

The Basics of the Metric Paper System

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Are you receiving printing orders from clients in foreign countries? Are you hoping that your foreign sales will pick up now that the North American Free Trade Agreement (NAFTA) has been passed? Have you ever wondered why many word-processing or desk-top publishing programs allow you to choose a paper size called A4 or B5? Or why the paper cassette on some laser printers can be adjusted to fit sizes other than letter or legal? If your answer to any of these questions is "yes," then you need to realize that most of the rest of the world uses the "metric" measurement system while we in the United States cling to the "US Customary" system of measurement. They also use the metric system to measure their printing papers.

It is likely that printers, especially in the Southwest, will be producing an increasing amount of work for Mexican clients, especially since NAFTA has been passed. Mexico uses the metric system, as do Canada and South American countries. Therefore, it is important for American printers to become familiarized with the metric paper system so that they can produce work that satisfies the needs of international clients.

THE ISO SYSTEM

The metric paper system, often called the ISO (International Standards Organization) system, is both simple and, in some ways, superior to the system we now use. It is simple because the paper sizes are all based upon only three "basic" sizes. It is superior because the printer or paper merchant need not maintain a vast array of "standard" sizes to fit the specifications of various jobs.

The ISO paper system is based upon sheets with a proportion of $1:\sqrt{2}$ (one to the square-root of 2) or 1:1.414. This proportion is magical! Any time a sheet with these proportions is cut in half width-wise, the new smaller sheet retains the same proportions! As a result, any

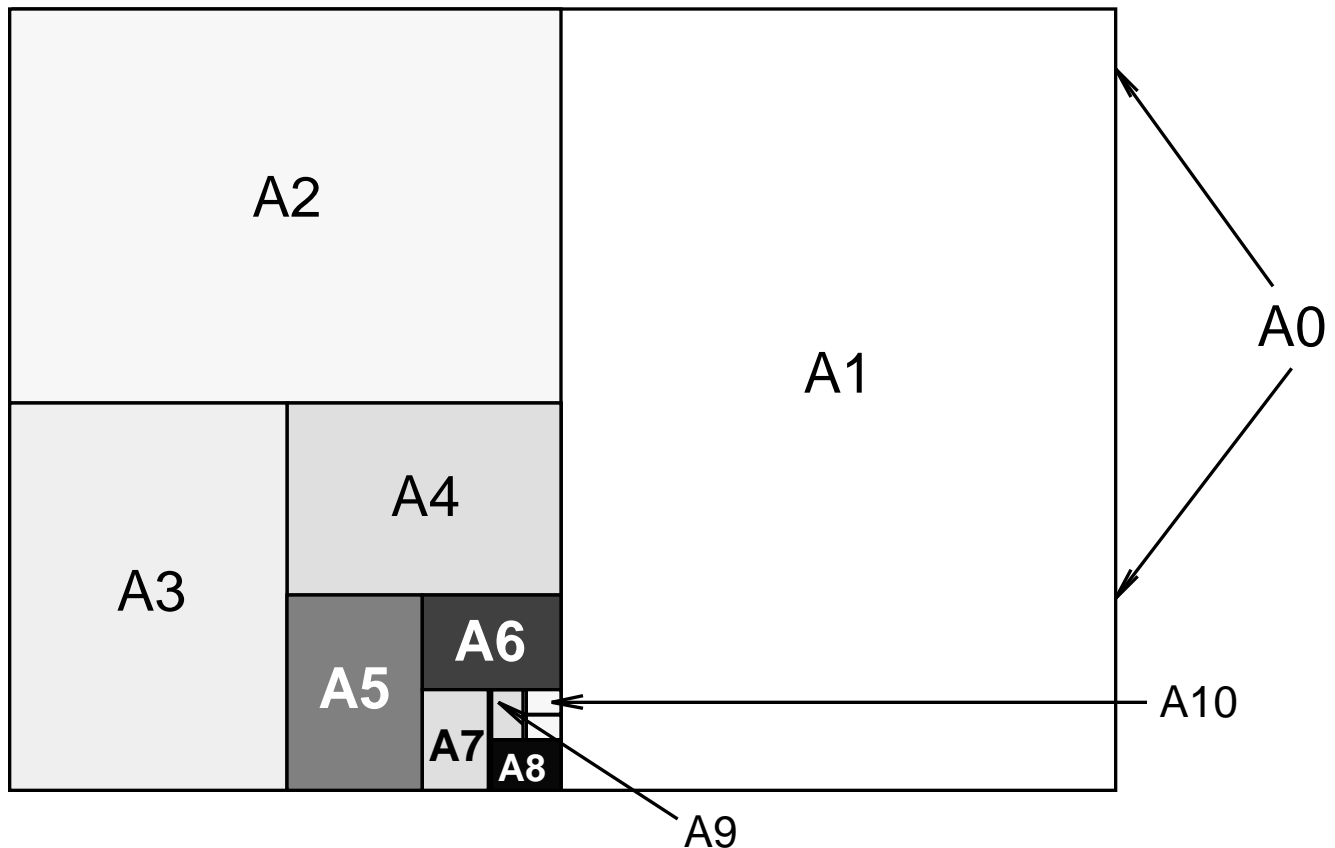


Figure 1: A visual representation of the relationship between the "A" series sizes

time various-sized ISO sheets are used together, harmony will automatically exist between the sizes.

THE “A” SHEET SIZES

The most common ISO paper sizes are called “A” sheets. The “basic” sheet of the “A” series has an area of exactly one meter. It measures 841 X 1189 mm (841 x 1189mm = 1 square meter) and is called size “A0” (A-zero). Using the “US Customary” measuring system, the “A0” sheet measures about 33 1/8 X 36 3/4”. Like all ISO sheets, its proportions are 1:1.414 (841 X 1.414 ≈ 1189¹). If an “A0” sheet is cut in half width-wise, the new smaller sheet measures 594 X 841 mm and is called “A1” (A-one). The designation “A1” means the “basic” “A” sheet has been cut in half once. Its proportions are also 1:1.414 (594 X 1.414 ≈ 841). If the “A1” sheet is cut in half, the new sheet will measure 420 X 594 mm and is known as “A2,” because the “A0” sheet has been cut in half twice. Its proportion, like the others, is 1:1.414. If an “A2” is cut in half, it becomes an “A3”, and so on. See chart 1 for a listing of the “A” series paper dimensions and figure 1 for a visual representation of the sizes.

If the printer needs extra-large sheets in the “A” series, size 2A0 (twice the area as A0) and 4A0 (four times the area of A0) are available. The sizes of these sheets are also listed in chart 1.

It is easy to see that the ISO system allows printers and paper merchants to stock fewer sizes of paper. If size “A4” of a particular stock is needed, size “A0” of the

<i>Size</i>	<i>Millimeters</i>	<i>Approx Inches</i>
4A0	1682 X 2378	66 1/4 X 93 3/8
2A0	1189 X 1682	46 3/4 X 66 1/4
A0	841 X 1189	33 1/8 X 46 3/4
A1	594 X 841	23 3/8 X 33 1/8
A2	420 X 594	16 1/2 X 23 3/8
A3	297 X 420	11 3/4 X 16 1/2
A4	210 X 297	8 1/4 X 11 3/4
A5	148 X 210	5 7/8 X 8 1/4
A6	105 X 148	4 1/8 X 5 7/8
A7	74 X 105	2 7/8 X 4 1/8
A8	52 X 74	2 X 2 7/8
A9	37 X 52	1 1/2 X 2
A10	26 X 37	1 X 1 1/2

Chart 1: “A” series sizes with metric and customary dimensions

¹All sizes are approximate based upon rounding of decimals. The ≈ symbol means “more or less.”

<i>Size</i>	<i>Millimeters</i>	<i>Approx Inches</i>
RA0	860 X 1220	33 7/8 X 48 1/8
RA1	610 X 860	24 1/8 X 33 7/8
RA2	430 X 610	17 X 24 1/8
SRA0	900 X 1280	35 1/2 X 50 3/8
SRA1	640 X 900	25 1/4 X 35 1/2
SRA2	450 X 640	17 7/8 X 25 1/4

Chart 2: “A” series “trim” (R) and “bleed” (SR) sizes with metric and customary dimensions

proper paper is cut it in half 4 times!

International letterheads are size “A4.” When you choose “A4” on your computer, the page will be set up with the dimensions of 210 X 297 mm (8 1/4 X 11 3/4”).

All these sizes previously identified are trimmed sizes. When producing printed products requiring trims, the printers should select the appropriate sheet with the prefix “R.” Thus, an “RA0” sheet is an “A0” sheet with allowances for trim. If extra trim or bleed allowances are required, a sheet with the prefix “SR” should be chosen. “SRA1” is an “A1” sheet with an extra amount of trim allowance. These oversized stocks are usually only available in a few of the larger sizes. Examples are shown in chart 2.

<i>Size</i>	<i>Millimeters</i>	<i>Approx Inches</i>
B0	1000 X 1414	39 3/8 X 55 5/8
B1	707 X 1000	27 7/8 X 39 3/8
B2	500 X 707	19 5/8 X 27 7/8
B3	353 X 500	12 7/8 X 19 5/8
B4	250 X 353	9 7/8 X 12 7/8
B5	176 X 250	7 X 9 7/8
B6	125 X 176	5 X 7
B7	88 X 125	3 1/2 X 5
B8	62 X 88	2 1/2 X 3 1/2
B9	44 X 62	1 3/4 X 2 1/2
B10	31 X 44	1 1/4 X 1 3/4

Chart 3: “B” series sizes with metric and customary dimensions

THE “B” SHEET SIZES

If clients and designers only had “A” series sheets to choose from, jobs of printing would become too standardized and predictable. Sometimes a client requires a sheet size that is special in order to attract attention. For this reason, a supplemental series of sheet sizes, known as the “B” series, is available. Like the “A” series sheets, the dimensions of the “B” sheets are in the ratio of 1:1.414. Cut sizes are described the same way, too. For example, size “B3” is size “B0” cut in half three times. However, the dimensions of the “B” sheet sizes fall about half-way between the “A” series sizes. To illustrate, the dimensions of sheet “B1” are half-way between those of “A0” and “A1.” See figure 2. The “B” series sheets are used when the change in size between two “A” series sheets is too great and for other jobs that need to attract attention. The dimensions of the “B” sheets can be seen in chart 3. Paper size “B5,” available as a choice on many computer programs, is 176 X 250mm (7 X 9 7/8”)

If an “A” or “B” sheet is folded in half width-wise, it

automatically becomes the next smaller size. For example, an “A4” sheet folded in half becomes an “A5.” Similarly, a “B5” folded in half has the same dimensions as a “B6” sheet.

METRIC ENVELOPE SIZES

Flat or folded sheets are often placed in envelopes for mailing purposes. It would not be practical to place an “A4” sheet into an envelope made to the same size. Additional clearance is necessary so that the pages can easily be “stuffed” into the envelope. A third series of sheets, known as “C,” is available for envelopes. Its sizes correspond to the “A” sizes allowing for additional clearance. For example, a flat “A4” would be placed into a “C4” envelope. The 229 X 324mm dimensions of the “C4” envelope allow appropriate clearance for the “A4’s” 210 X 297mm size. Similarly, a flat “A5” fits nicely in a “C5” envelope. If you want to fold an “A4” in half before placing it into an envelope, a “C5” envelope is used (recall that an “A4” folded in half has the measurements as an

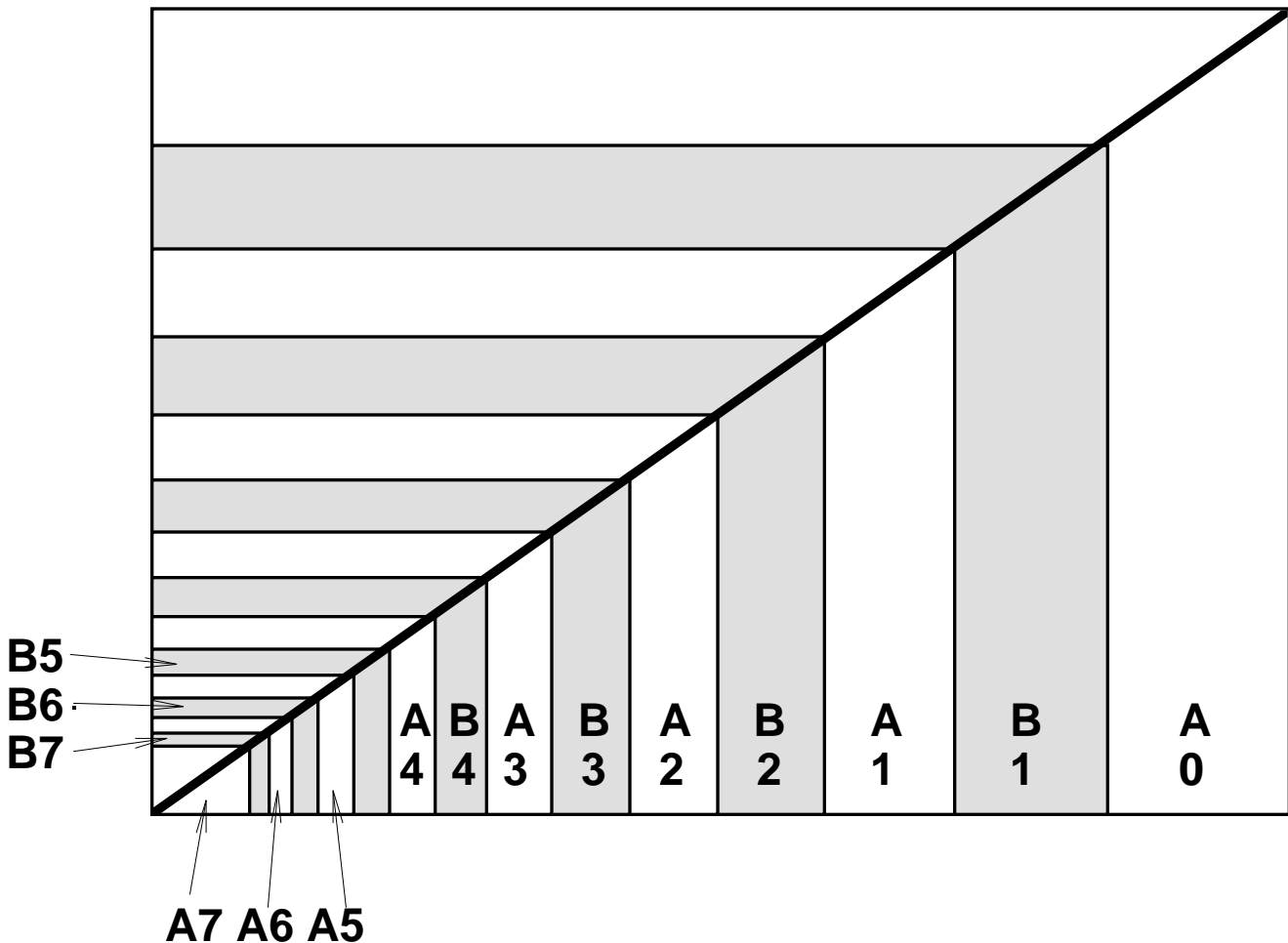


Figure 2: The relationship between the “A” and “B” series sheets

“A5”). Letterheads are often placed into an envelope after being parallel-folded twice (the “letterfold”). This is a special case, because the dimensions of such a folded sheet do not match any “A” or “C” size. In this case a special “DL” (for DIN LONG) envelope is used. The ISO envelope sizes are shown in chart 4.

METRIC STANDARDS FOR POSTCARDS AND FOLDERS

There are a limited number of additional ISO standards that printers may find useful. For example, postcards to be sent through the mail should be size “A6” (105 X 148 mm).

Folders used to file “A4” sheets can be folded to different sizes depending upon the width of the back or spine. Simple folders without a back or spine should be folded to 220 X 315 mm while those with a small back (of 25 mm or less) should be 240 X 320 mm. If a large back is needed (more than 25 mm), folders should be 250 X 320 mm. None of these sizes include tabs, which need to be added to the dimensions of the folder.

DRAWBACKS OF THE ISO SYSTEM

Although the ISO paper system is a well-planned and useful method of dealing with paper sizes, it lacks many necessary standards for printed items that are not as common as letterheads and books. For example, one may ask how far apart holes should be drilled in paper to be placed in binders. Or, what size should the following products be?

- business cards
- pocket folders
- ring binders

Unfortunately, standards for these items don’t exist or are not readily available in the United States. In fact, appropriate specifications could not be provided by the

<i>Size</i>	<i>Millimeters</i>	<i>Approx Inches</i>
C4	229 X 324	9 X 12 3/4
C5	162 X 229	6 3/8 X 9
C6	114 X 162	4 1/2 X 6 3/8
DL	110 X 220	4 1/8 X 8 5/8

Chart 4: Common “C” series envelopes with metric and customary dimensions

Graphic Arts Technical Foundation, the Institute of Paper Science and Technology or the American National Standards Institute (the U.S. representative for the International Standards Organization). If these organizations don’t know, the standards probably don’t exist! **A note of caution: until definitive standards are promulgated for these or other unspecified items, printers are advised to obtain, in writing, size specifications directly from their clients.**

BUSINESS CARDS

Personal experience has reinforced the notion that no standard exists for business cards. A random group of business cards from countries ranging from Austria to Slovenia measured various sizes from 50 X 95 mm to 56 X 100 mm. Interestingly enough, both the largest and the smallest cards came from Austria! If the objective of a business card size is to closely resemble the current U.S. business card size (51 X 90 mm) or credit card size (55 X 86 mm) so that the cards will fit in popular wallets and card cases, one could choose size “A8” (52 X 74 mm).

POCKET FOLDERS

Although no specific standard for pocket folders can be found, sizes used for envelopes or file folders could be adapted to this product. If a pocket folder is needed for an “A4” sheet, the dimensions of a “C4” envelope (229 X 324 mm) or a simple folder (220 X 315 mm) could be chosen. Of course, these sizes are finished folded sizes and do not include the pocket itself.

RING BINDERS

Even though no specific standard size for “A4” sheet ring binders is apparent, there is an ISO standard for file folders that have “wide backs” and “mechanisms.” It is 290 X 320 mm. If an “A4” sheet were replaced into a binder of such a size, there would be approximately 12 mm (1/2”) clearance for the page top and bottom and 80 mm (3 1/8”) to accommodate the right-side margin and the ring mechanism. This size would probably be appropriate for most ring binders.

FILE HOLES FOR RING BINDERS

There is an ISO standard which specifies hole size and placement for general filing purposes. However, the standard specifically states that these specifications are for general office punching and that they do not apply to loose-leaf binders. It calls for the hole to be placed 80 mm

(31/8") center-to-center. Holes should be 6mm (3/16") in diameter and be positioned so that the center of each hole is 12mm (7/16") from the edge of the paper. Practically speaking the 80mm center-to-center placement of the holes would be too close together for 3-ring binders.

CONCLUSION

In many ways the ISO paper system is simple and superior to the cumbersome system used by U.S. printers to specify sheet sizes. However, some questions have not yet been definitively answered. If anyone has answers for the questions raised in this article, please share them with the U.S. printing community!

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