



*May 1998 Edition*

HP LaserJet Printer Family  
Paper Specification Guide

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# HP LaserJet Printer Family

## **Paper Specification Guide** \_\_\_\_\_

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# Conventions

The following conventions are used throughout this guide:

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**Note**

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Notes contain important information.

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**CAUTION**

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Caution messages appear before procedures, which, if not observed, could result in loss of data or damage to equipment.



# Contents

## 1 Introduction

About the HP LaserJet Printer family . . . . .	9
Basic theory of operation . . . . .	9
Supported HP LaserJet products . . . . .	10
Alternate sources of information . . . . .	10

## 2 Guidelines and specifications for selecting media

Important notice. . . . .	11
Recommendations to the customer. . . . .	11
Buy media that meets specifications. . . . .	12
Test small amounts of media . . . . .	12
General guidelines . . . . .	12
Quality. . . . .	12
Size . . . . .	12
Basis weight . . . . .	14
Furnish (composition) . . . . .	14
Curl . . . . .	14
Finish (smoothness) . . . . .	15
Felt side vs. wire side . . . . .	15
Paper specifications . . . . .	16
Paper weight equivalences . . . . .	18
Comparisons of paper smoothness. . . . .	19
Recycled paper . . . . .	20
Archival paper . . . . .	20
Colored paper . . . . .	20
Paper with cutouts or perforations . . . . .	21
Preprinted forms and letterhead . . . . .	22
Envelope specifications. . . . .	23
Envelope construction. . . . .	25
Adhesive label specifications . . . . .	28
Label stock facts . . . . .	28
Overhead transparency specifications . . . . .	31
Types of media to avoid . . . . .	32

## 3 Purchasing, shipping, and storing media

Introduction . . . . .	33
Purchasing media . . . . .	33
Paper . . . . .	34
Overhead transparencies . . . . .	35
Labels . . . . .	35
Shipping media . . . . .	36

Storing media . . . . .	36
Environmental considerations . . . . .	37

## 4 Troubleshooting

Factors contributing to print problems . . . . .	39
Two-sided printing . . . . .	40
Automatic duplexing . . . . .	40
Manual duplexing . . . . .	40
Indications of paper problems . . . . .	41
High rates of jams . . . . .	41
High rates of multiple feeds . . . . .	42
Post-image curl . . . . .	44
Indications of envelope problems . . . . .	45
Gray background . . . . .	45
High rates of jams . . . . .	45
Wrinkling . . . . .	46

## A Paper basis weights

## B Postal customer recommendations statement

## C Glossary

## Index

# 1

# Introduction

## About the HP LaserJet Printer family

HP LaserJet printers quietly produce documents of excellent print quality at speeds ranging from four to seventeen pages per minute. You can print on a variety of print media, including paper, envelopes, labels, and overhead transparencies. (Envelopes and labels are not supported on the HP Color LaserJet printers.) Many printer settings are easily selectable from the printer control panel.

## Basic theory of operation

HP LaserJet printers use laser and electrophotographic technologies. In this process, a scanning laser beam writes an electrostatic image onto a rotating photosensitive drum. As this image passes the developing station, a dry, powdery toner is attracted to the imaged areas. In an HP Color LaserJet printer, this process is repeated for each of the four toner colors. The developed image then advances to the transfer station where the drum contacts the media and the toner image is electrostatically transferred onto the paper. After transfer, the media passes through the fuser where heat is applied and the toner fuses (melts) onto the media. The media is then deposited in the output bin, ready for use.

To create the printed image, all print media must be transported through the printer, charged electrostatically, and heated. This is why media properties such as electrical resistivity, caliper, finish, and stiffness can affect the print quality and media-handling performance of your HP LaserJet printer.

## Supported HP LaserJet products

This document provides useful guidelines for selecting media that will give you the best performance with most HP LaserJet printers and the HP LaserJet Companion.

This document does not support HP LaserJet 2686A, HP LaserJet Plus, HP LaserJet 500, or HP LaserJet 2000 printers. See the user guide for each printer for information about print media specifications.

## Alternate sources of information

The media manufacturer and vendor can provide you with information about the suitability of media for an HP LaserJet printer or the HP LaserJet Companion.

If you have tried the suggestions outlined in this document and in your user guide and you still need assistance, call the dealer from which you purchased your printer. You can also obtain support through the worldwide network of HP Sales and Service Offices. (See the sales and service listings located in the back of any HP LaserJet printer user guide.)

In the United States, HP offers support through the Customer Support Center. Call (208) 323-2551 from 6 am to 10 pm MST, Monday through Friday, or from 9 am to 4 pm MST, Saturday.

# 2

## Guidelines and specifications for selecting media

### Important notice

Properties of media are subject to change by manufacturers. Hewlett-Packard has no control over such changes. The customer assumes all responsibility for the quality and performance of media. Although testing media helps to characterize its performance, long-term satisfaction requires process quality control by the manufacturer and proper handling.

### Recommendations to the customer

HP LaserJet printers are designed to be flexible in the types of print media they can use. Because there are many types of media and variations can occur in the process of manufacturing media, it is important to select the best media for your printing application. Hewlett-Packard LaserJet or Multipurpose paper was designed specifically for use with your printer. If HP paper is available in your area, it is recommended that you use it.

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**Note**

HP recommends testing media prior to purchasing it in large quantities.

## Buy media that meets specifications

For best performance from your HP LaserJet printer, select high-quality print media that meets the guidelines and specifications in this document.

## Test small amounts of media

If you are planning a large purchase of media, first print a small quantity in your printing environment. Subject the media to the temperature, humidity, and printing applications in which the media will be operating. HP recommends that you ask your media vendor for a guarantee that their media will perform satisfactorily in your HP LaserJet printer and that the vendor will assume responsibility for the replacement of any media that will not print acceptably.

## General guidelines

This section summarizes general guidelines for choosing print media.

### Quality

HP LaserJet printers work best with high-quality media. Quality media for HP LaserJet printers is characterized by uniform physical properties, freedom from dust and lint, accurate cutting to size, and proper packaging. Proper packaging protects media from moisture and physical damage.

Avoid media with curled or bent edges, spots, dust or lint, wrinkling, or inaccurate size. These characteristics can cause misfeeding, jamming, premature wear of printer parts, or unsatisfactory print quality in the printer.

### Size

Table 2-1 lists the names and dimensions of the most commonly used paper and envelopes. See the user documentation for your printer for specific information on the media supported by your HP LaserJet printer. Use only paper and envelopes that are supported by your printer.

**Table 2-1. Common papers and envelopes**

Type of Media	Name	Dimensions
Paper	Letter	216 by 279 mm (8.5 by 11 in)
Paper	Legal	216 by 356 mm (8.5 by 14 in)
Paper	Executive	184 by 267 mm (7.25 by 10.5 in)
Paper	A0	841 by 1189 mm (33.1 by 46.8 in)
Paper	A3	297 by 420 mm (11.7 by 16.5 in)
Paper	A4	210 by 297 mm (8.3 by 11.7 in)
Paper	A5	148 by 210 mm (5.8 by 8.2 in)
Paper	Tabloid/Ledger	279 by 432 mm (11 by 17 in)
Paper	B4 (JIS)	257 by 364 mm (10.1 by 14.3 in)
Paper	B5 (JIS)	182 by 257 mm (7.2 by 10 in)
Paper	J Postcard (hagaki)	100 by 148 mm (3.9 by 5.8 in)
Paper	J Double Postcard (oufuku hagaki)	148 by 200 mm (5.8 by 7.9 in)
Envelope	Commercial #10	105 by 241 mm (4.1 by 9.5 in)
Envelope	#7 3/4 (Monarch)	98 by 191 mm (3.9 by 7.5 in)
Envelope	DL	110 by 220 mm (4.3 by 8.6 in)
Envelope	C5	162 by 229 mm (6.4 by 9.1 in)
Envelope	B5	176 by 250 mm (7.0 by 9.9 in)

## Basis weight

Basis weight (also called grammage) is an important characteristic of paper. Paper that is too light or too heavy can cause misfeeds, mis-stacking, paper jams, poor print quality, or excessive mechanical wear in the printer.

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### CAUTION

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Avoid using extremely heavy paper. Use paper that falls within your printer's specified basis weight, as shown in appendix A or in the user documentation that came with your printer.

## Furnish (composition)

Furnish is the mixing and blending together of various materials to make the paper stock. For optimum performance of your HP LaserJet printer, use paper made from 100 percent chemical wood pulp and/or cotton fiber. Recycled paper, made with no more than 5 percent groundwood, is also acceptable. To ensure that paper of a special fiber composition will work correctly in your printer, test it before purchasing large quantities. Other components of paper are sizing, fillers, and pigments.

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### Note

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Avoid using coated paper or paper containing materials that melt, vaporize, offset, discolor, or release hazardous emissions when exposed to 205° C (401° F) for 0.1 second (0.2 second for HP Color LaserJet printers).

## Curl

Curl is curvature in a sheet of paper. It is typically measured by laying the sheet of paper on a flat surface, with the corners up, and measuring the height of the corners. There are two types of curl:

- In-ream curl is the amount of curl in a sheet of paper before printing. In-ream curl results from the paper-manufacturing process or from exposure to the environment. Paper with excessive in-ream curl might lead to feeding and print-quality problems.
- Post-image curl is the amount of curl in a sheet of paper after printing. Post-image curl results from exposure to the fusing process and paper path in the printer. Paper with excessive post-image curl may be difficult to handle or to use in automatic-feed photocopiers.

## **Finish (smoothness)**

Paper should not have a heavy texture or a glossy smoothness. Printed output on textured paper may have broken character edges and show poor toner adhesion. On the HP Color LaserJet printers, textured paper will cause inconsistent or blotchy colors and may wrinkle in the fuser. Glossy-smooth paper tends to highlight defects such as stray toner particles, and may not hold toner. For sharp resolution or detail, use a smooth paper.

Paper finish is measured in units of Sheffield. The lower the Sheffield number, the smoother the paper. See Figure 2-1 for more information.

Avoid using paper with embossed or raised surfaces: spotty printing and misfeeding may occur. It is possible to print satisfactorily on paper that has embossed areas in the leading edge, trailing edge, or in areas where print will not appear on the paper; however, misfeeding or jamming may occur.

## **Felt side vs. wire side**

Some methods of manufacturing paper result in two-sided paper properties. Along with other process variations, these properties can make one side of the paper the preferred side on which to print. The “top” side of the paper sheet, as it is formed, is known as the felt side. The “bottom” is known as the wire side. Most manufacturers indicate the preferred printing side on the package.

# Paper specifications

Use conventional white xerographic paper for most printing. The paper should be high quality and free of cuts, tears, grease spots, loose particles, dust, wrinkles, voids, and curled or bent edges. Xerographic papers, also called photocopy or xerocopy papers, are usually made from chemical wood pulp and are characterized by a smooth surface, controlled electrical properties, heat stability, and cleanliness. These characteristics ensure good image transfer, fusing without excessive curl, and reliable printer operation.

Some printing applications may require a paper with a more prestigious look or feel. Bond papers generally have a watermark and often use cotton fiber. These papers tend to have a rougher surface and their properties might not be controlled like those of xerographic papers. Your HP LaserJet printer will print black satisfactorily on many of these bond papers. Using this type of paper on HP Color LaserJet printers can degrade color print quality. However, paper manufacturers are now making laser-grade bond papers, which have properties compatible with laser printing.

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## Note

For paper specifications specific to Magnetic Ink Character Recognition (MICR) printing applications, refer to the *HP MICR User's Guide*, HP part number 5091-3857.

One of the most important things you can do to ensure the best performance from your HP LaserJet printer is to select a quality paper. Table 2-2 summarizes the specifications of paper that provide the best performance.

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## Note

Paper may meet the general specifications listed in Table 2-2 and still not print satisfactorily because of the printing environment or other variables over which HP has no control.

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**Table 2-2. Paper specifications**

Description	Specifications
Basis weight	See appendix A or the user documentation for your printer.
Brightness	83% minimum. Recycled paper may not be as bright.
Caliper	3.0 to 7.0 mils (0.094 to 0.18 mm).
Curl	In-ream: flat within 5 mm (0.2 in).
Cut edge conditions	Cut with sharp blades with no visible fray and no dust.
Electrical surface resistivity	2.0 to 15 by $10^{10}$ ohms/square inch (conditioned at 23° C and 50% RH).
Electrical volume resistivity	1.2 to 15 by $10^{11}$ ohms-cm (conditioned at 23° C and 50% RH).
Finish	100 to 190 (Sheffield) for HP Color LaserJet printers; 100 to 250 for all other HP LaserJet printers.
Finishing precision	Cut sheet to within $\pm 0.03$ inch ( $\pm 0.8$ mm) of nominal and $\pm 0.2^\circ$ square.
Furnish (fiber composition)	100% chemical wood pulp and/or cotton fiber; recycled paper with up to 5% groundwood may be used.
Fusing compatibility	Must not scorch, melt, offset, or release hazardous emissions when heated to 205° C (401° F) for 0.1 second (0.2 second for HP Color LaserJet printers).
Grain	Long grain.
Moisture content	4% to 6% by weight.
Opacity	85% minimum.
Packaging	Polylaminated moisture-proof ream wrap.
pH	5.5 pH minimum.
Stiffness	1.6 minimum machine direction, 0.6 minimum cross direction (Taber).
Wax pick	12 minimum (Dennison).

# Paper weight equivalences

Use Table 2-3 to determine approximate equivalent points in weight specifications other than U.S. bond weight. For example, to determine the equivalent of 20 lb U.S. bond weight paper in U.S. cover weight, locate the bond weight (in row 3, fourth column) and scan across the row to the cover weight (in the sixth column). The equivalent is 28 lb.

**Note**

Shaded areas indicate a standard weight for that grade.

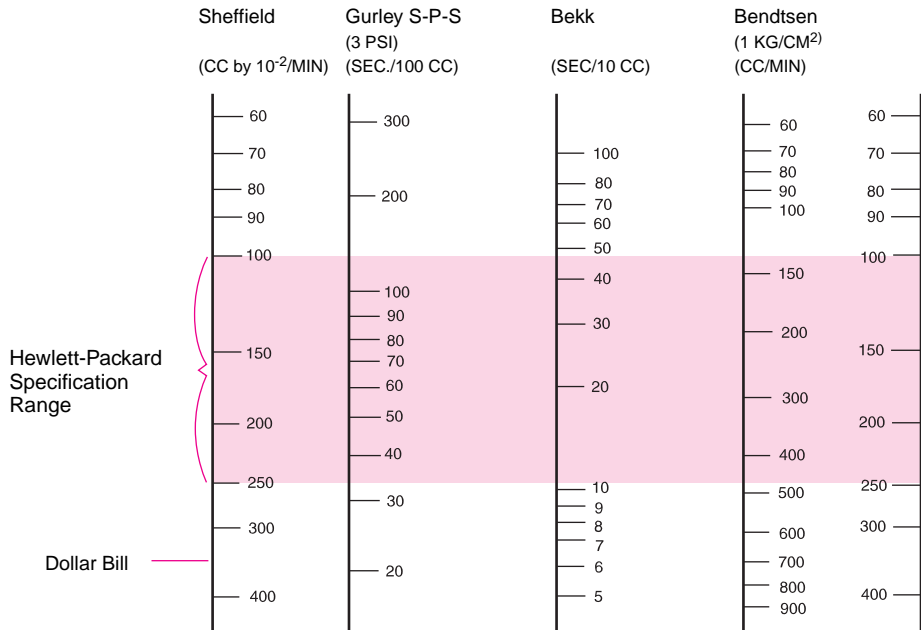
**Table 2-3. Paper weight equivalences**

Metric wt (g/m <sup>2</sup> )		U.S. weights (lb) or thickness (mm)						
Europe	Japan	Postcard* thickness	Bond Wt	Textbook Wt	Cover Wt	Bristol Wt	Index Wt	Tag Wt
60	60		16	41	22	27	33	37
64	64		17	43	24	29	35	39
75	75		20	50	28	34	42	46
80	80		21	54	30	36	44	49
80	81		22	56	31	38	46	51
90	90		24	60	33	41	50	55
100	100		27	68	37	45	55	61
105	105		28	70	39	49	58	65
120	120		32	80	44	55	67	74
120	128		34	86	47	58	71	79
135	135		36	90	50	62	75	83
148	148	0.18	39	100	55	67	82	91
157	157	0.19	42	107	58	72	87	97
163	163	0.20	43	110	60	74	90	100
176	176	0.23	47	119	65	80	97	108
199	199		53	134	74	90	110	122

\* U.S. postcard measurements are approximate. Use for reference only.

# Comparisons of paper smoothness

Smoothness typically is expressed in terms of Sheffield, Gurley, Bekk, or Bendtsen units. HP LaserJet printers generally require a smoothness of between 100-250 Sheffield.



**Figure 2-1 Interrelation among methods of air-leak smoothness**

## Recycled paper

Recycled paper is a combination of waste paper, pre-consumer waste, and post-consumer waste. Printed waste paper is usually washed to remove most of the inks and other contaminants. A recycled sheet of paper may contain dark specks or appear gray or dirty. Choose recycled paper that meets the same specifications, except brightness, as standard paper (see Table 2-2) and that has an appearance suitable for your needs. HP recommends that recycled paper contain no more than 5 percent groundwood.

## Archival paper

Paper used for archiving must meet the same specifications as standard paper; however, the pH should be no less than 7.0. Some archival demands are more stringent than others, requiring a specific degree of alkalinity and chemical stability. Toner is chemically stable and should last as long as the paper does. Toner can be degraded by petroleum-based solvents or plasticizers, such as those found in vinyl folders.

Avoid folding archival documents across printed areas or handling archival documents roughly. Discuss archival requirements with your paper supplier.

## Colored paper

You can use colored paper in your HP LaserJet printer as long as the paper meets the same specifications as standard paper (see Table 2-2).

The HP Color LaserJet printers are optimal for printing on white paper. You also can use an HP Color LaserJet printer to print on colored paper that meets all the specifications listed in this guide. However, colored paper may change the printed colors. This is because HP Color LaserJet printers create colors by printing a pattern of dots, overlaying and varying their spacing to produce various colors. When these colors are printed on colored media, varying the shade or color of the media will vary the shades of your printed colors. Since the printer cannot sense what color of paper you are using, it has no way to adjust the output colors for colored paper.

## Paper with cutouts or perforations

Avoid using paper with cutouts or perforations. These papers often cause paper jams, misfeeds, and paper-handling problems, and they may damage the printer.

**Cutouts:** A cutout is any portion of the paper that has been removed, including binder holes, notches, and square cuts.

**Perforations:** A perforation is a hole or a series of holes punched through the paper to aid in separating one piece of paper from another.

If you must use papers with internal perforations or cutouts, follow these guidelines:

- Punch cutouts and perforations from the side to be printed on, so that edge trimmings will not scratch the photosensitive drum.
- Avoid printing at a cutout location or closer than 3 mm (0.125 inch) to the edge of a cutout. This will prevent toner from contaminating the inside of the printer.
- Cut cutouts and perforations cleanly (without burrs) to avoid multiple feed, contaminants, or paper jam problems.
- On most printers, avoid perforations that run across the page, perpendicular to the paper path.

With an HP Color LaserJet printer, when printing on letter, A4, and executive-size paper, avoid perforations that run down the page because these paper sizes load long-edge first. When the printer transfers paper from one set of rollers to the next, a perforation can cause the page to bend downward and miss the pickup point on the next roller.

## Preprinted forms and letterhead

To avoid multiple feed and jamming problems when using preprinted forms, embossed paper, and letterhead paper, observe the following guidelines:

- Avoid using low-temperature inks (the kind used with some types of thermography).
- Use forms and letterhead paper printed by offset lithography or engraving.
- Print forms with heat-resistant inks that will not melt, vaporize, or release hazardous emissions when heated to 205° C (401° F) for 0.1 second (0.2 second for the HP Color LaserJet printers). Typically, oxidation-set or oil-based inks meet this requirement.
- When the form is preprinted, be careful not to change the moisture content of the paper, and do not use materials that change the paper's electrical or handling properties. Seal the forms in moisture-proof wrap to prevent moisture changes during storage.
- Avoid processing preprinted forms with a finish or coating.
- Avoid using heavily embossed or raised letterhead papers.
- Avoid papers with heavily textured surfaces.

# Envelope specifications

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**CAUTION**

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HP Color LaserJet printers do not support envelopes. Printing envelopes may damage the printer.

You can print many sizes and styles of envelopes on most HP LaserJet printers by using manual feed, a Multipurpose (MP) Tray, an optional envelope tray, or an optional envelope feeder. Whichever input method you use, envelopes should meet all specifications discussed in this document. Your envelope vendor should provide you with a satisfactory envelope that complies with the specifications listed in Table 2-4.

See your HP LaserJet printer user guide for detailed instructions on printing envelopes.

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**Note**

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Envelopes may meet the general specifications listed in Table 2-4 and still not print satisfactorily because of the printing environment or other variables over which HP has no control.

**Table 2-4. Envelope specifications**

Description	Specifications
Basis weight	<ul style="list-style-type: none"> <li>• 60 to 90 g/m<sup>2</sup> (16 to 24 lb), single thickness except HP LaserJet 4P/4PJ and 5L printers.</li> <li>• 75 to 90 g/m<sup>2</sup> (20 to 24 lb), single thickness on the HP LaserJet 4P/4PJ and 5L printers. Jamming might result if 90 g/m<sup>2</sup> (24 lb) is exceeded.</li> <li>• 105 g/m<sup>2</sup> (28 lb), single thickness on HP LaserJet 4000 and 5000 printers.</li> </ul>
Caliper	0.084 to 0.14 mm (3.3 to 5.5 mils), single layer thickness.
Curl	Envelopes must lay flat, with no more than 6 mm (0.25 in) curl across the entire surface.
Finishing	Avoid using envelopes with adhesive exposed to the printer. Envelopes must be folded accurately ( $\pm$ 0.04 in) so that there are no more than two thicknesses of paper anywhere along the leading edge. All folds must be well scored and sharply creased, and construction must be tight (not baggy). Avoid using envelopes that are stuck together with excess seam gum.
Fusing compatibility	All inks, adhesives, and other materials of the envelope must be compatible with the heat and pressure of the fusing process. Materials must not discolor, melt, offset, or release hazardous emissions when heated to 205° C (401° F) for 0.1 second.
Moisture content	4% to 6% by weight.
Paper	Paper used for envelope construction must meet the paper specifications listed in Table 2-2. See the Caution information that follows this table.
Smoothness	100 to 250 Sheffield

**CAUTION**

Envelopes containing windows, clasps, snaps, or synthetic materials should not be used; these may cause severe printer damage.

See the printer's user guide before using envelopes in your HP LaserJet printer.

## Envelope construction

Because of their construction, some envelopes will not feed through the printer dependably. Observe the following guidelines when purchasing and using envelopes:

- Make sure the envelope's leading edge, which enters the printer, is straight, with a sharp, well-creased fold with no more than two thicknesses of paper. Envelope paper exceeding 90 g/m<sup>2</sup> (24 lb) basis weight may cause jamming.
- Avoid using flimsy envelopes with thick or curved leading edges; they will not feed reliably.
- Envelopes should lay flat and should not be wrinkled, nicked, or otherwise damaged.
- Avoid envelopes with baggy construction; they might wrinkle while going through the printer's fuser assembly.
- Make sure that the adhesives used in envelopes will not scorch, melt, offset, or release hazardous emissions when heated to 205° C (401° F) for 0.1 second.

## Results of envelope tests

HP tests many types of envelopes to determine which ones print acceptably in an HP LaserJet printer. Some of the test results are listed below.

- Commercial or Official envelopes (also called Business or Regular), with diagonal seams and standard gummed flaps, performed the most reliably.
- Envelopes with double-side seam construction, which have vertical seams at both ends of the envelope instead of diagonal seams, tend to be more flimsy than diagonal-seam envelopes. Double-side seam envelopes may tend to jam or wrinkle unless the edges are thin and sharply creased. However, a variety of double-side seam envelopes have performed acceptably during testing.
- Envelopes with a peel-off adhesive strip, or with more than one flap that folds over for sealing, must use adhesives compatible with the heat and pressure of the printer's fusing process. Many varieties of this type of envelope performed satisfactorily in HP testing; however, the extra flaps and strips may result in increased jamming or wrinkling.

Generally, feeding problems increase with envelope size. Larger envelope sizes (C5, B5) cannot have a basis weight greater than 105 g/m<sup>2</sup> (28 lb).

## Unacceptable envelope construction

Many envelopes will feed through your HP LaserJet printer without problems. However, some envelope constructions (as shown in Figure 2-2) will not feed reliably. Problems may occur when the envelopes are folded smaller than normal, causing a thick leading edge near a corner. Folding inconsistencies at the manufacturer may cause some envelopes to feed well and others to jam. Purchase envelopes with the quality and consistency that you require.

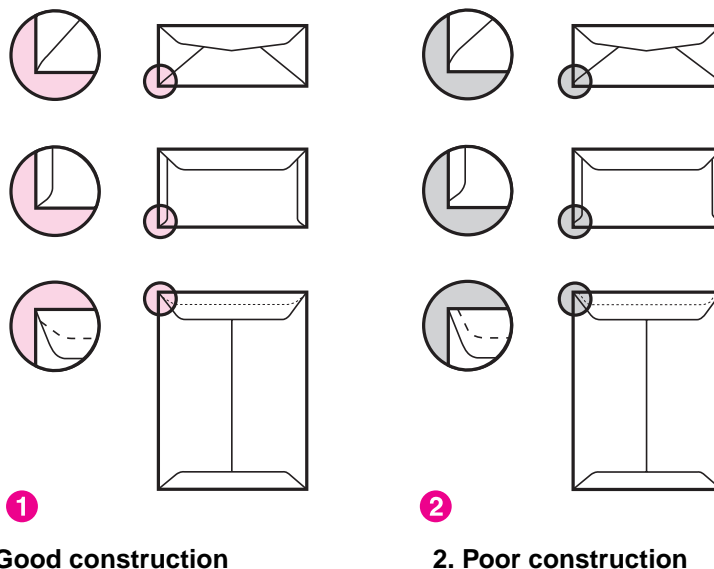


Figure 2-2

# Adhesive label specifications

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**CAUTION**

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HP Color LaserJet printers do not support labels. Printing labels may damage the printer.

Most labels are coated with pressure-sensitive adhesive. Label stock includes the top or face sheet, the adhesive, and the liner or carrier sheet (also referred to as the backing). See your HP LaserJet printer user guide for detailed instructions on printing on labels.

## Label stock facts

Consider the information in this section when choosing label stock.

### Top or face sheets

The top sheet, which is the printing surface, is usually composed of xerographic paper. The top sheets of the labels must provide good toner adhesion.

### Carrier sheets

The carrier sheet must be compatible with the temperatures and pressure of the fusing process and must be coated for easy release of the top sheet.

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**CAUTION**

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Avoid removing labels from the carrier sheet and then printing on the remaining labels. If you must remove labels, remove them from the bottom of the carrier sheet, continuing toward the top.

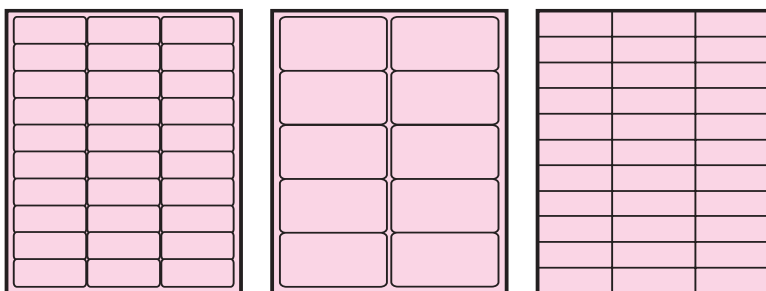
## Adhesives

The adhesive must withstand the 205° C (401° F) temperatures encountered for 0.1 second in the printer's fusing process. It also must not produce emissions that exceed exposure levels or threshold limits established by OSHA and other safety agencies. Adhesives must not come in direct contact with any part of the printer. No adhesive should be pressed out of the edges or between die-cuts (the cuts between individual labels).

## Label arrangement

Labels must cover the entire page. None of the carrier sheet should be exposed (see Figure 2-3). Using label stock with spaces between the horizontal rows of labels may result in labels peeling off during printing, causing serious jamming and possible printer damage.

Some labels are specially manufactured to leave a margin around the outside edges that correspond to the outer margins of the printable area. If this happens, **DO NOT REMOVE** the excess top sheet material from the carrier sheet. See Table 2-5 for more information.



Labels must cover entire page with none of the carrier sheet exposed.

**Figure 2-3** Arrangement of adhesive labels

### Note

Labels may meet the general specifications listed in Table 2-5 and still not print satisfactorily because of the printing environment or other variables over which HP has no control.

See “Purchasing media” in chapter 3 for information about ordering HP labels.

**Table 2-5. Label stock specifications**

Description	Specifications
Adhesive	Must not be on any external surfaces of the label before, during, or after printing. Label construction and die-cutting must not allow labels to peel off during transport, printing, or fusing.
Caliper	Must not exceed 0.18 mm (0.007 in).
Curl	In-ream: flat within 13 mm (0.5 in).
Electrical surface resistivity	2.0 to 15 by $10^{10}$ ohm per square inch.
Electrical volume resistivity	1.2 to 15 by $10^{11}$ ohm-cm.
Finishing precision	Cut sheet to within $\pm 0.8$ mm (0.03 in) of nominal and $\pm 0.2^\circ$ square.
Fusing compatibility	All adhesives, carrier sheets, top sheets, and other materials used in label construction must be compatible with the heat and pressure of the fusing process. Materials must not discolor, melt, offset, or release hazardous emissions when heated to 205° C (401° F) for 0.1 second.
Packaging	Moisture-proof wrap to preserve properties.
Shelf life	One year minimum, stored at 22° C (72° F) and 50% relative humidity (R.H.).

The following actions may cause labels to peel off, possibly damaging the inside of your printer:

- Using labels in the lower tray of noncompatible HP LaserJet printers. See the user documentation for your printer for more information.
- Printing on labels while the printer is in duplex (two-sided printing) mode.
- Removing individual labels from the carrier sheet and then printing on the remaining labels.

# Overhead transparency specifications

Overhead transparencies used in HP LaserJet printers must withstand the 205° C (401° F) temperature encountered in the printer's fusing process for 0.1 second (1.2 seconds for HP Color LaserJet printers). See your HP LaserJet printer user guide for detailed instructions on using overhead transparencies.

**Table 2-6. Overhead transparency specifications**

Description	Specifications
Caliper	0.12 to 0.132 mm (4.8 to 5.2 mils) for HP Color LaserJet printers. 0.100 to 0.110 mm (3.9 to 4.3 mils) for all others.
Cutting angle	90° ± 0.2°.
Electrical surface resistivity	2.0 to 15 by 10 <sup>10</sup> ohm per square inch.
Finishing precision	Cut sheet to within ± 0.8 mm (0.03 in) of nominal and ± 0.2° square.
Fusing compatibility	Overhead transparency materials must be compatible with the heat and pressure of the fusing process. Materials must not discolor, melt, offset, or release hazardous emissions when heated to 205° C (401° F) for 0.1 second (1.2 seconds for HP Color LaserJet printers). For HP LaserJet 500 printers: 200° C (392° F).

See “Purchasing media” in chapter 3 for information about ordering HP transparencies.

## Types of media to avoid

HP recommends against using media with any of the following characteristics:

- paper that is extremely shiny or glossy
- media that is very rough, highly textured, or embossed
- media with multipart forms
- media, media coatings, dyes, or inks that produce hazardous emissions or melt that when exposed to a fusing temperature of 205° C (401° F) for 0.1 second (0.2 second for HP Color LaserJet printers)
- media that offsets or discolors
- media that is damaged, curled, wrinkled, or irregularly shaped
- envelopes or labels that are noncompatible with HP Color LaserJet printers
- envelopes with an open flap with adhesive exposed so that closing the flap seals the envelope
- envelopes with clasps, snaps, tie strings, windows, or synthetic materials. These may severely damage the printer.
- envelopes that are not square, straight, or constructed correctly (see “Unacceptable Envelope Construction” in chapter 2)
- envelopes with a basis weight less than 60 g/m<sup>2</sup> (16 lb) or greater than 105 g/m<sup>2</sup> (28 lb)
- envelopes with baggy construction or folds that are not sharply creased
- media that was already printed on or was already fed through a photocopier or an HP LaserJet printer. Do not refeed media.

# 3

# Purchasing, shipping, and storing media

## Introduction

The performance of HP LaserJet printers depends on the condition of the print media used. This section contains recommendations for purchasing, shipping, handling, and storing media, and it provides information on the environmental effects on media.

## Purchasing media

In the United States, you can purchase HP media (paper, overhead transparencies, and labels) through the HP Direct Marketing Division. To order from HP Direct Marketing, call (800) 538-8787 and specify the HP part number listed in the tables that follow. To order paper outside of the U.S., contact your local HP sales office.

## Paper

In the U.S., use the part numbers listed in table 3-1 to order paper from the HP Direct Marketing Division (800 538-8787). Outside of the U.S., contact your local HP sales office.

You can also purchase acceptable paper from your local paper supplier. Ask your vendor to verify that the paper will work correctly with an HP LaserJet printer.

**Table 3-1. LaserJet printer paper part numbers**

<b>HP Multipurpose Paper</b>	<b>HP Part Number</b>
500 sheets letter-size 216 by 279 mm (8.5 by 11 in)	M1120
250 sheets letter-size 216 by 279 mm (8.5 by 11 in)	M2011
500 sheets three-hole, letter-size 216 by 279 mm (8.5 by 11 in)	M113H
500 sheets legal-size 216 by 356 mm (8.5 by 14 in)	M1420
500 sheets tabloid-size 279 by 432 mm (11 by 17 in)	M1720

<b>HP LaserJet Paper</b>	<b>HP Part Number</b>
500 sheets letter-size 216 by 279 mm (8.5 by 11 in)	J1124
200 sheets letter-size 216 by 279 mm (8.5 by 11 in)	J200C
500 sheets three-hole, letter-size 216 by 279 mm (8.5 by 11 in)	J113H

## Overhead transparencies

In the U.S., use the HP part numbers in table 3-2 to order transparencies from the HP Direct Marketing Division (800 538-8787). To order transparencies outside of the U.S., contact your local HP sales office. Each box contains 50 overhead transparencies.

**Table 3-2. LaserJet printer transparency part numbers**

Transparency Size	HP Part Number
Letter – 216 by 279 mm (8.5 by 11 in)	92296T
A4 – by 297 mm (8.3 by 11.7 in)	92296U
Letter – HP Color LaserJet	C2934A
A4 – HP Color LaserJet	C2936A

## Labels

In the U.S., use the HP part numbers in table 3-3 to order labels from the HP Direct Marketing Division (800 538-8787). To order labels outside of the U.S., contact your local HP sales office. Each box contains 100 sheets, 216 by 279 mm (8 ¾ by 11 inch), except where otherwise noted.

**Table 3-3. HP LaserJet printer labels part numbers**

Label Size (Height by Width)	Number per Sheet	HP Part Number
25½ by 67 mm (1 by 2 5/8 in)	30	92296A
25½ by 102 mm (1 1/3 by 4 in)	14	92296B
25½ by 102 mm (1 by 4 in)	20	92296C
51 by 102 mm (2 by 4 in)	10	92296D
85 by 102 mm (3 1/3 by 4 in)	6	92296E
13 by 45 mm (½ by 1¾ in)	25	92296F
18 by 88 mm (2/3 by 3 7/16 in)	25	92296G
70 by 70 mm (2¾ by 2¾ in)	9	92296H*
39 by 102 mm (1½ by 4 in)	12	92296J*
215 by 279 mm (8½ by 11 in)	1	92296K

\*Contains 70 sheets, 216 by 279 mm (8 1/2 by 11 in)

## Shipping media

When shipping print media through different environments, use plastic wrap to wrap all cartons on the shipping pallet. When shipping media across bodies of water, also wrap individual cartons. Packaging must protect the media from physical damage.

## Storing media

Follow these guidelines when stacking and storing print media:

- **DO NOT** store cartons or reams directly on the floor; place cartons on a pallet or on shelves.
- **DO NOT** store individual reams in a manner that will result in curling or warping.
- Rewrap partially used packages of media before storing.
- **DO NOT** stack more than six cartons on top of each other.
- Stack each carton squarely on top of the one underneath.
- Stack each carton upright.
- **DO NOT** place anything on top of media, regardless of whether the paper is packaged or unpackaged.
- Store envelopes in a protective box to avoid damaging the envelope edges.
- Keep stored media away from temperature and humidity extremes.
- **DO NOT** store printed documents in vinyl folders (which may contain plasticizers) and do not expose the documents to petroleum-based solvents.

## Environmental considerations

HP LaserJet printers are designed to operate in a wide range of environmental conditions. For best performance, store and use media at 20° to 24° C (68° to 75° F), with a relative humidity of 45 to 55 percent. Follow these guidelines when media is used in an environment outside those temperature and humidity ranges:

- **DO NOT** expose the media to humidity or temperature extremes. If media is left unwrapped or in the printer input tray, extreme changes in the environment will cause the media to take on unwanted characteristics.
- In the case of humidity extremes, keep paper and envelopes tightly wrapped in plastic.
- If a significant temperature difference occurs between the media storage area and the printer's operating environment, before unwrapping the media, allow it time to adjust to the temperature in the printer's operating environment. The greater the temperature difference and the greater the amount of media to acclimate, the longer this time period should be. Allow one day for every 10° C (20° F) difference in temperature between storage environment and printing environment.



# 4

## Troubleshooting

### Factors contributing to print problems

Print-quality problems usually result from media that does not meet the specifications in this guide, has been stored improperly, or is not in good condition. Ask the following questions to determine if the media you are using is causing print-quality problems:

- Does your media meet the specifications outlined in this document?
- Is the media in good condition? Is the media bent, wrinkled, or “dog-eared?”
- Are you using the printing procedures outlined in the printer user guide?
- Are you observing correct practices when handling media? (See the guidelines in your printer user guide for loading media.)
- Are your print-quality problems isolated to a specific type of media?
- Are you using media that has already been run through the printer?
- Did you check these aspects of the environment in which the printer operates?
  - temperature
  - humidity
  - exposure to sunlight
  - cleanliness

If you cannot determine the cause of your print defects, try the following procedures:

- 1 Print with media from another lot or from a different manufacturer.
- 2 Flip the paper over in the tray, or turn it from front to rear (both, if necessary).
- 3 If you have an envelope print-quality problem, print a sheet of paper to determine if the problem is caused by the variable thickness of your envelope.
  - If the paper's print quality is good, re-examine your envelope and the envelope specifications in this guide.
  - If the paper's print quality is poor, you may have a printer problem.
- 4 Read the rest of this chapter for troubleshooting information, perform the maintenance procedures recommended in your printer user guide, or see the troubleshooting section in your printer user guide.
- 5 Call your authorized HP dealer for assistance.

## Two-sided printing

Two-sided printing, also known as duplex printing, means printing on both sides of a sheet. Duplex printing can be either an automatic or a manual process.

### Automatic duplexing

Automatic duplexing requires an HP LaserJet printer designed especially for duplex printing.

### Manual duplexing

Manual duplex printing, in which sheets that already have been printed on are re-fed into the printer, requires both operator and software intervention. (See the software application user guide for more information.) Hewlett-Packard recommends manually re-feeding sheets **only** through the manual feed slot or the MP Tray. **Do not** re-feed sheets from the paper cassette trays. Using the paper cassette trays can cause jams, misfeeds, and print-quality problems.

# Indications of paper problems

This section provides information on conditions that may indicate paper problems. These conditions include high rates of jams, high rates of multiple feeds, and post-image curl.

## High rates of jams

### Problem

Paper that is too stiff or heavy. Heavy or stiff paper may not be able to negotiate the paper path or be picked up from the paper tray.

### Solution

- Make sure the paper does not exceed the basis weight listed for your printer as specified in appendix A or in the user documentation for your printer.
- Manually feed the paper into the printer.
- Use the correct output bin, as shown in your printer user guide.
- Use a lighter-weight paper.

### Problem

Paper that is too moist, resulting in waviness and curl.

### Solution

Try another ream of paper.

### Problem

Paper that is too smooth or too rough.

### Solution

Change the paper type or manually feed the paper into the printer. See your printer user guide for the correct output tray selection.

### Problem

Paper that is not cut to specification. This can cause poor print alignment, mis-stacking, improper fit in the paper tray, or difficulties for the paper sensors.

### Solution

Change the paper type or try another ream of paper.

**Problem**

Paper with excessive curling.

**Solution**

Flip the paper stack over, try another ream, or change the type of paper. You may need to acclimate the paper to your environment to diminish differences in heat and moisture.

**Problem**

Paper that is too light or too flimsy.

**Solution**

Make sure the paper meets the specifications listed in appendix A for basis weight.

**Problem**

Paper adjustments are set incorrectly in the printer.

**Solution**

Make sure all paper adjustments have been set correctly. See the user documentation for your printer for more information.

**Recovering from paper jams**

To recover from a paper jam, follow the directions listed in your HP LaserJet printer user guide. **DO NOT reuse the jammed paper—even if it appears undamaged!**

**High rates of multiple feeds****Problem**

Paper is added in small amounts to the paper tray.

**Solution**

Add only large amounts of paper to the paper tray, and avoid mixing paper types in the paper tray.

**Problem**

Paper is too dry, not moist enough. (Insufficient moisture makes paper less conductive and creates static buildup.)

**Solution**

Try another ream of paper or change the paper type.

**Problem**

Paper is too light or too thin.

**Solution**

Change the paper type.

**Problem**

Paper is too smooth or too rough. Surfaces tend to interlock or stick together.

**Solution**

Change the paper type.

**Problem**

Paper is embossed or has raised letterhead.

**Solution**

Change the paper type.

**Problem**

Paper adjustments are set incorrectly.

**Solution**

Make sure all paper adjustments have been set correctly. See the user documentation for your printer for more information.

**Problem**

Paper sticks together at the edges (edgeweld).

**Solution**

Edgeweld is caused by the use of dull cutting blades during the manufacturing process. Try a different ream of paper or try a different paper manufacturer.

## Post-image curl

When a sheet of paper is printed on by an HP LaserJet printer, the sheet develops a curvature called post-image curl. Generally, the higher the moisture content of the paper, the greater the curl. Higher weight equals higher curl.

Both the paper and the printer affect the amount of post-image curl. In the papermaking process, stresses that can cause curl are manufactured into the paper, so different papers will have differing amounts of post-image curl. In the printing process, the paper is subjected to the heat and pressure of the fusing assembly as well as to the contours of the paper path.

The following suggestions may help to reduce post-image curl:

- Print to the face-up output bin. (This option is not available with some printers.)
- Turn the paper stack over or turn it around in the input tray to reverse the direction of the paper.
- When the printer is not in use for long periods, remove paper from the paper tray and rewrap it.
- Change to a different type or brand of paper.
- Follow the storage and handling specifications in this document.
- On HP Color LaserJet printers, reduce toner coverage by using dither patterns rather than solid fill.

# Indications of envelope problems

Gray backgrounds and high rates of jams may indicate problems with envelopes.

## Gray background

For best print quality, avoid printing over seams or other multiple layer areas. On some printers, you can reduce background (gray shading in non-imaged areas) by adjusting the density of the print. If a gray background appears on your envelopes, adjust the print density setting on your printer to a darker setting. (See your printer user guide for instructions about how to adjust print density.)

## High rates of jams

Overfilling the envelope tray and misadjusting its guides are the most common causes of jams. However, if the envelope tray is properly loaded, the envelopes may be causing the problems.

Envelopes with the following characteristics can lead to jams:

### Problem

Poorly manufactured envelopes.

The leading edge must be straight, with a sharp, well-creased fold. The envelope must not have more than two thicknesses of paper along any leading edge. The folded layers of paper should form a point at the leading-edge corners (as shown in figure 2-2).

### Solution

Purchase envelopes that are manufactured correctly, or run a pen or pencil over the envelope edges to flatten them.

### Problem

Envelopes are not creased sufficiently to have sharp edges.

### Solution

Crease the leading edge of the envelope with a pen or pencil, or change to a different type or brand.

### **Problem**

Envelopes are wrinkled, “dog-eared,” or curled.

### **Solution**

Use envelopes with edges that are thin and sharply creased.

### **Problem**

Envelopes are too stiff or heavy. Stiff or heavy envelopes cannot negotiate the paper path or be picked up from the envelope tray.

### **Solution**

Use a lighter-weight envelope. Do not exceed 105 g/m<sup>2</sup> (28 lb).

### **Problem**

Envelopes are too smooth (not enough friction for transport) or too rough.

### **Solution**

Change to a different type of envelope.

### **Problem**

Envelope is inserted too far into the manual feed slot.

### **Solution**

Insert the envelope only until you feel a slight resistance.

## **Recovering from envelope jams**

To recover from an envelope jam, follow the directions listed in your HP LaserJet printer user guide. **DO NOT reuse the jammed envelope—even if it appears undamaged!**

## **Wrinkling**

Wrinkles that form in envelopes after printing usually are caused by the following envelope conditions:

- loose envelope construction
- folds that are not sharply creased
- high moisture content
- low weight/low strength paper used in envelope construction

See figure 2-2 for characteristics of good envelope construction.

# A

## Paper basis weights

**Table 4-1. Paper basis weights**

Printer	Source	Basis Weight
HP LaserJet 5000	Tray 1	60 to 199 g/m <sup>2</sup> (16 to 53 lb)
	250-Sheet Tray Optional 500-Sheet Tray	60 to 105 g/m <sup>2</sup> (16 to 28 lb)
	Duplexer	60 to 105 g/m <sup>2</sup> (16 to 28 lb)
HP LaserJet 3100	Printer Product Input Bin	60 to 105 g/m <sup>2</sup> (16 to 28 lb)
	Scanner Product Bin	44 to 252 g/m <sup>2</sup> * (12 to 67 lb*) *using special media lever
HP LaserJet 4000/4000N/ 4000T/4000TN	Tray 1	60 to 199 g/m <sup>2</sup> (16 to 53 lb)
	250-Sheet Tray Optional 500-Sheet Tray	60 to 105 g/m <sup>2</sup> (16 to 28 lb)
	Duplexer	60 to 105 g/m <sup>2</sup> (16 to 28 lb)
HP LaserJet Companion	Paper Input Slot	60 to 105 g/m <sup>2</sup> (16 to 28 lb)
HP LaserJet 6L/5L	Paper Input Bin	60 to 105 g/m <sup>2</sup> (16 to 28 lb)
	Front Paper Output Slot	60 to 163 g/m <sup>2</sup> (16 to 43 lb)

**Table 4-1. Paper basis weights (continued)**

<b>Printer</b>	<b>Source</b>	<b>Basis Weight</b>
HP LaserJet 5Si Mopier and 5Si/5Si MX	Tray 1	60 to 199 g/m <sup>2</sup> (16 to 53 lb)
	Tray 2, Tray 3, Tray 4, and Duplexer	60 to 105 g/m <sup>2</sup> (16 to 28 lb)
HP LaserJet 6P/6MP	Tray 1 (Multipurpose Tray)	60 to 163 g/m <sup>2</sup> (16 to 43 lb)
	Tray 2 (Paper Cassette)	60 to 105 g/m <sup>2</sup> (16 to 28 lb)
HP LaserJet 5P/5MP	Tray 1 (Multipurpose Tray)	60 to 158 g/m <sup>2</sup> (16 to 42 lb)
	Tray 2 (Paper Cassette)	60 to 105 g/m <sup>2</sup> (16 to 28 lb)
HP LaserJet 4V/4MV	Multipurpose Tray	64 to 105 g/m <sup>2</sup> (17 to 28 lb)
	Paper Cassette	64 to 105 g/m <sup>2</sup> (17 to 28 lb)
	Optional Lower Cassette	64 to 105 g/m <sup>2</sup> (17 to 28 lb)
HP LaserJet 4P/4PJ and 4L	Paper Cassette	60 to 105 g/m <sup>2</sup> (16 to 28 lb)
	Manual Feed	60 to 135 g/m <sup>2</sup> (16 to 36 lb)
HP LaserJet 4P/4PJ	Manual Feed	136 to 157 g/m <sup>2</sup> (37 to 42 lb) 100 to 180 Sheffield
HP Color LaserJet and Color LaserJet 5/5M	Front Input Tray	75 to 90 g/m <sup>2</sup> (20 to 24 lb)
	Optional Rear Tray	75 to 90 g/m <sup>2</sup> (20 to 24 lb)
	Manual Feed	75 to 90 g/m <sup>2</sup> (20 to 24 lb)

**Table 4-1. Paper basis weights (continued)**

<b>Printer</b>	<b>Source</b>	<b>Basis Weight</b>
HP LaserJet 5, 4 Plus, and 4	(Tray 1) Multipurpose Tray	60 to 135 g/m <sup>2</sup> (16 to 36 lb)
	(Tray 2) Paper Cassette	60 to 105 g/m <sup>2</sup> (16 to 28 lb)
	(Tray 3) Lower Cassette	60 to 90 g/m <sup>2</sup> (16 to 24 lb)
	Duplexer (LJ4 Plus and 5 only)	60 to 90 g/m <sup>2</sup> (16 to 24 lb)
HP LaserJet 4Si and III Si	Upper and Lower Bin: Cassette and Manual Feed	60 to 105 g/m <sup>2</sup> (16 to 28 lb)
	Duplexer	60 to 90 g/m <sup>2</sup> (16 to 24 lb)
HP LaserJet IIIP, IIP Plus, and IIP	Multipurpose Tray and Paper Cassettes	60 to 105 g/m <sup>2</sup> (16 to 28 lb)
HP LaserJet IIID and IID	Upper Bin: Cassette and Manual Feed	60 to 135 g/m <sup>2</sup> (16 to 36 lb)
	Lower Bin: Cassette and Manual Feed	60 to 90 g/m <sup>2</sup> (16 to 24 lb)
	Duplexer	60 to 90 g/m <sup>2</sup> (16 to 24 lb)
HP LaserJet III and II	Cassette and Manual Feed	60 to 135 g/m <sup>2</sup> (16 to 36 lb)

**Table 4-2. Paper and envelope sizes**

<b>Printer</b>	<b>Source</b>	<b>Minimum Size</b>	<b>Maximum Size</b>
HP LaserJet 5000	Tray 1	76 by 127 mm (3 by 5 in)	312 by 470 mm (12.28 by 18.5 in)
	Tray 2 (Optional 250-sheet)	148 by 210 mm (5.8 by 8.2 in)	279 by 432 mm (11 by 17 in)
	Tray 3 (Optional 500-sheet)	148 by 210 mm (5.8 by 8.2 in)	297 x 437 mm (11.7 x 17 in)
HP LaserJet 4000/ 4000N	Tray 1	76 by 127 mm (3 by 5 in)	216 by 356 mm (8.5 by 14 in)
	250-Sheet Tray	216 by 279 mm (8.5 by 11 in)	216 by 356 mm (8.5 by 14 in)
	Envelope Feeder	90 by 160 mm (3.5 by 6.3 in)	178 by 254 mm (7 by 10 in)
HP LaserJet 4000T/ 4000TN	Tray 1	76 by 127 mm (3 by 5 in)	216 by 356 mm (8.5 by 14 in)
	250-Sheet Tray 500-Sheet Tray	191 by 267 mm (7.3 by 10.5 in)	216 by 356 mm (8.5 by 14 in)
	Envelope Feeder	90 by 160 mm (3.5 by 6.3 in)	178 by 254 mm (7 by 10 in)
HP LaserJet 3100	Paper Input Bin	76.2 by 127 mm (3 by 5 in)	310 by 470 mm (12.2 by 18.5 in)
HP LaserJet Companion	Paper Input Slot	51 by 89 mm (2 by 3.5 in)	216 by 762 mm (8.5 by 30 in)
HP LaserJet 6L/5L	Paper Input Bin	76.2 by 127 mm (3 by 5 in)	216 by 356 mm (8.5 by 14 in)
HP LaserJet 5Si Mopier and 5Si/5Si MX	Tray 1	100 by 191 mm (3.9 by 7.5 in)	297 by 450 mm (11.7 by 17.7 in)
	Tray 2	216 by 279 mm (A4 /Letter) (8.5 by 11 in)	257 by 364 mm (JIS B4) (10.12 by 14.33 in)
	Tray 3	216 by 279 mm (Letter) (8.5 by 11 in)	279 by 432 mm (11 by 17 in)
	Tray 4	216 by 279 mm (Letter) (8.5 by 11 in)	279 by 432 mm (11 by 17 in)
	Envelope Feeder	100 by 191 mm (3.9 by 7.5 in)	163 by 241 mm (6.4 by 9.5 in)

**Table 4-2. Paper and envelope sizes (continued)**

<b>Printer</b>	<b>Source</b>	<b>Minimum Size</b>	<b>Maximum Size</b>
HP LaserJet 6P and 5P	Tray 1 (MP Tray)	76 by 127 mm (3 by 5 in)	216 by 356 mm (8.5 by 14 in)
	Tray 2 (Paper Cassette)	184 by 267 mm (7.25 by 10.5 in) (executive)	216 by 356 mm (8.5 by 14 in)
HP LaserJet 5/5M/5N	Tray 1	90 by 160 mm (3.5 by 6.3 in)	216 by 356 mm (8.5 by 14 in)
	Tray 2	184 by 267 mm (Executive) (7.25 by 10.5 in)	216 by 356 mm (8.5 by 14 in)
	Tray 3	184 by 267 mm (Executive) (7.25 by 10.5 in)	216 by 356 mm (8.5 by 14 in)
	Envelope Feeder	100 by 191 mm (3.9 by 7.5 in)	163 by 241 mm (6.4 by 9.5 in)
HP Color LaserJet and HP Color LaserJet 5/5M	Front Input Tray	184 by 267 mm (7.25 by 10.5 in)	279 by 432 mm (11 by 17 in)
	Optional Rear Tray	184 by 267 mm (7.25 by 10.5 in)	210 by 297 mm (8.3 by 11.7 in)
	Manual Feed	184 by 267 mm (7.25 by 10.5 in)	279 by 432 mm (11 by 17 in)
HP LaserJet 4V/4MV	Multipurpose Tray*	98.4 by 148 mm (3.9 by 5.8 in)	297 by 450 mm (11.7 by 17.7 in)
	Paper Cassette and Optional Lower Cassette	216 by 279 mm (8.5 by 11 in)	297 by 432 mm (11 by 17 in)
HP LaserJet 4P/4PJ	Manual Feed*	76 by 127 mm (3 by 5 in)	216 by 356 mm (8.5 by 14 in)
HP LaserJet 4L	Manual Feed*	76 by 190 mm (3 by 7.75 in)	216 by 356 mm (8.5 by 14 in)
HP LaserJet 4 Plus and 4	Multipurpose Tray*	90 by 160 mm (3.5 by 6.3 in)	216 by 356 mm (8.5 by 14 in)
	Envelope Feeder	90 by 160 mm (3.9 by 6.3 in)	176 by 250 mm (7.0 by 9.9 in)
HP LaserJet 4Si and IIISi	Manual Feed*	98.4 by 216 mm (3.8 by 8.5 in)	216 by 356 mm (8.5 by 14 in)
	Envelope Feeder	98.4 by 190 mm (3.9 by 7.5 in)	110 by 241 mm (4.3 by 9.5 in)

**Table 4-2. Paper and envelope sizes (continued)**

<b>Printer</b>	<b>Source</b>	<b>Minimum Size</b>	<b>Maximum Size</b>
HP LaserJet IIP, IIP Plus, and IIP	Multipurpose Tray*	96.4 by 170 mm (3.8 by 6.7 in)	216 by 356 mm (8.5 by 14 in)
	Envelope Cassette	96.4 by 188 mm (3.8 by 7.4 in)	164 by 255 mm (6.5 by 10 in)
HP LaserJet IID and IID	Manual Feed*	90 by 190 mm (3.5 by 7.5 in)	216 by 356 mm (8.5 by 14 in)
	Envelope Cassette	90 by 190 mm (3.5 by 7.5 in)	183 by 257 mm (7.2 by 10.1 in)
	Envelope Feeder	90 by 190 mm (3.5 by 7.5 in)	120 by 257 mm (4.7 by 10.1 in)
HP LaserJet III and II	Manual Feed*	90 by 190 mm (3.5 by 7.5 in)	216 by 356 mm (8.5 by 14 in)
	Envelope Cassette	90 by 190 mm (3.5 by 7.5 in)	183 by 257 mm (7.2 by 10.1 in)

\* Multipurpose trays and manual feed slots accept paper, envelopes, labels, and overhead transparencies.

# B

# Postal customer recommendations statement

## Recommendations for postal customers preparing laser printed mailings

Laser printing technology is being used by more and more postal customers to prepare their mailings. Laser printers produce high-quality images, offer advantages in speed, flexibility, and size, and are the printers of choice for smaller companies and in-home businesses.

Unlike offset printers, in which the ink is absorbed into the paper, laser printers use heat to fuse a plastic toner to the surface of the paper. Because of this difference, it is recommended that our customers use the following guidelines to produce quality laser-printed products for mailings:

- 1 Ensure that the manufacturer's recommended toner is used for the laser printer. Many aftermarket toners do not comply with the manufacturer's original specifications. Hewlett-Packard cannot predict or guarantee the performance of non-HP consumables in Hewlett-Packard products.
- 2 Paper selection is critical. Several manufacturers have papers that are specifically formulated for their printers. Good laser printer papers have the following properties:
  - Basis weight of 24 pounds (17 inch by 22 inch, by 500-sheet ream size)
  - Thickness from 4 to 4.7 mils (0.004 to 0.0047 inch)
  - Smoothness from 100 to 150 Sheffield

The new HP LaserJet Paper has been found in our testing and in the USPS testing to be superior to all the commodity grade papers available. The only comparable performing papers we tested were specialty papers not usually suitable for standard business use.

- 3 Envelopes should be used to contain the laser-printed sheets. The envelopes should have an edge or end seam and a minimum basis weight of 24 pounds (17 inch by 22 inch, by 500-sheet ream size). Avoid preparing laser-printed sheets as folded self-mailers.
- 4 Pre-bar code and pre-sort all envelopes. Meter the envelopes or use precanceled stamps. (In addition to helping in the overall performance of the laser-printed document, bar coding and pre-sorting may offer some advantages in postal charges. Please contact your USPS Business office to find out more about this.)
- 5 Avoid text-on-text contact. This can be avoided by printing single-sided, and folding the inserted document with the fold to the outside. Text will contact only the inside of the envelope or the back side of the printed sheets. If text-on-text contact cannot be avoided, use a thin insert such as onion skin to separate the printed sheets.
- 6 Ensure that all mailpieces are trayed and presented at the retail window or Bulk Mail Acceptance Unit (BMAU). **Avoid placing laser-printed mail into collection boxes or chutes.**



# Glossary

**Ash content** Refers to the inorganic residue remaining after ignition to remove combustibles and volatile compounds.

**Basis weight/grammage** Paper weight is measured on a metric scale (grammage) as the weight in grams of one square meter of paper. In English units, basis weight refers to the weight of 500 sheets of a basic size paper (17 by 22.5 inches for bond paper).

**Background** Paper looks gray or appears dirty because small toner particles are transferred to non-printed areas (white space). This condition is a symptom of a print-quality problem.

**Brightness** Refers to the reflectance and whiteness of a sheet of paper. Higher brightness papers are more expensive to produce and are usually associated with higher quality.

**Caliper** The thickness of a sheet of media.

**Carrier sheet** The sheet to which labels are temporarily attached. Usually this sheet has a “slick” feeling or appears shiny. To be used, labels must be peeled off the carrier sheet.

**Curl** Amount of curvature in a sheet of paper when it is laid on a flat surface. In-ream curl is the amount of curvature the sheet has at the time it is loaded into the paper tray, before printing. Post-image curl is the amount of curvature the sheet has after it has moved through the fusing and delivery operations. Any in-ream curl toward the side to be imaged is undesirable, but a small amount of curl on the opposite side is acceptable.

**Cut edge condition** Condition of the edges of paper, which can affect paper’s ability to feed properly.

**Cutouts** Any portion of the paper that has been removed, including binder holes, notches, square cuts.

**Density** Relative darkness of print.

**Die-cuts** Cuts between individual labels. Die-cuts are made by a machine in a predefined pattern.

**Duplex** Printing on both the front and back sides of a sheet of paper.

**Electrical resistivity** Characterizes how a sheet of paper accepts and holds a charge. Because HP LaserJet printers use an electrical charge to form the print image, the electrical properties of the sheet are important to the overall imaging process. Factors that affect resistivity are moisture content, paper composition, and the temperature and humidity of the paper's environment.

**Finish/smoothness** Characterizes a paper's finish. Textured paper causes inconsistent or blotchy colors and may wrinkle the fuser. Glossy-smooth paper tends to highlight defects and may not hold toner. For best results, use smooth paper.

**Finishing precision** Dimensions (length and width) of a piece of media, how closely it is cut to the stated size, and how square it is. Use media that is accurately sized, so that it can be handled properly.

**Furnish** The mixing and blending of various materials to make the paper stock. Furnish is expressed in terms of fiber composition, such as groundwood (mechanical) pulp, chemical wood pulp, or cotton.

**Fusing compatibility** Compatibility of media used in the printer and how it reacts when exposed to the fuser's temperature of 200° C (392° F) for 0.1 seconds (0.2 seconds for the HP Color LaserJet). Media should not discolor, melt, offset, release hazardous emissions, or break down in any way.

**Grain** The machine direction of the paper. Fibers tend to orient themselves in the direction of movement of the paper machine. The grain either can run parallel to the long dimension of the paper (long grain) or perpendicular to the long dimension (short grain). In a list of dimensions appearing on a ream of paper, the grain direction is listed last. For example, if short grain paper is specified on a ream of letter-size paper, the size will read 11 by 8.5 inches (216 by 279 mm).

**Groundwood** Wood fibers that are extracted using a mechanical rather than a chemical process. Groundwood papers are generally weaker than chemical wood papers.

**Mils** One mil = 0.001 inches.

**Moisture content** Ratio of moisture weight to the total weight of paper. Moisture content varies for different paper types and may change considerably if paper is subjected to temperature and humidity extremes. The method most often used to measure the relative moisture level of paper is the gravimetric method, in which paper is weighed, oven dried, and then re-weighed. The difference in weight is then calculated and expressed as a percentage of the original weight.

**Offset** A printing process in which ink or toner is transferred from a pre-printed form or a printed page onto rollers in the printer.

**Opacity** Determines degree to which printed matter shows through a sheet of paper (either from the backside of a duplexed page or from an adjacent sheet).

**Packaging** Packaging is an important consideration when using paper in an HP LaserJet printer because adequate packaging maintains the correct level of moisture and protects paper from damage during transport and storage.

**Perforations** A hole or series of holes punched through the paper to aid in the separation of one piece of paper from another.

**pH** Refers to the acidity/alkalinity of paper as determined by the TAPPI (Technical Association of the Pulp and Paper Industry) cold-extraction method.

**Pre-consumer waste** Paper that never reaches the customer after it has been manufactured. Pre-consumer waste can be unused paper stock, bindery trimmings, envelope cuttings, business forms, or unsold books or magazines.

**Print media** Paper, envelopes, overhead transparencies, and labels used with printers. Print media used in HP LaserJet printers must meet the guidelines and specifications listed in this guide.

**Post-consumer waste** Paper that the customer has used. Post-consumer waste can be office paper, mail, used boxes, old newspapers, or magazines.

**Simplex** Printing one side of a sheet of paper.

**Smoothness** Surface smoothness is determined by measuring the rate of air flow between the sheet surface and a flat reference surface. Smoothness usually is expressed in Sheffield or Bekk units.

**Stiffness** The paper's ability to resist deformation under stress.

**Watermark** An impression made in a wet sheet of paper as it is being manufactured. Watermarks are visible when the sheet is held up to light. They appear as a word, symbol, or other impression.

**Waste paper** A generic term used for post-consumer waste and some pre-consumer waste.

**Wax pick** Characterizes the resistance of the surface layer of a sheet to the breakaway of surface fragments. Expressed in Dennison units.

**Xerographic paper** A grade of paper suitable for printing by the electrophotographic process. Xerographic paper is characterized by a smooth finish, heat stability, non-curling qualities, and good aesthetic properties (such as color, brightness, and cleanliness).

# Index

## A

- adhesives
  - envelope specifications 26
  - label specifications 28
  - on envelopes 25
  - on labels 30
  - temperature specifications 28
- archival paper
  - printing on 20
  - specifications 20
- ash content, definition 55
- automatic duplexing 40

## B

- background, definition 55
- basis weight
  - definition 55
  - envelope specifications 24
  - paper specifications 17
- brightness
  - definition 55
  - paper specifications 17
  - recycled paper 20

## C

- caliper
  - definition 55
  - envelope specifications 24
  - label specifications 30
  - overhead specifications 31
  - paper specifications 17
- carrier sheet 28
  - adhesive label specifications 28
  - definition 55
- colored paper, using 20
- common sizes
  - of envelopes 13
  - of paper 13
- curl
  - definition 55
  - envelope specifications 24
  - in ream 14
  - label specifications 30
  - media 14
  - in paper 14
  - paper specifications 17
  - post-image 14, 44

- Customer Support Center 10
- cut edge condition
  - definition 55
  - paper specifications 17
- cutouts
  - definition 55

## D

- density, definition 56
- die-cuts
  - adhesive 28
  - definition 56
- duplex, definition 56
- duplexing
  - automatic 40
  - manual 40
  - printing 40

## E

- electrical surface resistivity
  - definition 56
  - label specifications 30
  - overhead transparencies 31
  - paper specifications 17
- envelopes
  - basis weight 24
  - caliper 24
  - common sizes 13
  - construction of 25
  - curling of 24
  - gray background 45
  - HP testing of 25, 26
  - sizes 13
  - specifications 23, 24
  - troubleshooting jams 45
  - types 13
  - types to avoid 25, 27, 32
  - wrinkling 46
- environmental considerations 37

## F

- felt side 15
- finish
  - definition 56
  - in media 15

- finishing precision
  - definition 56
  - label specifications 30
  - overhead transparency specifications 31
  - paper specifications 17
- forms, printing on 22
- furnish (composition)
  - definition 56
  - media 14
  - paper specifications 17
- fusing compatibility
  - definition 56
  - label specifications 30
  - overhead transparency specifications 31
  - paper specifications 17

## G

- grain
  - definition 56
  - paper specifications 17
- grammage, basis weight 13
- groundwood
  - definition 56
  - specification 14

## H

- HP Direct Marketing 35
- HP LaserJet printers
  - performance 33
  - theory of operation 9
- humidity, media specifications 37

## J

- jams, recovery
  - envelope 46
  - paper 42

## L

- labels
  - caliper 30
  - carrier sheets 17, 28
  - curl 30
  - duplex mode 30
  - electrical surface resistivity 30
  - fusing compatibility 30
  - packaging of 30
  - part numbers 35
  - precautions 30
  - printing with 28
  - purchasing 35
  - sizes 35
  - specifications 28, 30
- letterhead, printing on 22

## M

- Magnetic Ink Character Recognition (MICR) 16
- manual duplexing 40
- media
  - archival 20
  - basis weight 17
  - colored 20
  - curl 14
  - definition 57
  - descriptions of 17
  - electrical surface resistivity 17
  - environmental considerations 37
  - finish (smoothness) 15, 17
  - furnish (composition) 14
  - humidity specifications 37
  - moisture content 17
  - overhead transparencies 31
  - solving paper jams 41
  - paper smoothness comparisons 19
  - precautions 32
  - properties 15
  - purchasing 33, 34
  - quality 12
  - recycled 20
  - shipping 36
  - sizes 12, 13
  - smoothness 19
  - specifications 17
  - stiffness 17
  - storing 36
  - temperature specifications 37
  - testing 12
  - types to avoid 32
  - weight equivalences 18
  - with cutouts 21
  - with watermark 16
- mils, definition 56
- moisture content
  - definition 57
  - envelope specifications 24
  - pre-printed forms and letterhead 22

## O

- offset, definition 57
- opacity, definition 57
- overhead transparencies
  - electrical surface resistivity 31
  - fusing compatibility 31
  - part numbers 35
  - printing on 31
  - purchasing 33, 35
  - sizes 35

## P

- packaging
  - definition 57
  - label specifications 30
  - paper specifications 17
- paper basis weights 47
- paper jams, solving 41
- paper smoothness comparison 19
- paper weight equivalences 18
- part numbers
  - labels 35
  - overhead transparencies 35
- perforations
  - definition 21, 57
  - printing on paper with 21
- pH, definition 57
- postal customers, recommendations for 53
- post-consumer waste, definition 57
- post-image curl 44
- pre-consumer waste, definition 57
- pre-printed forms, printing on 22
- print defects, causes 40
- print media
  - See media
- printing
  - on archival paper 20
  - on colored paper 20
  - on embossed paper 22
  - on letterhead 22
  - on pre-printed forms 22
  - on recycled paper 20
  - with cutouts/perforations 21
- print-quality problems 39
- problems
  - See troubleshooting

## Q

- quality, of media 12

## R

- recycled paper
  - with groundwood 14
  - using 20

## S

- shipping media 36
- simplex, definition 57
- smoothness
  - definition 57
  - finish 15
- specifications
  - archival paper 20
  - envelopes 23
  - overhead transparencies 31
  - paper 17
- stiffness, definition 58
- storing media 36

## T

- temperature specifications
  - adhesives 28
  - media 37
- textured paper, printing on 22
- theory of operation 9
- transparencies
  - See overhead transparencies
- troubleshooting
  - envelope background gray 45
  - envelope jams 45
  - envelopes wrinkling 46
  - multiple paper feed 42
  - paper jams 41
  - post-image curl 44
  - print defects 40
  - print-quality problems 39
- two-sided printing 40

## W

- waste
  - post-consumer 20
  - pre-consumer 20
- waste paper, definition 58
- watermark, definition 58
- wax pick
  - definition 58
  - paper specifications 17
- weight equivalences 18
- wire side 15

## X

- xerographic paper, definition 58







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