Digital Laser Printers
Guide to Paper and Other Media

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Preface

Digital's laser printers can use a variety of media: paper, labels, and transparencies. The quality of the media can affect the quality of your printed output and the long-term performance of your printer. This guide describes some of the characteristics to look for when buying media. It also gives some guidelines for storing and handling paper.

This guide is intended for anyone who buys supplies for a Digital laser printer or operates a laser printer. For additional information about operating and maintaining a laser printer, see the operator's guide for that printer.

Chapter 1

Laser Printers

Digital's laser printers use laser electrophotography to provide high-resolution, high-quality printing at a variety of print speeds and paper-handling capacities.

Laser electrophotography refers to the nonimpact printing technique that laser printers use to produce an image. A low-power laser generates an image on a charged photoconductive surface, for example, a belt or drum. When the printer applies a dry powder (toner) to that surface, the charged toner particles adhere to the image.

Media enters the printer and is electrically charged to attract toner to it. The toner is transferred to the charged media as the media passes by the photoconductive surface. The charge on the media is then neutralized. The media passes through the fusing rollers, which apply both heat and pressure to bond the toner to the media, and is ejected from the printer.

For high-quality laser printing, the print media must be able to accept and hold an electrical charge and to move easily through the paper path. Qualities like weight, moisture content, and electrical resistivity are important considerations when choosing media that will provide the best print quality and fewest jamming problems.

The most common media used in printers is plain paper, but laser printers can also print on transparencies, gummed labels, letterhead paper, and envelopes. This guide describes some of the characteristics to look for when choosing paper and other media to use with your laser printer.

Chapter 2

Paper

Paper is made of many individual fibers woven or pressed together. The fibers — generally wood or cotton — are first processed into a pulp. Sizing and fillers like clay and talc are added to the pulp to enhance the paper's durability, brightness, and opacity. Finally, the water used in the paper-making process is eliminated from the paper by heat and pressure. Reducing the moisture content of paper is what gives it the electrical properties needed for laser printing.

To get the best print quality from your laser printer, you should use paper intended for use in laser printers or photocopiers. These papers are characterized by a smooth finish, uniform composition, and high brightness. They are free of curled edges and paper dust or lint. They are packaged to protect against moisture and physical damage.

2.1 Paper Characteristics

This section describes some of the characteristics that are important to consider when choosing paper.

- *Brightness*, sometimes referred to as a paper's "whiteness," determines the degree of contrast between the paper and the image you are printing. You should use paper that has a minimum brightness of 84%.

- *Curl* refers to the curve in a sheet of paper laid on a flat surface and can occur both before and after printing. In-ream curl refers to the curve of the paper before it is printed. After printing, curling may also occur as a result of the paper moving through the fusing unit and paper path.

– *Cotton or 'Rag' Content* refers to the amount of cotton content in paper composition. Since cotton content can negatively affect print quality in some printers, a maximum of 25% is recommended.

– *Moisture content* of paper affects how well it moves along the printer's paper path and how well it accepts a charge. Paper that has too high a moisture content will jam more often and curl more; paper that is too dry may not feed properly. Changes in moisture content can mean changes in the paper's ability to hold a charge. The ideal moisture content of paper for your laser printer is 4% to 6% water by weight.

– *Opacity* determines how much of what is printed on one side of the paper you can see from the other side. Opaque paper is especially important when you are printing on both sides of a sheet, but paper should always be at least 85% opaque.

– *Smoothness* refers to how free the paper's surface is of irregularities. Paper should be smooth, but not glossy. Heavily textured papers, sometimes referred to as *laid* or *wove* papers, should not be used in laser printers. The texture causes the paper's contact with the printer's belt or drum to be uneven and can result in poor print quality.

– *Weight*, also referred to as *basis weight*, is one of the most important considerations in selecting paper. Paper that is too heavy or too light can cause poor print quality, jamming, misfeeding, and mechanical wear on your printer. Your laser printer is designed to perform best with 20-pound paper.

2.2 Paper Storage

Its storage environment is very important to how well paper will perform in your laser printer. Improper storage can cause changes to the paper, which can lead to misfeeds, jamming, and other performance problems. This section describes some aspects you should consider in storing paper.

– Extremes in temperature or humidity can cause degradation in print quality and performance. For best results, paper should be stored and used at 20±3° C (68±5° F) with a relative humidity of 45% (±5%).

- If your paper is stored in an excessively humid or dry environment, the entire stack of paper cartons on the shipping pallet should be wrapped in plastic to prevent it from absorbing or losing moisture to the environment.
- Do not stack cartons of paper on the floor — leave them on the pallet or put them on shelves.
- To prevent damage to the edges of the paper, stack cartons squarely on top of one another, and do not place anything else on top of the carton stack. Stack the cartons upright, no more than six cartons high.

2.3 Paper Handling

Improperly handled paper can also cause misfeeds, jamming, and other performance problems. This section describes some things you should consider when handling paper.

- Try to keep the storage and operating environments as much the same as possible.

  If there is a temperature difference between where your paper is stored and where it is used, give the paper time to adjust to the operating environment before unwrapping and using it. A general guideline is to allow one hour for each degree of temperature difference between the storage and operating areas for paper.
- Try to load a whole package of paper at a time. Unwrap only as much paper as you are going to load into your printer right away.
- When you unwrap a new package of paper, you may want to discard the top and bottom sheets, as they tend to absorb the most from the surrounding environment. Also discard any sheets that have nicks, wrinkles, folds, tears, or any other obvious defects.
- Load paper into your printer in large quantities, rather than a little bit at a time. Loading small amounts of paper can cause jams and misfeeds because of possible air pockets created between small stacks.
- Be sure to follow the directions in your laser printer operator's guide on how to load paper into input trays.

2.4 Paper Specifications

Use paper that is intended for laser printers and xerographic copiers and that meets the specifications in Table 2–1. These papers have the smoothness and brightness necessary for good print quality and lack the imperfections that can cause problems in your laser printer. Imperfections like paper dust, wrinkles, and curled edges can cause poor print quality, jamming, and premature wear on your printer.

Please note, however, that even paper that meets the specifications may not be satisfactory in your printing environment. Before you buy a large quantity of paper, buy a small amount to test on your printers.

Never use photocopies as media in a laser printer.

Never reuse paper you have already printed in a laser printer.

Table 2–1 describes the range of specifications for paper in all Digital laser printers. Some printer models may have more restrictive specifications. Consult your operator's guide for any additional restrictions your laser printer may have. Specifications in Table 2–1 are measured at 20°C (68°F), 65% relative humidity.

Table 2–1: Paper Specifications for Laser Printers

Category	Specification	Explanation
Acid content	pH 5.5 minimum (type 111 permanence)	Acidity/alkalinity of the paper
Basis weight	60 to 90 g/m^2 (16 to 24 lbs.)[1]	Basis weight is determined using 500 sheets of 374-inch square xerographic paper
Brightness	84% minimum	"Whiteness" of paper; affects contrast of sheet and image
Coefficient of friction	0.4 to 0.7	Measure of how easily one surface can slide across another
Cutting angle	90° ±0.2°	When paper is cut to size, the edges should be at right angles.

[1]Digital's PrintServer 20 requires a minimum paper weight of 18 pounds (67.5 g/m^2).

Table 2–1 (Cont.): Paper Specifications for Laser Printers

Category	Specification	Explanation
Cutting dimensions	±0.7 mm (±0.028 in.)	Dimensions of a sheet should be accurate to this amount.
Electrical resistivity	1×10^{10} to 1×10^{13} ohm-cm	Resistance paper has to electric current
Moisture content	4% to 6% by weight	Ratio of moisture to the dry mass of the paper
Opacity	85% opaque minimum	Percentage of light that the paper can block
Thickness	0.086 to 0.107 mm (0.003 to 0.004 in.)	Thickness of a single sheet
Cotton (Rag) Content	25% maximum	Presence of cotton fibers in paper's composition

2.4.1 Colored Paper

Paper manufactured for use in laser printers and xerographic copiers comes in many colors. You can use these colored papers in your Digital laser printer.

Some types of paper have a colored coating added after they are manufactured. These coatings may not withstand the heat in the printer's fusing unit. Do not use these coated papers in your laser printer.

2.4.2 Prepunched Paper

You can use prepunched paper in your laser printer. Be sure that the hole edges are smooth. Rough or raised hole edges can cause jams and multiple feeding to occur; paper dust from rough hole edges can cause print quality problems.

Be sure to load prepunched paper correctly. If you load the paper so that the holes are aligned with the printer's optical sensors, they can be interpreted by the sensor to mean that no paper is present, causing an error condition. See the operator's guide for your printer for information on how to load prepunched paper.

2.4.3 Preprinted Forms and Letterhead Paper

You can use preprinted forms and letterhead paper with your laser printer, provided you observe some precautions. Not all inks used on these media can withstand the high temperatures in the printer's fusing unit. Some inks vaporize, producing emissions that can be hazardous to health or damaging to the printer. Some inks are transferred from the media to the printer, which can also damage the printer.

Use only preprinted forms and letterhead paper that have been printed with heat-resistant inks. The ink must not melt, vaporize, or produce hazardous emissions when subjected to temperatures as high as 195°C (385°F) for at least .5 second. In addition, inks used on these media should have a high resistance to silicone oils and must not be affected by the resin in the toner.

2.4.4 Cotton ('Rag') Content Papers

Papers with cotton (or 'rag') content have a rougher surface that can affect the transfer of toner and create print quality problems. Papers with a maximum of 25% cotton content (such as Gilbert Neutech and Neenah N.P. ™) should perform satisfactorily on your Digital laser printer. Consult your operator's guide for any further restrictions.

Chapter 3

Other Media

You can use other types of media besides paper on your laser printer, for example, transparencies, and labels. It is important to use only those media that meet the specifications in this guide.

Please note, however, that even media that meets the specifications may not be satisfactory in your printing environment. Before you buy a large quantity of any media, buy a small amount to test on your printers.

3.1 Transparencies

Digital's laser printers support printing on transparencies. Remember that the fusing unit in a laser printer is hot; transparencies that do not meet the specifications in this section may melt or become soft during printing, damaging your printer.

The transparency material must be able to withstand the high temperatures in the printer's fusing unit — as high as 195°C (385°F) for at least .5 second. In addition, the transparency material should not be sensitive to silicone oils.

You cannot use transparencies that have a paper backing on them, as they will cause your printer to jam.

Table 3–1 describes the range of specifications for transparencies in all Digital laser printers. Some printer models may have more restrictive specifications.

Table 3–1: Transparency Specifications for Laser Printers

Category	Specification	Explanation
Base heat stability	0.8% max. heat shrink-age at 195° C (385° F) for 15 min.	Maximum amount the transparency will shrink
Cutting angle	90 ±0.2°	When paper is cut to size, the edges should be at right angles.
Cutting dimensions	0.7 mm (±0.028 in.)	When the trasnparency is cut, the size should be accurate to this amount.
Curl	5.0 mm (±0.197 in.)	Maximum amount sheet can curve when laid on a flat surface
Material	Polyester	
Thickness	.105 ±0.005 mm (.0041 ±.0002 in.)	Thickness of a single transparency
Weight	142 ±4 g/m^2	Weight per unit area (1m^2)

3.2 Labels

Labels have three parts: the label, the adhesive, and the backing. It is important that you use only label stock that meets the specifications in this section, to be sure that the adhesive will not melt or soften during the printing process. The adhesive must be able to withstand the pressure and high temperatures — as high as 195°C (385°F) for .5 second — it will be exposed to during the fusing process, without melting or seeping out of the label stock. The adhesive must remain strong enough to prevent the labels from separating from the backing as they pass over the printer rollers.

When printing on label stock, select the output tray that allows the label sheet to follow the straightest path through the printer. This minimizes the amount of bending that the labels must go through in being printed.

Table 3–2 describes the range of specifications for labels in all Digital laser printers. Some printer models may have more restrictive specifications.

Table 3–2: Label Specifications for Laser Printers

Category	Specification	Explanation
Cutting angle	90° ±0.2°	When label sheets are cut, the edges should be at right angles.
Cutting dimensions	±0.5 mm (±0.020 in.)	When label sheets are cut, they should be accurate to at least this amount.
Initial adhesive strength (normal)	More than 600 g/25 mm	Test of the force required to remove a test label 25 mm wide at an angle of 180°
Moisture content	4.5% to 7.0% by weight	Ratio of moisture to the dry mass of the labels
Placement tolerance	±0.5 mm (±0.020 in.)	Label placement on backing should be accurate to at least this amount.
Thickness	.125 ±.010 mm (0.0049 in. ±0.0004 in.)	Thickness of a label sheet (labels and backing)
Weight Specifications:		
Base coating amount	15.5 ±2.5 g/m^2	Weight of the adhesive
Basis weight	50±3 g/m^2	Weight of label backing
Face sheet weight	51±4 g/m^2	Weight of label paper
Total product weight	116.5±9.5 g/m^2	Weight of labels, adhesive, and backing

3.3 Card Stock

Paper with a basis weight of 30 lbs. (112.5 g/m^2)or more is often called *card stock*. Do not use card stock in your laser printer. Card stock is thicker and less flexible than the media your printer is designed to use. Using card stock will cause excessive jamming and can damage your printer.

3.4 Envelopes

Envelopes are not standard media for most laser printers. Do not print envelopes unless your laser printer specifically allows printing them.

Envelopes can have from two to seven thicknesses of paper at different parts. This uneven layering can cause the rollers in your printer to place uneven pressure on the envelopes, twisting or skewing them. In addition, the glue used on the envelopes must be able to withstand the high temperature in the printer's fusing unit or the envelopes may be sealed during the printing process.

If your printer is specified to print on envelopes, select the output tray that allows the envelopes to follow the straightest path through the printer. This minimizes the amount of bending that they must go through in being printed.

Chapter 4

Troubleshooting

If you are seeing increased paper jams and misfeeds or poor print quality, you may be able to solve the problem by following the guidelines in this document. If the problem is the environment or the way the media is being handled, correcting the condition should solve your problem.

Ask yourself the following questions:

- Is your printer's operating enviroment within its specified limits for humidity and temperature? (See your operator's guide.)
- Do you store paper in the specified enviroment? (See Section 2.2.)
- Has the paper been given time in the printer's operating area to adjust to that environment? (See Section 2.2.)
- Do you follow the correct procedure for loading paper into the printer? (See Section 2.3 and your operator's guide.)
- Does the media you are using meet the specifications listed in this guide?

If the problem is with the media you are using, do the following:

- Check to see that the media is within the specifications. In particular, check that paper is the correct weight and texture.
- Try "fanning" the paper before it is loaded into the printer.
- Try turning the paper over in the input tray. This will often reduce curl and misfeed problems.
- Change to another lot of paper, or try another brand of paper. Sometimes paper that falls within the specifications is still not suitable for a particular printing environment.

If none of these steps solves the problem, perform the preventative maintenance procedures recommended in the operator's guide for your printer. If your printer's performance still does not improve, call the Digital Support Line for additional assistance.

How to Order Media

Digital provides paper and transparencies that meet stringent quality criteria to ensure high print quality and trouble-free printing. You can buy paper and transparencies for your laser printer directly from Digital by calling DECdirect at either of the following numbers:

1-800-DIGITAL
1-800-332-3366 (Electronic ordering at 1200/2400 baud)

Ordering information is listed in the following table.

Table 5–1:   Ordering Information for Paper and Transparencies

Media	Order Number	Quantity	Size
Paper	LN01X–AB/LX	5000 sheets	Letter (8.5 x 11 in.)
	LN01X–AD	5000 sheets	A4 (297 x 210 mm)
	LN01X–AC	5000 sheets	Legal (8.5 x 14 in.)
	LPSXX–PA/LX	2500 sheets	11 x 17 in.
Transparencies	LN03X–AJ/LX	50 sheets	Letter (8.5 x 11 in.)
	LN03X–AK	50 sheets	A4 (297 x 210 mm)

If you have questions or need presales assistance, call 1-800-343-4040.

Other Media

Digital can take responsibility only for its own media. However, some other brands of paper are acceptable for use in Digital laser printers. These include the Gilbert Neu-Tech and Neenah N.P.™ cotton content papers.

Be sure that any media you buy meets the specifications listed in this guide. Test a small amount of each new brand of media before buying it in quantity, to verify that it prints satisfactorily in your environment.