined here.

Use the Right Stock

As a rule, the more absorbent the paper stock used for pre-printed materials, the better the copier imaging. The paper you choose should be a multipurpose grade, compatible with both offset and xerographic use.

Choose Your Printer

Choose a commercial printer that has experience with printing materials that will be imaged in laser copiers and printers. When you can, pre-test printed materials in your copier / printer before ordering large quantities. Controlling the printing environment to 20-25 C/68 – 76 ^{0} F and 40 – 50% R.H. is recommended.

Make a Clean Cut

When trimming is necessary, Xerox recommends that you cut paper in stacks of 250 sheets or less. Why? It ensures a clean edge, reducing paper dust contamination and improves feed reliability leading to improved machine performance.

Ink Coverage

Since toner does not adhere well to pre-printed areas with heavy ink coverage, try to avoid it on large printed solids. The toner will not adhere well and can be rubbed off or smeared. For best toner adhesion results image on an area where the pre-printing has been screened back to 30% or less during the printing process. The thinner the pre-printed ink coating, the better the toner adhesion. When possible, design your form allowing you to image in non pre-printed areas.

Pre-printing and Fusing

To avoid contaminating your imaging equipment, choose inks, varnishes and coatings that can withstand the heat and pressure. Why? Fuser temperatures can rise as high as 400^{0} F / 204^{0} C. and pressure as high as 140 psi. The best choices are laser compatible inks and other coatings featuring temperature stable resins and low levels of petroleum distillates. **Oxidative and UV cured inks** are highly recommended for use in Xerox copiers and printers.

Avoid These Inks

Coldset, conductive and rubber-based inks are not recommended. Why? Coldset inks penetrate the paper but do not dry well, causing them to smear and offset, contaminating machine components. Conductive inks contain carbon blacks or metallic powders that can interfere with the papers ability to hold a sufficient charge for proper toner transfer. Rubber based inks also do not cure well and will contaminate.

Varnished and Coated: Use Quickly

Be sure you use varnished or coated pieces within two weeks of printing. Why? The additional curing time can harden the coating, potentially limiting toner adhesion.

Press Fountains

Press fountains can impact drying times. If they carry excess water, glycerin or glycol ether, or if the pH falls too low, drying time can be slowed. Avoid the use of Gum Arabic; it can impact the papers electrical properties resulting in image transfer problems.

Powder

Some printers, when printing on sheet fed presses, use various spray powders (corn starch, rosin, talc) on the pre-printed material to enhance form drying. We recommend not using drying agents. Why? The powders are carried into the machine, contaminating machine components. Background on copies, streaks, and deposits in the machine fusing system can occur when using drying agents.

Drying and Packaging

When using inks that air dry (oxidative) we recommend drying times of 3-5 days. To ensure it dries completely, do not package for shipment directly after printing. Waiting 3-5 days before shrink-wrapping is recommended. Once dried the material can be shrink-wrapped using minimal pressure.

Special Stocks

Many types of special papers and other application materials, such as coated paper, synthetics, ID cards, labels and transparencies, can be run on Xerox printers. Some require special handling, and some should be used only in specific machines, and some require special equipment to run such as a Tiltatron to help feed ID cards.

Any time you are uncertain of a paper or specialty media's ability to run well in your printer, be certain to pretest it before purchasing in quantity. Also refer to the Recommended Media List for your particular machine – available at www.xerox.com/supplies

In any digital printing systems, specialty stocks cannot be expected to run as consistently as multi-purpose and digital papers, which are designed for large production runs. You may find that jam rates are somewhat higher with specialty stocks.

Recycled Papers

Most recycled papers are made from a combination of virgin pulp, *broke* (mill waste from the papermaking process itself, such as roll trimmings), and *post-consumer waste*, which is paper that has gone to the end user, been used, and returned for recycling.

In order to be reused, post-consumer waste is sent to a plant where it is deinked and washed. The fibers can then be incorporated in the papermaking process. It is important to remember that not all recycled papers are manufactured under the same quality requirements and therefore you can expect different performance levels. The nature of the post-consumer waste is unpredictable. It may contain adhesives (from window envelopes, stick-on notes, labels, etc.), which are very difficult to remove, or certain types of ink and toner that cannot be readily removed from the fibers. As a result, some recycled papers are less uniform in content and quality than papers made entirely from virgin fibers. Some recycled papers generally do not perform quite as well as virgin sheets; they are dirtier due to residual inks and adhesives that are not fully removed in the cleaning process, and they usually cost more. However recent technology advances in de-inking has significantly improved the quality of recycled fiber.

Xerox has long recognized these potential quality issues with recycled paper. To address them, we've established for Xerox recycled papers the same stringent performance and reliability specifications that apply to their virgin counterparts. These specifications are designed to reduce excessive paper dust, curl, paper static and poor cut quality to ensure optimum runnability.

The problems of excessive curl and contamination are quality issues related to the paper manufacturing process. Recycled papers, just like virgin papers, vary from high- to low-quality in terms of print quality and runnability. Producing a quality paper requires papermakers to establish strict performance specifications and to control the variability of the papermaking process to meet these specifications consistently -- regardless of the production run, or the paper machine or mill making the paper.

Colored Papers

Colored (tinted) papers are available in a wide range of shades. They do not differ from the untinted version of the same paper from the same mill in terms of performance in a Xerox printer.

Coated Papers

Coated papers have a surface layer of mineral pigment (such as clay or calcium carbonate) and a binder (or “glue”) such as polymeric resin or starch. Other additives are usually included as well.

Papers are coated to enhance the surface for printing and visual appeal. They are used for “value added” applications, such as annual reports, advertising brochures, marketing materials, etc. where visual “snap” and bold vivid color sells. Coated papers are available with coating on both sides of the sheet, coated two-side (C2S) or with coating only on one side of the sheet, coated one-side (C1S). There are also different gloss levels or finishes associated with coated paper. The most common finishes are gloss, silk, matte, dull, or high gloss (cast-coated).

There is a wide variation in coating composition and application techniques that make it impossible to predict how a particular coated paper will perform in a Xerox printer without extensive testing. Traditionally coated paper has been manufactured for the offset printing market. Because of the differences in digital and offset print technology, offset coated paper when run through a digital printer can cause the coating surface to blister, crack and bubble when exposed to the high temperatures of a digital printer’s fuser. Toner adhesion and image quality can also be a problem with coated offset paper. It is important to use coated paper that has been designed specifically for digital printing.

Xerox offers a product family of coated papers that are digitally optimized to eliminate the problems associated with offset coated sheets and have been thoroughly tested in Xerox digital color printers to minimize fuser damage and machine contamination.

At this time, coated papers are not recommended or supported in monochrome digital printing systems with the exception of the Nuvera™ Digital Production System.

Carbonless Papers

Carbonless papers reproduce an image when chemical-containing capsules coated onto one or both sides of the sheet are broken from the pressure of a pen, typewriter, or impact printer. Because of the chemistry used in most carbonless papers, as well as the presence of overly large capsules, carbonless papers have generally represented a contamination problem when run in large quantities on most Xerox printers, requiring extra service, parts replacement, and frequent cleaning of certain printer parts by a Xerox service representative or a specially trained on-site operator.

Xerox produces a carbonless paper with a unique chemistry incorporating “capsule control,” a process that largely eliminates capsule breakage during shipping and can be used in a large variety of Xerox digital printers.

Carbonless papers allow you to print work orders, medical forms, invoices and purchase orders.

Xerographic Roll Stock

Xerographic paper is also available in rolls, for roll feeders that automatically feed and cut 8.5x11/A4 sheets of paper and for roll fed printers that cut the paper into any finished size after printing.

In specifying xerographic rolls it is important that the paper be a high quality xerographic grade with physical and structural properties equivalent to those of a cut sheet xerographic paper. Additionally, roll width needs to be tightly controlled to ensure accurate sheet dimensions and the roll edge must be cleanly cut and free from excessive fuzziness to prevent equipment contamination. The rolls must also be free from defects such as wrinkles and dents and contain no more than one splice per roll to ensure maximum productivity.

The finished rolls should be fitted with core plugs to prevent core crushing during shipment and protected with a moisture barrier wrap to prevent moisture damage.

Great care must be taken in handling these rolls as they weigh nearly 500lb/250kg and lack stability due to their narrow width.

Heavyweight Stocks

Xerox Heavyweight papers, including cover stock and index stock can range in weight from 145 g/m^2 to 350 g/m^2. Most Xerox digital printers run some range of heavyweight stock but due to equipment specifications, may not run the entire weight range. Refer to the “Machine Specifications” in Appendix A to determine if heavyweight stock can be run in your machine. Your Xerox digital printer's operator guide also has this information.

Xerox sells a wide variety of heavyweight, digitally optimized papers that fully meet the requirements of your Xerox digital printer or copier.

Hole-Punched Paper

Hole-punched paper has two or more holes along one edge, for use in ring binders and notebooks and comes in a wide variety of formats. The most common is 3-hole punched in North America, annotated by “3HP” or “3HD” and DIN 2 and DIN 4 hole in Europe. (This stock is often referred to as “predrilled” paper, but a punch rather than a drill usually produces the holes.) More hole padding (sheets sticking together in the area of the holes) often occurs when the holes are drilled and not punched, resulting in additional feeding related issues.

Main Problems

The main problems that can occur with punched paper are jams and image quality problems caused by the interlocking of sheets due to dull punches, and plugs (the round pieces cut out of the paper to create the holes) that remain in the ream.

Edge-Reinforced Punched Paper

Edge-reinforced papers have a plastic strip along the edge with the holes. This reinforces the holes, virtually eliminating the possibility of papers

being inadvertently torn from binders and notebooks. It also keeps frequently handled materials usable and new looking longer.

Before loading reinforced paper in your Xerox printer, *always fan the paper thoroughly*. Follow the directions provided with your reinforced paper for correct positioning of the holes (left or right) and the plastic strip (up or down) when loading the feeder.

In general, paper should be loaded so that the lead edge is *opposite* the plastic strip; i.e., the reinforced edge should be the trailing edge. However, in all printers when printing *duplex (two-sided),* the reinforced edge should be the *leading* edge.

Perforated Papers

Perforated papers have been pierced with one or more rows of holes to permit easy tearing or separating into sections. Perforated heavyweight stock may be used to print sheets of tickets or employee identification badges, for example, which could then be easily detached and distributed. Perforated forms may contain a detachable mail-back portion, or a sheet that is to be part of a bound document may be perforated along the inside edge for ease of removal. They can also be used for forms, coupons, and statements.

Potential Problems

Papers with perforations can experience reliability issues if the depth of penetration of the perforation blade is not properly controlled. A blade that penetrates too deeply leads to underside bulge, which can lead to feeding and stacking problems. Jams can also occur if a full-length perforation line parallel to the paper's long side is closer than three inches/75mm to the leading edge of the sheet (in long edge feeding printers).

Parchment Papers

Parchment paper has a feel and appearance similar to genuine parchment (which was actually an animal skin prepared for writing or painting during ancient times). Parchment paper has a rough, mottled surface, to give the parchment appearance. Image mottle is a design feature of parchment papers. Not all parchment papers are produced to the same standard and image mottle can vary. It is best to use parchment paper that is designed for digital printers. Parchment paper can be run in most Xerox digital printers.

Vellums

It is important to note the difference between “vellum stock” and “vellum finish,” as their meanings are nearly opposite. Vellum *finish*, which is a surface finish found on papers, is extremely rough. A paper with a vellum finish may or may not have some of the characteristic qualities of true vellum papers. Vellum *stock*, on the other hand, is a special type of paper that is very smooth and translucent. It is most often used in drafting and engineering work.

Vellums are generally produced by adding an organic resin in a solvent vehicle to the paper in order to make it translucent. When heated in the fusing process, the solvent can evaporate and create a contamination problem, as well as emitting a strong, unpleasant odor.

Vellums not specifically developed for use in digital printers can cause problems:

- Vellums containing high levels of plasticizer can cause photoreceptor spots in digital printers due to interaction of the plasticizer and the dry ink.
- Plasticizer can cause machine contamination in all Xerox printers.

Label Stocks

Many types of paper may be used for the label. Pressure-sensitive labels are used for applications such as direct mail, shopping, file ID, test scores, product or specimen identification, bar coding for retailing needs, etc. Label stock consists of three layers: the face sheet, pressure sensitive adhesive, and the backing or release sheet.

Adhesive labels consist of a silicon-treated backing sheet and the actual label, which has an adhesive coating. The silicon treatment allows for easy separation of the label from the backing sheet. The adhesive effect may vary according to the application. A distinction is made between easy-to-remove and permanently adhering labels.

Face materials include 16 to 24 pound/60 to 90 g/m^2 bond grade paper, latex impregnated and surface coated papers, and heat resistant synthetic materials such as polyester film.

Adhesives are designed for both permanent and removable applications. The backing sheet can vary in weight, depending on the stiffness required for use in a given printer.

When printing self-adhesive labels, it is best to use label stock designed for use in laser printers. The correct balance of physical properties for label stock is employed to offer optimum feedability, and the adhesives are designed to withstand the higher temperatures and pressures of such machines without bleeding and causing spotting or damage to the photoreceptor.

Labels should be die cut cleanly, without cutting into the backing sheet. The backing sheet should be of non-slippery material, to promote reliable feeding and avoid improper registration.

Purchase only label stock that is designed for use in digital printers. Xerox has a wide variety of label stocks that meets the requirements for Xerox digital printers.

Note: Dry gum labels (require moistening before being applied) are a potential contamination problem. The heat and pressure of the fusing process can cause dry glue particles to detach from the label backing. Atmospheric moisture can then activate the glue particles, causing spotting and other difficulties. Dry gum labels are not recommended.

Note: The following precautions should be observed when printing labels:

- Condition label stock for 72 hours in the printing environment before using it in the printer.
- Leave the labels sealed in plastic wrapping until they are loaded in the printer.
- Do not fan the label sheets before use unless the package instruct you to do so.

Table 6-4. **Requirements for labels**

Grammage	≥ 65 g/m^2
Specific Volume	1.3 cm^3/g ± 0.2 cm^3/g
Specific static bending resistance	Lengthwise: > 0.16 mN x m
Tensile strength	Lengthwise: > 65 N Crosswise: > 40 N
Tear length	Lenthwise: > 5000 m Crosswise: > 2500 m
Dimensional stability	Lengthwise: < 0.06% Crosswise: < 0.14%
Writing properties	Ink-stable accoding to DIN 53126
Surface character	Roughness according to Bendtsen: 120 ml/min ± 40 ml/min
PH-value	> Ph 5.0
Dust-free	The abrasion after 100 revolutions at a load of 500 g as tested in accordance with DIN 53109 is less than 30 mg
Water absorption	22 g/m^2 ± 7 g/m^2 according to DIN 53132
Opacity	≥ 85%
Electrical resistance	At a measuring voltage of 100 V and in a normal climate of 23°C at 50% relative humidity, according to DIN 50014 Surface resistance 108 to 1011 ohms Volume resistance < 1010 ohms

Table 6-5. **Requirements for silicon backing sheet**

Type of paper	Coated kraft paper
Grammage	85 g/m^2 ± 4%
Specific Volume	
Tensile strength	Lengthwise: > 85N Crosswise: > 40 N
Breaking length	Lenthwise: > 5000 m Crosswise: > 2500 m
Surface character	Roughness according to Bendtsen: 200 ml/min to 500 ml/max

The labels must not peel off the backing sheet during printing. Ensure that your labels use adhesives that are resistant to the fusing temperature in the printing system. The adhesive must adhere to all metallic and nonmetallic, smooth, clean, dust-free and silicon-free surfaces without any extra activating process (e.g. using heat or solvents). The labels should not corrugate (or bubble) when they are affixed.

The label forms must have neatly cut edges.

Synthetic or Durable Products

Non-tearing papers, such as Xerox NeverTear™ Paper and Xerox Durapaper™, are not actually paper. Synthetic product construction or chemical composition varies from polyolefin, polypropylenes, polyester, clay-coated-poly, etc. They are waterproof, soil resistant, and extremely difficult to tear. Synthetic products are a good choice for printing important documents that must be preserved, used outdoors, or handled frequently. There is a wide variety of synthetic products that range from 4-16 mils.

Not all synthetic products can run through digital equipment. Common problems associated with synthetic products are poor toner adhesion and frequent jams, melting and fuser wraps.

As with all specialty stock, its jam rate may be higher than xerographic or multi-purpose papers. It is also considerably more costly than xerographic or multi-purpose papers. Use only synthetic products that are designed for digital printing or have been tested in your equipment. Xerox has a full range of synthetic products designed specifically for digital printing.

Like transparencies, non-tearing paper may arrive at the output station with a thin film of fuser oil or lubricant when run in laser printers. This occurs because the surface is completely nonabsorbent. This film can be readily removed with a lint-free tissue.

The problem can be reduced by occasionally running a few sheets of xerographic paper through the machine when running any significant quantity of non-tearing paper.

Transparencies

Transparency stock is used primarily to create images that can be projected on a wall screen for easy viewing by groups of people or used as a presentation cover or overlay.

Transparencies are made of polyester film coated with a chemical substance to make dry ink stick to it readily. Due to technical differences between color and monochrome printers, machine families often have unique transparencies.

Printer Transparency Requirements

Xerox printers differ in their requirements for transparency material. Some require material designed for use in high-speed machines. Others use an optical sensor and require a transparency with an opaque strip along one edge, or a paper backing, in order for the machine to “see” the transparency and not react as if a paper jam had occurred. Still others require that, if a paper-backed transparency is used, it be bound on the short edge, which feeds first.

Usage Hints For Transparencies

Some helpful hints for using transparencies follow:

- Fan transparencies before loading in the feeder tray, to avoid sticking together.
- Load transparencies on top of a small stack of same-size paper.
- If the transparencies have an opaque stripe along one edge, be certain they are loaded with the stripe facing in the direction indicated in the printer's operator guide.
- If a coating of fuser oil or lubricant remains on the transparency after printing, remove it by wiping gently with a lint-free cloth or tissue. If this is a problem during a long run, feed several sheets of paper through to help absorb the oil.
- If a jam occurs while transparencies are printing, look carefully for the jammed transparency. If you cannot find it, *do not resume printing*. The heat from machine operation can cause the transparency to melt, resulting in serious engine damage. Call for service assistance.

MICR (magnetic ink character recognition)

Magnetic ink character recognition (MICR) uses special ferromagnetic dry ink and specially shaped font characters to create machine-readable documents.

MICR configured Xerox printers such as the 4635MX, DocuTech 6180MX can produce, in a single pass, an entire check/cheque image, including all text and data, the form, logos and signature, and the line of MICR characters at the bottom of a check/cheque or other document that make such documents machine readable.

Paper Requirements For MICR

MICR documents are intended for further processing. They must thus meet the requirements of not only the Xerox printer, but also the post-processing equipment. They must be able to withstand considerable mechanical stress from reader-sorters, cutting and slitting machines, and other equipment without loss of image or significant deformation. This is particularly true for checks, which constitute the majority of MICR applications. The following qualities are important for MICR papers:

- The surface must fuse well with MICR ferromagnetic dry ink.
- In North America paper intended for use as checks should be 24-pound/90- g/m^2. Current ANSI Standard X9.18, approved by the American Bankers Association (ABA), specifies that if 24-pound/90-g/m^2 paper is used, the grain of the checks can be in either direction.
- In Europe, paper must meet the APACs banking standards of CBS1 for cheques and CBS2 for gyro slips.

Note: If anything less than a 24-pound/90- g/m^2 paper is used (the minimum is 20-pound/75- g/m^2), the completed check must be *grain long*, which usually means that when checks are printed two- or three-up on a large sheet of paper, that sheet must be *grain short*. (What was the short edge of the original sheet becomes the long edge of the final check; grain that was parallel to the short edge is parallel to the long edge of the finished document). Since this may reduce runnability, 24-pound/90- g/m^2 paper is recommended.

Xerox Multipurpose 4024 Paper 24-pound/90- g/m^2 meets all current banking organization specifications for MICR papers in North America and Xerox Xprint 90 g/m^2 meets CBS2 requirements.

- Sheffield smoothness should be 120 to 150.
- Moisture content should be 4.5%
- Use paper is packaged in a moisture-proof wrapper.
- Avoid using cut-sheet paper converted from fanfold, as this can produce dimensional inaccuracy, poorly cut edges, and unacceptable curl pattern.
- Do not use papers containing ferromagnetic material.
- If carbonless paper is required, use self-contained carbonless paper, not conventional carbonless paper.

Note: Self-contained carbonless paper is required for duplicate check printing applications. These applications use carbonless paper to provide a duplicate copy of the completed check. With conventional carbonless paper, the capsules on the back of the check break during initial bank processing. The chemical released from the capsules migrates during storage and attacks toner-based inks. The ink becomes tacky causing checks to stick together. Self - contained carbonless paper retains all the carbonless chemistry on the duplicate, preventing this contamination.

Security Paper

Most security documents, such as stock certificates or passports, are printed on security paper. The use of security paper guards against tampering as alterations become easily detectable.

The background color pattern in a security paper has a very low adhesion coefficient so that any erasures of printed material on the check remove or discolor the background. Some security papers are chemically treated so that the word void becomes visible in areas where mechanical or chemical erasure is attempted.

If using a security paper, ensure that any preprinting was done using ink for xerographic printers, and that the ink has dried thoroughly. (Refer to “Preprinted Materials” in Chapter 5.)

Tabs

Many Xerox digital printers are “tab-enabled” and can print and insert index tabs to produce fully collated documents that enable customized reference manuals. Multipurpose tabs are usually manufactured with 90lb or 110lb index stock in North America and 160 g/m^2 in Europe. Color tabs should be manufactured from a digitally optimized cover weight with Xerox offering tabs in 60lb cover in North America and 160 and 170 g/m^2 in Europe. Tab stock can come uncut for customized die-cutting or pre-cut. Standard collated sets come in a variety of configurations and can be straight or reverse collated. Additionally, mylar or plastic reinforced tabs are available.

Papers That Are Not Recommended

The following papers are not recommended for use in Xerox printers, primarily due to their potential for contaminating the machine, necessitating service calls.

Conductive Papers

Very conductive papers, such as paper with aluminum foil backing, should *never* be used in digital printing systems. Electric arcing from the foil area can occur and cause machine damage or poor print quality. Papers with high moisture content and/or high salt content may be too conductive to hold sufficient charge for efficient dry ink transfer. The result can be low print density, poor solid area density, and deletions. Conductivity problems can also occur with forms that are preprinted using conductive inks. (Refer to “Avoid These Inks” in Chapter 5 for further information.)

Papers Containing Talc

Talc is sometimes used in papermaking to control the effects of pitch in the paper. These talcs are difficult to hold within the paper; papers containing talc, even in amounts under 1%, can cause significant problems. When subjected to processing, these papers can release talc, lowering the friction between the paper and the feed transport belts.

In smaller printers, frequent feeding jams may occur after only a few prints. In larger machines, the effects can be more subtle and difficult to analyze.

Symptoms of a talc problem include:

- Increasing rates of jamming and misfeeds at the feeder, feeder wait station, registration gate, and transfer area.
- Background (spots) on the prints caused by free talc. Talc problems can be very difficult to diagnose with certainty, even in a well-equipped laboratory. The only way a paper user can be sure of avoiding talc-related malfunctions is by purchasing only papers with guaranteed performance, such as those produced by Xerox.

Papers Containing Stearate, Or Plasticizer

Wax, stearate, and plasticizer in papers can cause paper-handling problems due to their friction-lowering effects on paper and on feed belts. These substances can also cause print quality defects due to spot formation on the photoreceptors of digital prints.

Stearates and plasticizers are found in a variety of papers (calendered sheets, some vellums, and coated papers). It is difficult to tell beforehand if these substances are present.

Color Printers and Paper

The wide number of full color digital printers such as the DocuColor family and the iGen3 Digital Production Press has increased tremendously the types of papers that are available for digital printing. However, it also adds to the complexity of the paper selection process.

In today's environment it is feasible to produce as wide a range of printed products on a digital printer as could previously only be produced on an offset lithographic press -and the world of color continues to explode.

Selecting Paper For A Digital Color Printer

In selecting a paper for digital color printing, be aware that the color or shade of the paper strongly influences the eye's perception. When selecting a white digitally optimized paper, choose a sheet that has good brightness as well as sufficient whiteness to provide good color reproduction. The closer to true white the paper is, the more accurately a given color will be rendered.

As digital color printing is predominantly graphics-based, image quality is more critical than with monochrome printing. Additionally, the increased toner application rates (four toners versus one for black-and-white printing) result in increased stress on the paper, resulting in the need for a slightly heavier and stiffer sheet of paper.

Both coated and uncoated papers can be used in today's digital color printers – provided the products have been designed for the stresses of the digital environment. This is particularly critical for coated papers. Refer to "Coated Papers" in Chapter 6 for further information.

Digital printing can offer excellent graphic reproduction as the dry toners/dry ink used in the process remains on the surface of the paper, thereby retaining dot structure and image gloss. This provides for improved resolution and enhanced image quality.

Good contrast and resolution are critical to rendering high-quality graphics; as a result smooth, bright sheets perform well. Smooth sheets also help to prevent print mottle (the appearance from an uneven application of toner).

Selecting papers that have been precision sheeted is also a critical quality requirement for digital color printers, as discussed in Chapter 3 Cut-Quality/Finished Product Quality, papers that have not been precision sheeted can result in increased machine contamination, issues with duplex registration and finishing, as well as image quality defects such as hickies or white spots.

Due to the wide variety of Xerox digital color printers, please consult Xerox.com/Supplies for the Hints and Tips Guide to printing paper and specialty media on your specific printer. www.xerox.com/supplies

Post-Processing Considerations

Processing operations that follow printing, such as slitting, folding, envelope insertion, etc., require special attention if they are to be completed without compromising productivity.

Post-Process Equipment and Paper

Traditionally, post-processing equipment has been designed based on the handling qualities of materials printed by offset lithography. Paper that has been printed in a digital printing system differs in several important ways:

- The printed sheets are drier, and thus more susceptible to static, which causes a variety of post-processing problems.
- The sheets may contain fuser oil or lubricant. Oiled sheets are more susceptible to slippage, and may not be immediately receptive to further application of printing or typing.
- Edges of the sheets may be wavy.
- The sheets may contain varying amounts of curl, from passage through the paper path and the application of heat and/or pressure during the fusing process.
- Digital prints have high calendering (gloss) due to the extreme pressure encountered during the fusing process.

Equipment to handle these sheets must be capable of operating with minimal static generation, neutralizing existing static, operating with fuser oil or lubricant on drive belts/rolls, and keeping curled and wavy papers under control.

Paper that will be processed after printing must be selected with those operations in mind. It must work well in both simplex (one-sided) and duplex (two-sided) mode, and must also offer a minimum of problems from distortion, static, and slipperiness in processing.

Potential Problems

There is no guarantee that because a printer can successfully handle paper that it can be manipulated in post-processing equipment. Because of the high cost and severe productivity loss that results from faulty post-processing, it is prudent to test and purchase paper from the standpoint of best total system performance.

Wavy Edges

Wavy edges occur when hot, dry stacks of printed sheets undergo rapid absorption of moisture on the sheet edges. The edges expand, but the sheet centers do not. The result is a wavy deformation that can be permanent.

The amount of deformation can be decreased by proper sheet design. Papers produced by Xerox are designed and tested to minimize such distortions. Procedures that can lessen the problem include:

- Condition the input reams, in the wrapper, in the machine room (Refer to “Conditioning Paper” in Chapter 4).
- Lower the print room relative humidity to below 50% (but not so low that static problems develop).

- Post-process the prints immediately, before significant moisture absorption occurs.
- Cover the printed sheets with plastic drop cloths or box covers, to minimize exposure to atmospheric moisture.
- Let the sheets condition slowly for a number of hours (or days) to reduce the difference between the moisture content of the sheet edges and centers.
- Try to complete the conditioning time rapidly. Paper *stacks* can require days to achieve edge-to-center moisture uniformity, but this occurs in about 60 seconds if a *sheet* is fully exposed, on both surfaces, to ambient relative humidity. Equilibrium will be reached more quickly by:
  - Slow fanning of the stack of printed sheets
  - Breaking up large stacks into smaller ones

Paper Static

Static problems can be caused by low moisture or low conductivity in paper. When it occurs, static sometimes prevents sheets from separating from one another, thus causing feed problems in post-processing equipment.

Out-of-the-wrapper sheet conductivity should be sufficient to dissipate excessive static, but not so conductive as to affect image quality under humid conditions.

Out-of-the-wrapper sheet moisture should not be so low as to contribute to excessive static, nor so high as to aggravate curl and image quality problems under humid conditions.

Post-processing machinery should be constructed of materials that minimize static generation, and should be equipped with suitable static eliminators.

Solving Static Problems

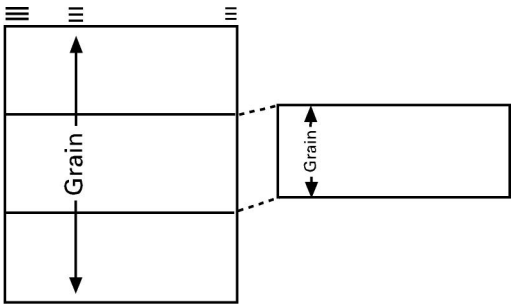
Static is often associated with dryness of both the paper and the atmosphere of the processing room. Actions you can take to reduce static problems include:

- Ensuring that antistatic devices in the printer and post-processing equipment are installed and operating properly
- Increasing the relative humidity in the post-processing area
- Conditioning the input paper by placing it in the machine area well prior to printing. Do not remove it from the ream wrapper during conditioning. (Refer to “Conditioning paper” in Chapter 4.)
- Fanning the printed sheets.

Grain Direction and Handling Problems

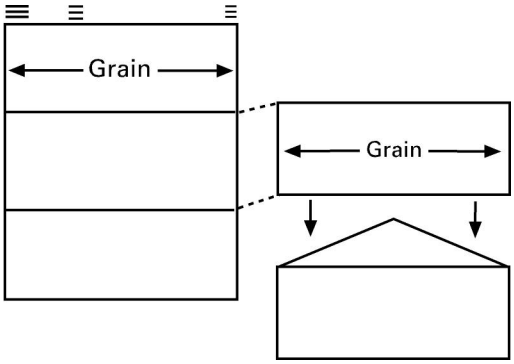
Before beginning a job that will involve post-processing, it is important to ascertain any grain direction requirements of the post-processing equipment. Keep in mind that grain direction can change based on the cutting of sheets after they have been printed. Any time you change, by cutting, what was a vertical sheet into horizontal finished pieces, you are changing the grain orientation. What was the long edge of the original sheet, with the grain long, becomes the short edge, with the grain short. Refer to figure 8-1.

Figure 8-1. **Change of grain direction orientation from cutting: Sheet on left is grain long; documents after cutting are grain short**



Many types of post-processing equipment must have grain-long materials in order to operate properly. If you are going to cut three bills from a sheet, as shown in figure 8-2, the full sheet must be *grain short* in order for the final documents to be grain long, as required by the envelope inserter or other post-processing equipment.

Figure 8-2. **Grain-short full sheet cut to yield grain-long documents, as required by some post-processing equipment**



Grain Direction and Interface Problems

The interface between sheets that have grain running in different directions increases the likelihood of printer feed problems. This is true in most post-processing machinery as well.

Be particularly wary of smaller sheets that have been cut from a large parent sheet. In an effort to maximize the yield, you may be given either all grain-short sheets, or a mix of grain-long and grain-short sheets. Either can result in intermixing of grain directions, producing multi-feeding (caused by shape and frictional variations) and erratic performance.

About Xerox Papers

There is a direct relationship between the performance and productivity of digital printing systems and the design and quality of the paper used. Performance is a combination of high quality and high productivity.

Xerox digital printers are designed and tested using Xerox papers and specialty media. You can be assured of the most consistent image quality and productivity by using the papers that have been designed in conjunction with your machine.

Paper Properties and Paper Performance

There are a large number of factors, from moisture and smoothness to electrical conductivity and caliper, which can have an affect on the performance of paper in your printer.

The user cannot readily determine most of the factors that impact your machine performance. Nor can the user know with any degree of certainty how consistent the paper product is from a given mill.

Assuring top performance means that the paper mill and specialty media manufacturer have been presented with a demanding set of specifications based on an understanding of the entire digital printing system of toner, equipment, and paper, and then monitored to assure adherence, within very slight tolerances, to those specifications. The engineers of the Xerox Media Technology Center use their expertise to develop detailed specifications for Xerox paper and specialty media and then ensure that Xerox paper and specialty are manufactured to those demanding specifications on a continuous basis.

Xerox Quality Assurance

Formulating and monitoring paper specifications is the bonus you receive when buying a Xerox paper or special media product. Behind every ream of paper and box of specialty media stands a Xerox quality assurance team whose sole job is seeing that every product meets specifications every time ensuring the most consistent paper and specialty media on the market.

Before a mill is accepted as a supplier of Xerox-branded paper, it goes through a painstaking qualification process that *averages* 12 months in length. In this process specific papermaking machines and sheeting devices are qualified. Additionally, all machine operators are trained on Xerox quality program requirements and are certified to package Xerox branded paper or specialty media. Any major changes to the papermaking process or to the paper machine require re-qualification.

Once a mill is qualified, its production is closely monitored. If a production run fails to meet Xerox standards, Xerox will not accept the paper. The mill will either scrap the rejected material or repackage it as a private label brand.

Poor performance is expensive. Jams, lost production, poor print quality are costly to users. That’s why it pays to use Xerox paper and specialty media.

Xerox understands what is required in paper and specialty media to ensure optimal print quality and performance. That is why all our papers and specialty media are Digitally Optimized. As the only company in the world that truly understands the relationship between digital equipment, toner and developer, paper and service requirements, Xerox is uniquely qualified to bring you paper and specialty media designed for digital printing.

The Xerox Standard

Xerox is the largest distributor of digital paper and specialty media under one brand in the world.

Quality Paper

Paper and specialty media produced by Xerox is of consistently high quality because Xerox:

- Has state-of-the-art knowledge of both the digital equipment, toner, and paper and knows how they all go together. Xerox knows exactly what will provide optimal performance in Xerox printers.
- Has the most demanding specifications for digital paper and specialty media in the industry. Xerox is the recognized world leader in designing and specifying digitally optimized papers and specialty media.
- Demands 95% statistical conformance to Xerox specifications and uses lean six sigma practices to ensure specifications are achieved in the most efficient manner.

  Testing is done on *finished reams,* the most stringent standard. Paper companies commonly test adherence to specification by evaluating paper while still in roll form (before it is cut into sheets).
- Uses multiple tests to monitor our papers for over 50 physical requirements, ream cut quality, and packaging quality.
- Constantly tests mill output for performance in office and production digital printers such as yours. This is the final and best test of whether paper or specialty media is performing properly.
- Gives you the most consistent paper on the market, with the least variability from order to order. This assures superior performance, color consistency, and image quality.
- Protects its paper in heavyweight, covered cartons that can be reused for storage purposes. Each ream is wrapped in durable ream wrap designed to protect the finished product from moisture, dirt and damage. In each Xerox storage area, the cartons are placed on a wooden pallet and protected with a barrier of stretched wrapped plastic to ensure the product arrives at its destination intact and free from dirt and other debris.

Xerox paper and specialty media is the best available for all your digital print jobs because of the extra design and manufacturing requirements we build into every sheet. We are able to provide this added value to all of our paper and specialty media products because the world class research and development resources available at the Xerox Media Technology Center.

The Recommended Paper

Xerox provides Recommended Media Lists for our digital color equipment and Compatibility matrices for our monochrome equipment. All papers and specialty media on these lists are Xerox Branded and have been extensively tested in the respective equipment. All Recommended Media Lists can be found on Xerox.com/supplies.

Additionally, for Monochrome Production Equipment Xerox Multipurpose grades are the benchmark papers used for designing and testing our monochrome digital printers.

For our DocuColor product portfolio, Xerox Digital Color Xpressions+, Digital Color Colotech+, and Digital Color Gloss are the benchmark papers used for designing and testing this equipment as well as ongoing image quality inspection.

Papers by Xerox

Xerox offers a wide variety of digitally optimized papers and specialty media designed for use in digital printing systems. Products are offered in the categories identified below. Contact you Xerox Supplies representative or visit our website, www.xerox.com/supplies for a complete list of products and equipment Recommended Media Lists.

- Multipurpose papers
- Multipurpose Recycled Paper
- Pastel & Tinted Colored Papers
- Coated Digitally Optimized Paper for Color Printing
- Uncoated Digitally Optimized Paper for Color Printing
- Publishing/Book Papers
- Digitally Optimized Specialty Media
- Carbonless Paper
- Tabs and Dividers
- Synthetic Products
- Labels
- Transparencies and so much more

Appendix A: Paper Handling Capabilities

Appendix A lists the various Xerox printers and their paper handling capabilities.

Table A-1. **Machine Specifications for Paper Basis Weight and Sheet Size (Color Machines)**

Machine	Paper Basis Weights	Sheet Size in Inches
5760 5765	Trays: 16 lb bond to 24 lb bond (60 to 90 g/m^2) Bypass: 16 lb bond to 90 lb index (60 to 163 g/m^2)	Trays: 8 x 10 to 11 x 17 Bypass: 8 x 10 to 11 x 17
5790 5799	Trays: 16 lb bond to 24 lb bond (60 to 90 g/m^2) Bypass: 16 lb. bond to 90 lb. index (60 to 163 g/m^2)	Trays: 8 x 10 to 11 x 17 Bypass: 8 x 10 to 11 x 17
DC 30 DC 40	Trays: 16 lb bond to 28 lb bond (60 to 105 g/m^2) Bypass: 16 lb bond to 80 lb cover (60 to 216 g/m^2) Maximum bypass paper basis weight is 220 g/m^2 (Our 10 pt. coated)	Trays: 8.5 x 10 to 11 x 17 Bypass: 4 x 6 to 12 x 18
DC4	Trays: 16 lb bond to 28 lb bond (60 to 105 g/m^2) Bypass: 16 lb bond to 80 lb cover (60 to 216 g/m^2)	Trays: 7.17 x 10.12 to 11 x 17 Bypass: 4 x 6 to 13 x 18
DC 12 Series 50	Tray 1: 64 to 105 g/m^2; Trays 2 - 4, 64 to 128 g/m^2. Bypass: 64 to 250 g/m^2	Trays: 8 x 10 to 12 x 18 Bypass: 4 x 6 to 12 x 18 (SRA3)
DC 2045 DC 2060	Trays 1 & 2: 64 to 220 g/m^2, uncoated Tray 3: 64 to 280 g/m^2, uncoated, coated, transparencies	Tray 1 & 2: 7.17 x 10.12 to 12 x 18 Tray 3: 7.17 x 10.12 to 12.6 x 19.2
DC 6060 DC 5252	18 lb bond/45 lb text to 100 lb cover uncoated & coated	Trays: 7.17 x 10.12 to 11 x 17
DC 2006	Trays: 64 to 105 g/m^2 Bypass: 64 to 220 g/m^2	8.5 x 11 (A4) to 11 x 17 8.5 x 11 (A4) to 12 x 18
DC1632/2240	Trays: 1,2,3 &4 Plain/Bond/Recycled (64-105 g/m^2) Bypass: Plain/Bond/Recycled (64-105 g/m^2) Heavywt.1 (106-169) Heavywt.2 (170-220 g/m^2)	Trays: 1,2,3&4 up to 11x17 Tray: 5 up to 18 x12
WC Pro 32/40	Trays: 1,2,3 &4 Plain/Bond/Recycled (64-105 g/m2) Bypass: Plain/Bond/Recycled (64-105 g/m2) Heavywt.1 (106-169) Heavywt.2 (170-220 g/m2)	Trays: 1,2,3&4 up to 11x17 Tray: 5 up to 18 x12
M24	Trays: 1,2,3 &4 Plain/Bond/Recycled (64-105 g/m^2) Bypass: Plain/Bond/Recycled (64-105 g/m^2) Heavywt.1 (106-169) Heavywt.2 (170-220 g/m^2)	Trays: 1,2,3&4 up to 11x17 Tray: 5 up to 18 x12
DC 3535	Tray: 1-4 & up, 18 lb bond to 110 lb.Index (64 g/m^{2}to 220 g/m^2)	Tray 1-4: 5.5 x 8.5 -11 x17 (A5-A3) Bypass: 5.5 x 8.5 - 12 x 18
Individual trays in a machine may have different paper weight and size specifications. For further machine information click on the Xerox external web site below and use the search option to find the product of interest. http://www.xerox.com/		

Table A-2. **Machine Specifications for Paper Basis Weight and Sheet Size – Monochrome Machines**

Machine	Paper Basis Weights	Sheet Size in Inches
DC 212	Trays: 16 lb bond to 24 lb bond (60 to 90 g/m^2)	Trays: 5.5 x 8.5 to 8.5 x 14
DC 214		Bypass: 5.5 x 8.5 to 8.5 x 14
DC 220		
DC/DP 230		
DC 332	Trays: 16 lb bond to 24 lb bond (60 to 90 g/m^2)	Trays: 5.5 x 8.5 to 11 x 17
DC 340	Bypass: 16 lb bond to 110 lb index (60 to 200 g/m^2)	Bypass: 4 x 6 to 11 x 17
DC 432		
DC 440		
DC425		
DC 240		
DC 255		
DC/DP 265	Trays and Bypass: 16 lb bond to 110 lb index	Trays: 5.5 x 8.5 to 11 x17
DT/DP 65/75	(60 to 200 g/m^2)	Bypass: 4.5 x 5.5 to 12 x 18
DT/DP 90		Trays: service can adjust to 12 x 18
WC Pro 65/75/90		
DC 460/470		
DC 480/490		
C55	16 lb bond to 24 lb bond (60 to 90 g/m^2)	7.25 x 10.5 to 8.5 x 14
NC 60		Manual Feeder for Labels & Transp.
N 17	Trays: 16 lb to 28 lb bond (60-105 g/m^2) Bypass:16lb to 28lb (60-105 g/m^2)+ A6 postcards (190 g/m^2)	7.25 x 10.5 to 8.5 x 14 3.87 x 7.5 to 7.25 x 10.5
N 24	Trays: 16 lb bond to 24 lb bond (60 to 90 g/m^2)	Trays: 5.5 x 8.5 to 11 x 17
N 32	Bypass: 16 lb bond to 110 lb index (60 to 200 g/m^2)	Bypass: 3.87 x 7.5 to 11 x 17
N 40		
DP 390HC	20 lb bond to 110 lb index (75 to 200 g/m^2)	8 x 10 to 8.5 x 14
DP 4890		No bypass
DP 92C		
DP 96	16 lb bond to 110 lb index (60 to 200 g/m2)	7 x 10 to 14 x 17
DP 135		No bypass
4635		
DP 180	16 lb bond to 110 lb index (60 to 200 g/m^2)	7 x 10 to 14 x 17 No bypass
6100		
DT 6115	16 lb bond to 110 lb index (60 to 200 g/m^2)	DT 135: 8 x 10 to 11 x 17
DT 135		6115 & 6135: 8 x 10 to 14.3 x 17
6135		No bypass
DT 6155	16 lb bond to 110 lb index (60 to 200 g/m^2)	8 x 10 to 14 x 17
DT 6180		No bypass
4050	20 lb bond to 110 lb index (75 to 200 g/m^2)	8 x 10 to 8.5 x 14 No bypass
4090	20 lb bond to 110 lb index (75 to 200 g/m^2)	8 x 10 to 8.5 x 14 No bypass
4220	Trays: 16 lb bond to 32 lb bond (60 to 120 g/m^2)	Trays: 5.5 x 8 to 11 x 17
4230	Bypass: 16 lb bond to 110 lb index (60 to 200 g/m^2)	Bypass: 3.5 x 5.5 to 11 x 17
4235	16 lb bond to 32 lb bond (60 to 120 g/m^2)	5.5 x 8.5 to 11 x 17 No bypass
4850	20 lb bond to 110 lb index (75 to 200 g/m^2)	8 x 10 to 8.5 x 14 No bypass
5090	16 lb bond to 110 lb index (60 to 200 g/m^2)	8 x 10 to 11 x 17

Machine	Paper Basis Weights	Sheet Size in Inches
5390		No bypass
5690	Trays: 16 lb bond to 110 lb index (60 to 200 g/m^2)	Trays: 8 x 10 to 11 x 17
5028	All Trays: 16 to 32 lb bond (60 to 120 g/m^2)	Tray 1: 8.5 x 11 to 11 x 17
5328		Tray 2: 8.5 x 11
5334		Tray 3: 8.5 x 11 to 8.5 x 14
		Bypass: 5.5 x 8.5 to 11 x 17
5065	16 lb bond to 110 lb index (60 to 200 g/m^2)	5.5 x 8.5 to 11 x 17
5365	(5065 max. basis weight is 100 lb. index, 180 g/m^2)	No bypass
5100		
5885	16 lb bond to 110 lb index (60 to 200 g/m^2) in sizes	8 x 10 to 8.5 x 11
5890	16 lb bond to 24 lb bond (60 to 90 g/m^2) in sizes	8.5 x 14 to 11 x 17 - No bypass
5895		
5800		
5900	20 lb bond to 110 lb index (75 to 200 g/m^2)	8 x 10 to 11 x 17
5990		No Bypass
5995		
5350	Trays: 13 lb bond to 24 lb bond (50 to 90 g/m^2)	Trays: 5.5 x 8.5 to 11 x 17
5352	Bypass: 13 lb bond to 110 lb index (50 to 200 g/m^2)	Bypass: 4.5 x 5.5 to 11 x 17
5665		
5388	Trays: 16 lb bond to 110 lb index (60 to 200 g/m^2)	8 x 10.5 to 8.5 x 14
5680		No Bypass
5892		
5624		
5626	Trays: 16 lb bond to 32 lb bond (60 to 120 g/m^2)	Trays: 8.5 x 11 to 11 x 17
5828	Bypass: 16 lb bond to 32 lb bond (60 to 120 g/m^2)	Bypass: 8.5 x 11 to 11 x 17
5830		Single Sheet Bypass in sizes 5.5 x 8.5 to 11 x 17
5818	Trays: 16 lb bond to 32 lb bond (60 to 120 g/m^2)	Trays: 8.5 x 11 to 11 x 17
	Bypass: 16 lb. bond to 32 lb. bond (60 to 120 g/m^2)	Bypass: 5.5 x 8.5 to 11 x 17
5837	Trays: 13 lb bond to 24 lb bond (50 to 90 g/m^2)	Trays: 5.5 x 8.5 to 11 x 17
5845C	Bypass: 13 lb bond to 110 lb index (50 to 200 g/m^2)	Bypass: 4.25 x 5.5 to 11 x 17
5855C		
555/545/535 WC Pro 35/45/55	Trays: 16 lb bond to 110 index (60 to 200 g/m^2)	Trays: 5.5 x 8.5"/140 x 216mm/ A5 to 11 x 17"/279 x 432mm/A3
	Bypass: 16 lb bond to 80 lb cover (60 to 216 g/m^2)	Bypass: 4.13 x 5.83"/105 x 148mm to 11.7 x 17" 297 x 432mm
1010 2101	Tray:#1: 18 lb to 28 lb bond (64 to 105 g/m^2) Trays: #2 - 4: 18 lb to 32 lb bond (64 to 128 g/m^2)	Tray:#1: 8.5 x 11 Trays: #2 - 4: 8.5 x 11 to 12 x 18
	Bypass: 18 lb to 80 lb Cover (64 to 220 g/m^2) Interposer: 15 lb to 90 lb Index (56 to 162 g/m^2)	Bypass: 4 x 6 to 12 x 18/SRA3 Interposer: 8.5 x 11 to 11 x 17
Xerox Nuvera 100/120 DC/P	Trays: 16 lb bond to 110 lb index (56 to 216 g/m^2)	Trays: 5.5 x 8.5" to 12.2 x 18.5" (A5 to A3)
Individual trays in a machine may have different paper weight and size specifications. For further machine information click on the Xerox external web site below and use the search option to find the product of interest. http://www.xerox.com/		

Appendix B: Paper Types and Grades

There are many types of paper available on the market for printing. Paper grades are typically defined in terms of usage – with each grade designed for a specific or most common purpose. This appendix explains the differences between the most commonly encountered paper grades.

Bond Papers

Bond papers are the most commonly used paper for writing, printing, and copying. Bond papers are uncoated paper manufactured using the Freesheet/Woodfree process. They range in quality characteristics from premium grades of high brightness/whiteness that may be made from rags or cotton fibers to less expensive grades of lower brightness.

Bond papers tended to be classified by brightness level (in North America) and whiteness level and shade in the rest of the world. In North America the most commonly used bond papers are 84 and 88 brightness. Europe, Latin and South America, as well as the rest of the world classify papers as A, B and C grade with the distinction being made based on whiteness/shade and price.

Rag Bonds

These are the “prestigious-looking” papers made from a combination of cotton and wood fibers, which gives them strength and a pleasing appearance. Most of these papers are watermarked to specify their cotton content and are graded accordingly:

No. 1 bonds = 100% cotton fiber
No. 2 bonds = 50 to 75% cotton fiber
No. 3 bonds = (obsolete)
No. 4 bonds = 25% cotton fiber

As rag bonds frequently have embossed surfaces, dry ink may fuse poorly to them in the digital printing process. They generally have greater stiffness; therefore, giving them a nice “quality feel”.

Xerographic Bonds

These papers were designed specifically for use in xerographic and laser printing equipment. The paper characteristics, including smoothness and moisture, have been modified for performance in the toner based printers

Offset Papers

Offset, or book, papers are designed for use in the offset lithography process. These products can be either coated or uncoated. Offset papers possess good surface strength and higher moisture content than digital papers.

Because of their higher moisture content, uncoated offset papers can excessively curl, causing problems in digital printers.

Coated offset papers are designed to ensure suitable absorption of offset inks; as such they usually do not perform well in the high heat environment of the digital printing process. They have a tendency to blister, crack or jam. While some recent coating formulations have been modified to respond more favorably to the digital print environment – from a physical perspective, issues around toner adhesion and image quality are consistently apparent.

Multipurpose Papers

These sheets are the most commonly used in digital monochrome printers and copiers and fax machines. They have been designed for use in multiple devices (and technologies), such as xerographic, offset, and inkjet. The design specifications are such that these products perform satisfactorily in most instances on these devices. Multipurpose papers are typically not suitable for color printers.

Carbonless Papers

Carbonless paper has been coated on one side with encapsulated dyes. These dyes are released when the paper is printed, allowing for the transmittal of images from one sheet to another.

It is essential that only digital carbonless paper be used in a digital printer. Digital carbonless has been designed to ensure that the pressure applied by the paper feed, transport, and fusing sections do not prematurely break the capsules, contaminating the machine and destroy the imaging characteristics of the product.

Recycled Papers

Environmental consciousness and a sense of public responsibility have resulted in the increased use of recycled papers. Recycled papers are manufactured using some percentage of post-consumer waste fiber instead of virgin fiber. With advances in wastepaper sorting and processing, recycled content can be found in many types of paper products, including multipurpose bonds and other digital papers.

There are two types of recycled fiber: post-consumer waste and pre-consumer/industrial waste. Post-consumer waste is the fiber recovered from papers that have been used for their intended end-use, for example a brochure or document that has been printed and discarded in an office environment. Pre-consumer/industrial waste is the fiber recovered from papers that have been discarded during a manufacturing process, for example, the waste such as hole punches or excess trim collected during a paper converting operation. In keeping with our commitment to environmental responsibility, Xerox offers a number of paper products that include post-consumer fiber.

Digital Coated Papers

Coated papers are being used with increasing frequency in digital color printing. Coated papers are produced by applying an aqueous coating to a base sheet. The basic ingredients of a coating are mineral pigments such as clay, calcium carbonate plus a binder. The binder is a synthetic copolymer, which not only binds the pigments together but also binds the coating mix to the base paper. The main purpose of paper coating is to give a smooth, receptive area for printing and a distinctive appearance.

Coated papers are commonly available as either Coated-two-side (C2S) or Coated-one-side (C1S) products. In addition to being classified as C2S or C1S, coated papers are also typically categorized by their “gloss” level. Gloss is achieved by making the surface more reflective through a combination of calendering (pressing) and/or coating choices.

The range of gloss varies from a matte to high gloss.

Typical coated paper gloss levels per grade classification:

	Coated Paper Classification	**Gloss Range (75°)**
High Gloss	Cast Coated	80+
Gloss	Gloss, Enamels, Art, etc	50 to 80
Semi-gloss	Dull, Silk	35 to 50
Satin	Satin or Velvet	25 to 35
Matte	Matte	10 to 25

Appendix C: Paper Weights and Measures

Two of the most commonly mentioned characteristics about paper are the weight, expressed in pounds or grams per square meter, and the size, such as 8.5 x 11 or A4. This appendix will discuss these two characteristics.

Paper Weights

When deciding on a paper to use in the printer, it is necessary to specify a particular weight. Internationally, the weight of paper is expressed in grams per square metre (g/m^2, g/m^2, grammage), which makes it possible to compare any two papers easily and determine which is heavier.

The United States and Canada are the sole exception to this international standard. In the U.S. and Canada, paper weight is expressed in terms of *basis weight*, which is the weight of 500 sheets of a particular size. For bond/xerographic/office paper, the basis sheet size is 17 by 22 inches; for offset (text, book paper), it is 25 by 38 inches; for Cover it is 20 by 26 inches, and for index and tab stock it is 25.5 by 30.5 inches. Because each type of paper (bond, text, cover, etc.) is expressed in terms of a different basis size, a 24-pound bond and a 24-pound offset paper are not the same weight.

Weight Conversion

The following chart shows the weight, in grams per square meter and in basis weight, for the most frequently used commercial weights of paper. By reading across the chart, it is possible to determine what the closest comparable weight is for two different categories of paper.

For example, a 20-pound xerographic paper weighs 75 g/m^2 and falls between a 50- and 55-pound text/offset; the 50-pound offset weighs 74 g/m^2, and is thus the closest commercially available weight of offset paper.

To convert any basis weight to grams per square meter, multiply the basis weight by 1406.13. Then divide by the number of square inches in the basis sheet. For example, 20-pound bond has a basis size of 17 by 22 inches (374 square inches). 20 x 1406.13=28,122.6; divide by 374 to get 75 g/m^2.

Table C-1. **Paper Weight Conversions**

Business Papers	Book Papers	Covers	Tag	Index	Bristol	Coated Board	
Xerographic Bond Laser	Premium text Uncoated Book Coated Text/book	Coated Uncoated Opaque				(Sold by caliper not weight – weights are approximates)	
17x22"	25x38"	20x26"	24x36"	25.5x30.5"	22.5x28.5"	*Point Scale (1pt=.001)	
Basis Weight (in pounds, lb.)							g/m^2
	20						30
9							33
10	26						38
	28						42
	30						44
12							46
13	33						49
	35						52
	38						56
	40						59
16							60
18	45						67
20	50						75
	55						80
24	60						90
28	70						105
32	80						120
					57		125
36	90	50					135
			90				146
					67		147
40	100					6pt/150µm	150
	105						155
	110	60	100	90			160
		65			80		175
	120					8pt/200 µm	180
		70					190
			125	110			200
							210
		80					215
					100	10pt/250µm	220
				125	120		225
		88					240
		90	150				245
				140		12pt/300 µm	250
							260
		100					270
			175		150		285
		110					300
				170			310
			200				325
							330
		130					350

Standard Paper Sizes

The cut-sheet paper used in printers is normally cut to certain standard sizes before packaging. The standard cut-sheet dimensions used in the North America, where measurements are stated in inches, differ from those used internationally and measured in millimeters. The following tables show the standard North American and International sizes, with their equivalents in meters and inches.

Table C-2. **Standard North American Sheet Sizes**

Inches	Millimeters
4 x 9	102 x 229
4.5 x 6	114 x152
5.5 x 8.5	140 x 216
6 x 9	152 x 229
7 x 12	177 x 305
8.5 x 11	216 x 279
8.5 x 13	216 x 330
8.5 x 14	216 x 356
9 x 12	229 x 305
11 x 17	279 x 432
12 x 18	305 x 457
14 x 25	356 x 635
17 x 22	432 x 559
18 x 24	457 x 610
20 x 26	508 x 660
20.5 x 14.33	521 x 364
22.5 x 28.5	572 x 724
22.5 x 35	572x 889
24 x 36	610 x 914
25 x 38	635 x 965
25.5 x 30.5	648 x 762

Note: Paper may be ordered specially cut to any desired size.

Table C-3. **Standard International cut-sheet sizes in Inches / Millimeters**

Sheet Size	Inches	Millimeters
4A	66.22 x 93.62	1692 x 2377.95
2A	46.81 x 66.22	1189 x 1692
A0	33.11 x 46.91	841 x 1189
A1	23.39 x 33.11	594 x 841
A2	16.54 x 23.39	420 x 594
A3	11.69 x 16.54	297 x 420
A3+	18 x 12	457 x 305
A4	8.27 x 11.69	210 x 297
A5	5.83 x 8.27	148 x 210
A6	4.13 x 5.83	105 x 148
A7	2.91 x 4.18	74 x 105
A8	2.05 x 2.91	52 x 74
A9	1.46 x 2.05	37 x 52
A10	1.02 x 1.46	26 x 37
2B	55.67 x 78.74	1414 x 1500
B0	39.37 x 55.67	1000 x 1414
B1	27.83 x 39.37	707 x 1000
B2	19.68 x 27.83	500 x 707
B3	13.9 x 19.68	353 x 500
B4	9.84 x 13.9	250 x 353
B5	6.93 x 9.84	176 x 250
SRA3	17.72 x 12.6	450x 320

The international sizing standard for cut-sheet paper is known as the A0 system. An A0 sheet of paper is one square meter in area. A1 is one half of the base area (.5 square meter). Half of A1 is A2 (.25 square meter), etc.

Appendix D: Troubleshooting Guide

This section outlines situations that can occur when running your printer with a variety of papers.

These hints are intended to help you resolve problems and get your paper to work satisfactorily; or, if necessary, direct you to an alternate paper that has the requisite properties for your application.

Your Xerox service representative can verify that your printer is adjusted within design tolerances. If a paper runnability problem persists, consider changing:

1. The ream, carton, or if a problem persists, paper from a different lot

2. Your type, weight, or brand of paper

3. The atmospheric conditions where you store your paper

4. The temperature or humidity of your printing environment.

These alternatives are usually under your control. You may find that all, or any combination of the above changes needs to be made.

The link to the Specialty Media Guide / Hints and Tips are at the following links:
http://www.xerox.com/go/xrx/template/009.jsp?view=Feature&ed_name=Supplies_Library&Xcntry=USA&Xlang=en_US

Paper Resource Centre under Supplies on www.xerox.com

Troubleshooting Hints

Paper jamming can be caused by a variety of factors. Use the following table to assist in determining the specific cause.

Table D-1. **Troubleshooting guide**

Problem	Cause/suggested remedy
Repeated jams in the processing area	Excessive curl 1. Turn paper stack over in feeder. 2. If problem persists, replace paper with new ream. Paper too stiff Try using a lighter weight paper. Paper too limp Try using a paper with a lower moisture content or more stiffness. Excessive smoothness Try using a rougher paper with a higher Sheffield rating (refer to “Smoothness” in **Paper Properties and Xerox Printers section)** Bent corners 1. Remove all papers with bent corners. 2. Turn paper stack around feeder, reversing leading edge. 3. If problem persists, replace paper with new ream. High moisture content 1. Replace paper with new ream. 2. Check storage area to ensure paper is being properly stored. 3. Try using a different paper. Plugs from holes in drilled paper are in the paper path Fan paper thoroughly to remove paper plugs.

Table D-1. **Troubleshooting guide** (continued)

Problem	Cause/suggested remedy
Paper multi-feeds or skewed feeds	Poorly cut paper 1. Fan paper thoroughly on all four sides to remove any dust or shavings from edges. 2. Turn paper stack around in feeder, reversing leading edge. 3. If problem persists, replace paper with new ream. Wrapper wax or glue on sheets 1. Remove a few sheets from the seam side of the ream before loading ream in feeder. 2. Fan paper thoroughly on all for sides to remove any glue holding edges together. 3. If problem persists, replace paper with new ream. Low humidity (check with humidity measuring device) Raise humidity in printing room. Poorly drilled/punched paper 1. Fan paper thoroughly to remove paper plugs and to separate sheets stuck together at the holes. 2. If problem persists, replace paper with new ream. Paper too porous 1. Turn paper stack over in feeder. 2. If problem persists, use a different paper. Feeder is adjusted incorrectly for paper size being used 1. Refer to your Xerox printer operator guide to ensure size of paper you are using is recommended for your printer, and that the paper is loaded correctly. 2. If problem persists with all papers, have your Xerox service representative adjust the feeder.

Table D-1. **Troubleshooting guide** (continued)

Problem	Cause/suggested remedy
Frequent misfeeds	Excessive curl 1. Turn paper stack over in feeder. 2. Turn paper stack around in feeder, reversing lead edge. 3. If problem persists, replace paper with new ream. Excessive static 1. Fan the paper before loading. 2. Increase relative humidity in machine area. 3. If problem persists, try using a different paper. High moisture content 1. Replace paper with new ream. 2. Check storage area to ensure paper is being properly stored. 3. Try using a different paper. Poorly drilled/punched paper 1. Fan paper thoroughly to remove paper plugs and to separate sheets stuck together at the holes. 2. If problem persists, replace paper with new ream. Paper coating or chemical lcontent causes sheets to stick Try using a different paper. Paper outside weight or stiffness parameters for your printer 1. Refer to your Xerox printer operator guide for a list of paper weights that will run in your printer. 2. Replace the paper you are using with a ream of recommended paper. Paper has too much suface texture Use a paper with less cotton or rag content. Paper outside weight or stiffness parameters for your printer 1. Refer to your Xerox printer operator guide for a list of paper weights that will run in your printer. 2. Replace the paper you are using with a ream of recommended paper. Paper has too much surface texture Use a paper with less cotton or rag content. Ripped or damaged edges 1. If only one edge of stack is damaged, turn paper stack around in feeder, reversing lead edge. 2. If onlyl a few sheets are damaged, remove and discard those sheets. 3. If problem persists, replace paper with a new ream. Feed rollers contaminated with paper dust 1. Follow instructions in your Xerox printer operator guide for cleaning and replacing the feed rollers. 2. If the feed rollers can not be cleaned or replaced by the operator, call for service. Feed or retard belt glazed Follow instructions in your Xerox printer operator guide for cleaning or replacing the feed or retard belt.

Table D-1. **Troubleshooting guide** (continued)

Problem	Cause/suggested remedy
Frequent jams in output station	Excessive curl 1. If your printer has a decurler, review decurler operating procedures to minimize curl in the output station. 2. Turn paper stack over in feeder. 3. If problem persists, replace paper with new ream. Paper moisture content too high or too low 1. Replace paper with new ream. 2. Check storage for proper paper storage. 3. Try using a different paper. Low humidity (check with humidity measuring device) Raise humidity in machine environment.
Sheets stick together in output station	Low humidity in printing environment Raise humidity in machine environment. Excessive static 1. Fan paper thoroughly before loading. 2. Increase relative humidity in machine area. 3. If problem persists, try a different paper. Paper dust on static eliminator Ask your Xerox service representative to check the static eliminator. CAUTION: Never use antistatic spray to combat this condition.
Streaks appear on prints	Fuser has been contaminated by particles from abrasive paper 1. Use a smoother paper (xerographic or dual purpose grades should be smoother than many offset or bond grades). 2. Ask your Xerox service representative to check the fuser Print cartridge or erase rod wire is worn out Verify that erase rod and/or print cartridge are operating properly. Refer to your Xerox printer operator guide for replacement procedures if required.

Table D-1. **Troubleshooting guide** (continued)

Problem	Cause/suggested remedy
Leading edge of paper tears or binds	Poorly cut paper 1. Fan paper thoroughly on all sides. 2. Turn paper stack around in feeder to reverse lead edge. 3. If problem persists, replace paper with new ream. 16 pound or lighter paper is being used Try using heavier weight paper, such as 20 pound. Excessive curl 1. Turn paper stack over in feeder. 2. If problem persists, replace paper with new ream. Wrapper wax or glue on sheets 1. Remove a few sheets from the seam side of the ream before loading ream in feeder. 2. Fan paper thoroughly on all for sides to remove any glue holding edges together. 3. If problem persists, replace paper with new ream.
Fingerprints or smudges appear on one or more sheets printed on the 4075	Area of sheets to be imaged was touched before printing Avoide touching the top surface of the paper when loading as the 4075 will image fingerprints that are left on the paper. Handle paper at the sides.

Photoreceptor Spots

A variety of materials and substances can cause spots on the photoreceptor of a laser printer. Listed below are the causes and the suggested remedies.

Table D-2. **Photoreceptor spot cause and avoidance**

Cause of Spots	Avoidance Procedure
Carbonless paper (encapsulated solvents, dust)	Avoid using these papers if they cause problems in your printer.
Preprinted forms (use of nondrying inks or inks with low temperature resistance)	Order only forms and letterhead printed with inks having the following characteristics: • Oxidative or cured with ultraviolet light • Nonvolatile, cross-linkable vehicles • Internal and surface curing driers • Minimal oxidants used • No slip agents • pH level in fountain high enough to permit curing • (4050F, 4850/4890) printed only in oil-based inks Avoid buying forms printed with coldset inks.
Plasticized or solvent-containing papers (engineering vellums, printed forms, solvent contaminated papers)	Try using different brands to avoid using any that cause problems in your printer.
Wax laminate ream wrap (Wax transfers and migrates through paper; degree of transfer is very sensitive to temperature history of product.)	Use only paper packaged in a plastic laminate wrap.
Glue spots (from ream wrapper sealing operation)	Purchase only high-quality xerographic or image series dualpurpose paper for printing. Ensure all required printer cleaning and maintenance is performed on schedule.
Paper dust (from poorly bonded paper, fillers, fuzziness, sheeting operation, poorly bonded ream wrapper, and airborne dust in paper manufacturing)	Purchase only high-quality xerographic or image series dualpurpose paper for printing. Ensure all required printer cleaning and maintenance is performed on schedule.
Environmental dust in printing room	Ensure printing and storage rooms are as clean and dust-free as possible. Ensure all required printer cleaning and maintenance is performed on schedule.
Talc (from paper pitch control process, and printing process. Interferes with development process)	Purchase only papers with guaranteed performance.
Anti-offset spray on printed forms (from spraying forms with starch, talc, or resin powders during printing process)	Require your forms vendor to eliminate or minimize use of antioffset sprays on your forms. Pretest all forms in a Xerox printer before purchasing large quantities. Avoid purchasing any forms shown to cause problems in your printer.
Atmospheric corrosives and dusts (from external air in chemical and manufacturing areas)	Keep your printer in a dust-free environment, closed off from outside and manufacturing areas. Ensure doors and windows remain closed.

Fuser Area Condensation

Occasionally, combinations of machine temperature, machine room temperature, machine room relative humidity, machine condition, and paper moisture can result in moisture condensing around the fuser area of a laser printer. This is usually a sporadic and temporary situation. If this becomes troublesome due to collection of water drops, your Xerox service representative may install a thin piece of felt or similar material along the edge of the pressure roll cover to absorb water droplets and allow harmless re-evaporation.

Appendix E: Ordering Xerox Supplies

It is easy and convenient to order Xerox papers and specialty media. Simply call Xerox Supplies Sales Center, or contact your local Xerox Supplies Representative and place your order.

In the U.S. Call: 1-800-822-2200
In Canada Call: 1-800-668-0199 (English)/1-800-668-0133 (French)
In Europe Call:

- Austria +43 (0) 1 240 50 700
- Belgium +32 (0) 2 716 60 00
- Croatia +385 (0) 1 484 82 88
- Czech Republic +420 (0) 2 84 02 71 11
- Denmark +45 (0) 88 17 80 00
- Estonia +37 (0) 1 91 176 78
- Finland +358 (0) 204 68 5400
- France +33 (0) 825 00 12 00
- Germany +49 (0) 2131 2248 2666
- Greece +30 (0) 210 9311 026/27
- Hungary +36 (0) 1 436 8800
- Ireland +44 (0) 1850 200 910
- Italy +39 (0) 800 425 042
- Latvia +371 (0) 91 176 78
- Netherlands +31 (0) 30 69 80 400
- Norway +47 (0) 800 33 033
- Poland +48 (0) 22 878 78 00
- Portugal +351 (0) 210 400 661
- Romania +40 (0) 1 303 35 00
- Slovakia +421 (0) 75 941 8393
- Slovenia +386 (0) 1 540 1824
- Spain +34 (0) 902 40 30 03
- Sweden +46 (0) 8 795 16 20
- Switzerland +41 (0) 1 872 44 44
- United Kingdom +44 (0) 870 010 4445

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