

**Silvie Turner**

# **The Book of Fine Paper**

pp. 209-214 on "sizes & weights"  
of papers  
+ p. 184  
w/illustration of (perhaps)  
largest sheet of handmade  
paper ever made



Thames and Hudson, 1998

# 7

## Reference

### Sizes and weights

#### *Traditional sizes*

*'It has been suggested that the origin of the dimensions of paper sizes is possibly aesthetic, that is, subject to the laws of harmony as found in classic art.'*

E. J. Labarre, *Dictionary and Encyclopaedia of Paper and Papermaking*, Amsterdam 1952

There is possibly little reason for the sizes of very early papers other than the ability of the maker to hold the mould; the word 'format' may have derived from the French *forme*, meaning 'mould'. However, Labarre cites that the Arabs in the 9th–11th centuries made both very large ( $28\frac{7}{8} \times 43\frac{1}{4}$  in./  $733 \times 1099$  mm) and very small ( $2\frac{5}{8} \times 3\frac{9}{16}/61 \times 91$  mm) paper, the latter in use for pigeon post which indicates that from an early time usage may also have determined size. The commonest dimension in the 13th and 14th centuries was  $13\frac{5}{8} \times 20\frac{1}{4}$  in. ( $345 \times 515$  mm); in 1390, in Stromer's mill in Nuremberg, a format of  $11\frac{13}{16} \times 16\frac{1}{2}$  in. ( $300 \times 420$  mm) was recorded. With the spread of printing in Europe, further ranges developed; the maximum up to the 17th century was  $19\frac{1}{10} \times 29\frac{1}{8}$  in. ( $485 \times 740$  mm).

Paper names were derived from a number of sources: from watermarks originally used in a particular size, e.g. Foolscap, Colombier; from their use, e.g. Atlas; from their size, e.g. Demy or Medium; or from a fancy name, e.g. Emperor, Imperial, Royal. Adjectives, such as 'Broad', 'Extra', 'Long', 'Small', were often used to form a number of combinations with a basic size.

Variations in sheet size (and consequently in weight) were common in hand production. Also, some mills measured their paper from the outside edge of each deckle, others from the inside, which could account for up to  $\frac{1}{2}$  in. (12.7 mm) difference. And grades for printing were traditionally made larger than for writing, hence a further variation of  $\frac{1}{4}$ – $\frac{1}{2}$  in. (6–12.5 mm).

Perhaps one of the reasons why the old sizes are still made is the beauty of their proportion, which in some cases corresponds to the golden section ( $1:\sqrt{1.6}$ ). To my mind Imperial sizes are suited to human production methods, not to machines, and the moulds are designed to be manoeuvred by hand. I have often found it fascinating that Imperial sizes somehow seem pleasing to the eye and are also very satisfying to use for any hand medium.

#### **The British Imperial and U.S. customary system**

A system in which standard sizes were formulated was accepted in Britain in 1836. Called the Imperial system, its object was to assist the production of a uniform result, thus making it possible to save time, energy and expenditure in manufacture, and allowing the papermaking trade and buyers of paper to make a better-informed judgment on quality. A few years earlier, a similar standardization of traditional British units had taken place in the United States,

Weighing paper in lbs per ream at  
De Zaanische Molen, Netherlands.

resulting in what is known as the U.S. customary system. In the world of fine paper today, the term 'Imperial' is still applied to traditional sizes and linked weights of the premetrication era.

In the Imperial system, the basis weight of paper is expressed in terms of the weight of a ream (now 500 sheets, although in the past it might be 472, 480 or even 516 sheets) of a particular size. Thus if 500 sheets of the size called 'Imperial' (22 × 30 in.) when dry weigh approximately 140 lb, the paper is termed 'Imperial 140 lb'. This principle can give rise to confusion because sheets appear to weigh more in different sizes: e.g. Double Elephant (27 × 40 in.) 246 lb has the same basis weight as Royal (20 × 25 in.) 106 lb.

Some common sizes are described below, with equivalents in millimetres. From smallest to largest, they are Pott, Foolscap, Post, Crown, Hand, Demy, Medium, Royal, Elephant, Cartridge, Imperial, Colombier, Atlas, Double Elephant, Eagle, Antiquarian and Emperor. Sizes marked with an asterisk (\*) enjoyed a wider currency; today Royal, Imperial and Double Elephant are still quite widely retained.

Antiquarian	31 × 53 in	787 × 1346 mm	
			One of the largest drawing papers made by hand in Europe, its size has varied over time between 36 × 54 and 29 × 52 in. It was first made in England, in Kent, by James Whatman in 1773; the moulds for these huge sheets were hoisted on a lifting device called 'The Contrivance', with six to eight men required in the dipping and couching processes (see p. 184).
Atlas	26 × 34 in.	660 × 864 mm	
Extra Large Atlas	27 × 35 in.	686 × 889 mm	
			A large size of drawing paper, originally developed for the printing of maps and atlases from engraved plates.
Cartridge	21 × 26 in.	534 × 661 mm	
			Traditionally a size for wrapping and drawing papers. Originally derived from the Italian <i>cartoccio</i> , paper ( <i>carta</i> ) for wrapping up a charge of powder. See also p. 164.
Colombier	24 × 34½ in.	597 × 876 mm	
			This size was standard in England, although foreign equivalents vary. It was popular with American papermakers in Pennsylvania. The original watermark of a dovecot, after which it is named, was a play on the name of the Auvergnat papermaker Colombier.
*Crown	15 × 20 in.	381 × 508 mm	
Double Crown	20 × 30 in.	508 × 762 mm	
Quad Crown	30 × 40 in.	762 × 1016 mm	
			A size for many types of printing paper and board, which varies from 15 × 19 to 16½ × 20 in. There are a number of other Crown sizes; e.g. folio, quarto and octavo which are related to book making, based on folding a sheet. The name possibly derives from a watermark of the royal crown, found as early as 1312 at Fano in Italy. Foreign equivalents vary.
*Demy	17½ × 22 ½ in.	444 × 571 mm	
Double Demy	22½ × 35 in.	571 × 889 mm	
Quad Demy	35 × 45 in.	889 × 1143 mm	
			A printing size which has varied historically between 14½ × 18 and 18 × 23 in. The name, from the French <i>demi</i> , 'half', indicates that it was originally derived by folding a large sheet in half (possibly a Colombier drawing paper, or an Imperial writing paper). Demy traditionally carried the fleur-de-lys within a shield watermark.

Eagle	28¾ × 42 in.	730 × 1067 mm	
	An old standard size of drawing paper known as early as 1300, which took its name from a watermark of an eagle.		
Elephant	20 × 27 in.	508 × 686 mm	
Double Elephant	27 × 40 in.	686 × 1016 mm	
	A sheet also named after its watermark. Double Elephant is also called Grand Eagle. The variations are still particularly wide in the largest sheet of this size.		
Emperor	48 × 72 in.	1219 × 1829 mm	
	This name has been used for a size of notepaper (roughly 6 × 8 in./152 × 203 mm), but more commonly refers to a writing or drawing size. In the U.S., it often means 40 × 60 in. (1016 × 1520 mm)		
*Foolscap	13½ × 17 in.	343 × 432 mm	
Double Foolscap	17 × 27 in.	432 × 686 mm	
Quad Foolscap	27 × 34 in.	686 × 864 mm	
	A size for writing, drawing and printing which could vary by 2 or 3 in. (50 or 76 mm) from the standard given above. The name comes from the watermark of a jester's head (with cap and bells), introduced in Britain in the mid-16th century; this was replaced in the 18th century by the Britannia watermark.		
Hand	16 × 22 in.	406 × 559 mm	
Royal Hand	20 × 25 in.	508 × 635 mm	
	The name is derived from the watermark, traditionally a hand or glove, dating back to the 16th century.		
*Imperial	22 × 30 in.	559 × 762 mm	
Large Imperial	22 × 32 in.	559 × 813 mm	
Half Imperial	15 × 22 in.	381 × 559 mm	
Double Imperial	30 × 44 in.	762 × 1118 mm	
	A popular size traditionally for writing and printing papers; in common use today.		
*Medium	18 × 23 in.	457 × 584 mm	
Double Medium	23 × 36 in.	584 × 914 mm	
Quad Medium	36 × 46 in.	914 × 1168 mm	
	This size is occasionally today watermarked with the traditional fleur-de-lys.		
*Post	15 × 19 in.	387 × 489 mm	
Large Post	16½ × 21 in.	419 × 533 mm	
Double Post	21 × 33 in.	533 × 838 mm	
	The name derives from the watermark of a post horn, first used in the 14th century.		
Pott	12 × 15½ in.	317 × 394 mm	
	This is the smallest handmade size, used for writing and drawing papers. The earliest Pott watermark illustrates a pot or chalice divided into compartments for holding food and drink. Foreign equivalents vary.		
*Royal	20 × 25 in.	508 × 635 mm	
Super Royal	20 × 28 in.	508 × 711 mm	
Double Royal	25 × 40 in.	635 × 1016 mm	
Quad Royal	40 × 50 in.	1016 × 1270 mm	
	A size for drawing, writing, printing and wrapping, formerly watermarked with an ornamental shield surmounted by a fleur-de-lys.		

## Some traditional Continental sizes

<b>France</b>	Those marked with an asterisk (*) were possibly the most widely used until metrication	
*Carré	$17\frac{3}{4} \times 22$	$450 \times 560$
Cloche	$11\frac{7}{8} \times 15\frac{3}{4}$	$300 \times 400$
Cognille	$17\frac{3}{4} \times 22$	$450 \times 560$
Colombier	$24\frac{3}{4} \times 35\frac{1}{2}$	$630 \times 900$
*Couronne	$14\frac{1}{8} \times 17\frac{3}{4}$	$360 \times 450$
Ecolier	$13\frac{3}{8} \times 16\frac{7}{8}$	$340 \times 430$
Ecu	$15\frac{3}{4} \times 19\frac{5}{8}$	$400 \times 500$
Grand Aigle	$27\frac{1}{2} \times 41$	$700 \times 1040$
*Jésus	$22 \times 28\frac{3}{8}$	$560 \times 720$
*Pot	$12\frac{3}{8} \times 15\frac{3}{4}$	$320 \times 400$
*Raisin	$19\frac{5}{8} \times 25\frac{1}{4}$	$500 \times 640$
Soleil	$22\frac{7}{8} \times 31\frac{1}{2}$	$580 \times 800$
Tellière	$13\frac{3}{8} \times 17\frac{1}{4}$	$340 \times 440$
<b>Germany</b>	These sizes were standardized in 1884	
Bienenkorb	$14\frac{1}{8} \times 17\frac{3}{4}$	$360 \times 450$
Bischof	$15 \times 18\frac{7}{8}$	$380 \times 480$
Kanzlei	$13 \times 16\frac{1}{2}$	$330 \times 420$
Lexicon	$19\frac{5}{8} \times 25\frac{5}{8}$	$500 \times 650$
Pro Patria	$13\frac{3}{8} \times 16\frac{7}{8}$	$340 \times 430$
Register	$16\frac{1}{2} \times 20\frac{3}{8}$	$420 \times 530$
<b>The Netherlands</b>	Sizes in use around 1800 include	
Olifants	$24\frac{3}{8} \times 28\frac{3}{8}$	$620 \times 720$
Royal	$20\frac{1}{2} \times 24\frac{3}{8}$	$520 \times 620$
Schrijfformat	$13\frac{3}{8} \times 16\frac{1}{2}$	$340 \times 420$
Vierkant	$16\frac{1}{8} \times 24\frac{3}{8}$	$410 \times 620$

## *Standardization and the metric system*

The metric system is the most recent system of standardization relating to weights and sizes of paper. Much of the world's population live in countries that now use or are committed to using it. It is based on the ISO (International Standards Organisation) Series which uses grammes and metres rather than pounds and inches (as in the Imperial system).

### **Metric weights (ISO series)**

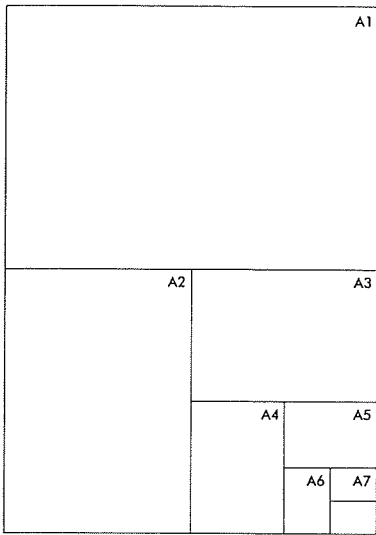
International standard weights are based on the metric system. The basis weight of a sheet of paper is described in terms of grammes weight per square metre (gsm or  $g/m^2$ ). Although this has not totally replaced the old Imperial method of measuring, it has the advantage of being less complicated as no laborious calculations are necessary to compare the weights of different-sized papers.

### **Metric sizes (ISO series)**

Three series exist within this system. The basic size from which all others are derived is called A0: it measures  $841 \times 1189$  mm and has a surface area of 1 sq. m. The A series represents paper sizes for general printing matter; the B series is primarily for posters and wall charts; and the C series covers

envelopes and folders to take A series contents. Within each series, smaller denominations (e.g. A1, A2, A3) are obtained by halving the longer side.

Although it is the only system in use in the machinemade paper trade, and is in general use in mouldmade production, it is not common in handmade manufacture. The Imperial system is part of the tradition inherent to handmade paper and moulds which last indefinitely are still in production from the pre-metrication era. However, the advantages of the metric system lie in standardization, uniformity and simplicity and a gradual movement towards this is slowly taking place over the whole fine paper field.



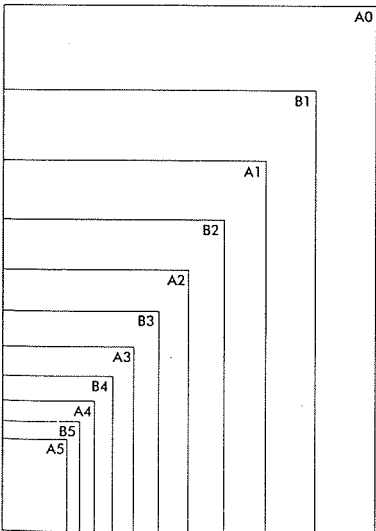
#### A series

A0	841 × 1189 mm	33.11 × 46.82 in.
A1	594 × 841 mm	23.39 × 33.11 in.
A2	420 × 594 mm	16.54 × 23.39 in.
A3	297 × 420 mm	11.69 × 16.54 in.
A4	210 × 297 mm	8.27 × 11.69 in.
A5	148 × 210 mm	5.83 × 8.27 in.
A6	105 × 148 mm	4.13 × 5.83 in.
A7	74 × 105 mm	2.91 × 4.13 in.
A8	55 × 74 mm	2.05 × 2.91 in.
A9	37 × 55 mm	1.46 × 2.05 in.
A10	28 × 37 mm	1.02 × 1.46 in.
4A0	1682 × 2378 mm	66.22 × 93.52 in.
2A0	1189 × 1681 mm	44.81 × 66.22 in.

Two untrimmed versions of the A series are available. These are used mainly for commercial printing; the excess is an allowance for the grippers on the machine and is trimmed off afterwards.

1. The RA series, for non-bleed printing (i.e. where there is a margin between any image and the edge of the page), includes an extra 10–20 mm.
2. The SRA series, for any work in which the image bleeds off the trimmed size, includes an extra 30–40 mm.

Here is an example of how the relative sizes compare:



A2	420 × 594 mm
RA2	430 × 610 mm
SRA2	450 × 634 mm

#### B series

B0	1000 × 1414 mm	39.75 × 55.6 in.
B1	707 × 1000 mm	27.8 × 39.4 in.
B2	500 × 707 mm	19.6 × 27.8 in.
B3	353 × 500 mm	13.8 × 19.6 in.
B4	250 × 353 mm	9.8 × 13.8 in.
B5	176 × 250 mm	7 × 9.8 in.

#### C series

C0	917 × 1297 mm	36.2 × 51 in.
C1	648 × 917 mm	25.5 × 36.2 in.
C3	324 × 458 mm	12.75 × 18 in.
C4	229 × 324 mm	9 × 12.75 in. (takes A4 sheet flat)
C5	162 × 229 mm	6.4 × 9 in. (takes A5 sheet flat)
C6	114 × 162 mm	4.5 × 6.4 in. (takes A5 folded once)
C7/6	81 × 162 mm	3.25 × 6.4 in. (takes A5 folded twice)
C7	81 × 114 mm	3.25 × 4.5 in.

## *Imperial/metric conversion factors*

The following are handy approximate figures:

### **Length**

1 in.	25.4 mm (therefore to find mm when you know in., $\times 25.4$ )
1 mm	0.0394 or $\frac{1}{25}$ in. (to find in. when you know mm, $\times 0.04$ )
1 cm	0.3937 or $1\frac{3}{32}$ in. (to find in. when you know cm, $\times 0.4$ )
1 m	39.3 in. or 1.0936 yd (to find ft when you know m, $\times 3.3$ )
1 sq. cm	0.15 sq in. (to find sq. in. when you know sq. cm, $\times 0.15$ )
1 sq. m	1.2 sq yd (to find sq. m when you know sq. yd, $\times 1.2$ )

### **Weight**

1 oz	28.3 g (to find g when you know oz, $\times 28.3$ )
1 lb	450 g (to find g when you know lb, $\times 450$ )
1 g	0.35 oz (to find oz when you know g, $\times 0.35$ )
1 kg	2.2 lb (to find lb when you know kg, $\times 2.2$ )

### **Paper weights**

To convert Imperial weights for various sizes of sheet to gsm, multiply the weight in pounds (lb) per ream by the following factors:

Double Crown 2.34

Demy 3.27

Imperial 2.08

Medium 3.4

Large Post 4.06

Royal 2.81

– thus Double Crown 90 lb = 210 gsm ( $90 \times 2.34$ ).

To convert gsm into the nearest equivalent in pounds per ream, divide the weight in gsm by the same factors

– thus 150 gsm is equivalent to Imperial 72 lb or Royal 54 lb.

Note that 1 tonne (metric) = 1000 kg and that 1 ton (Imperial) = 2240 lb

## Unusual papers

*'The Double Elephant which I at present make is 3 ft. 4 in. by 2 ft. 2½ in. [101.6 × 67.3 cm] and is as large as any paper I have ever seen manufactured in Europe... My present contrivances will not permit of my making any larger than Double Elephant without alterations of most of the utensils and even then it cannot be made by hand, but I have no doubt a contrivance I have thought of will enable me to make it, although that will draw a certain expense of at least Fifty Pounds for things which cannot be of use to me on any other occasion.'*

James Whatman, in a letter to the Council of the Society of Antiquaries discussing his new Antiquarian paper (31 × 53 in./ 78.7 × 134.6 cm), 1772. From Richard L. Hills, *Papermaking in Britain 1488-1988*, London 1988

A ten-man team of papermakers from the Echizen area in Fukui Prefecture creating the largest sheet of handmade paper I have ever seen, Kyoto, Japan.

Designers of every package, bag, book, fabric, pot, necklace, lampshade, poster, dress, chair, etc., consider paper. In the past, it was necessary for graphic designers in particular to be acquainted with the types of papers that printers used so they could accurately show and specify for a visualization to their clients. Today's multi-function designers with a wider and more adventurous approach cross over boundaries and have a consciousness of the role of paper in every and any form of communication.

Fine-quality papers, traditionally used by artists and craftspeople, have found their way into design usage, and the reverse has also happened – a few commercial paper manufacturers have created some sheets directly for designers which are now being used by fine artists. Paper suppliers also have unexpectedly had to expand their horizons and find materials to fit unusual briefs and concepts, often bearing little relationship to the traditional purpose of the sheet. Bizarre and impossible requests are certainly not unknown.

Chris Hough, from Falkiner Fine Papers in London, suggests that a marketing director, for example, may choose a recycled paper to give an ecologically 'caring' feel to the company literature; or a paper which is uneven and seemingly 'primitively' formed to stress an 'anti-technological' approach and to provide a radical contrast to other printed matter; or an artist's paper for a prestigious company brochure. The subtlety of a handmade paper compared to the hard, plain feel of some machinemade sheets has not escaped the designers' attention.

A bonus to traditional fine papers from this new usage is that high sales will help to keep specialist mills and smaller papermaking outfits in business. The innovative use of these papers may give new inspiration to the fine arts. And the radical combination of handmade sheets and new printing technology will certainly save some papers from obscurity.

Considered on pp. 193–95 are a number of special paper qualities and unique papers that designers in any field will find inspiring. See also 'Fancy papers', pp. 196–200.



Plate 14 A section of handmade paper with flower and grass inclusions, PETAL PAPER, from Sri Aurobindo Mill, Pondicherry, India (see p. 106). Courtesy Sri Aurobindo Mill.