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Photography and imaging — Inkjet media: Classification, nomenclature and dimensions —

Part 1: Photo-grade media (paper and film)

Photographie et image — Milieux encreurs: Classification, nomenclature et dimensions —

Partie 1: Milieux de qualité photographique (papier et film)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 18055-1 was prepared by Technical Committee ISO/TC 42, *Photography*.

ISO 18055 consists of the following parts, under the general title *Photography and imaging — Inkjet media: Classification, nomenclature and dimensions*:

— *Part 1: Photo-grade media (paper and film)*

Non-photo-grade media (paper, film and other bases) will be the subject of a future Part 2.

Introduction

Within the rapidly developing field of inkjet media, there is a need to establish clear and unambiguous classifications with regard to descriptions of product types, formats/sizes, thicknesses/grammages and general nomenclature. It is important that all participants in the inkjet market, i.e. producers, processing industries, trade and end-users, achieve an agreed, consistent understanding of all these elements of the market.

It is the aim of this part of ISO 18055 to establish such an understanding, in respect of photo-grade media.

Photography and imaging — Inkjet media: Classification, nomenclature and dimensions —

Part 1: Photo-grade media (paper and film)

1 Scope

This part of ISO 18055 establishes a classification of photo-grade inkjet papers and films with regard to nomenclature, formats and thickness/grammage.

It does not include non-photo-grade media, non-paper/film media, or media intended solely for laser printing.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1:2002, *Geometrical Product Specification (GPS) — Standard reference temperature for geometrical product specification and verification*

ISO 216:1975, *Writing paper and certain classes of printed matter — Trimmed sizes — A and B series*

ISO 554:1976*, Standard atmospheres for conditioning and/or testing — Specifications*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
inkjet printing
process of building up an image on a receiving layer by non-contact application of droplets of ink, usually microscopic

3.2
inkjet medium
liquid-permeable or -impermeable base (paper or film), the surface of which is rendered capable of receiving and retaining an inkjet image, either by chemical treatment or by means of a suitable receiver layer

NOTE *Inkjet media* is the plural form of this term.

3.3
preferred size
industry standard size, as determined by most frequent user demand (number of units) and product volume (square metres)

NOTE Designers of new equipment are encouraged to use preferred sizes whenever possible.

3.4
recognized size
size that is significant in the industry, but not so generally used that it is selected as preferred size

NOTE This category assists the reader to understand the requirements for certain sizes that may have been once preferred and are becoming less popular, or are new and are becoming more popular.

3.5
nominal size
size reference that appears on product labels and in catalogues

3.6
core
physical mass, which serves as the central part of a wound roll of paper or film, that has no fixed flanges at its ends and is generally cylindrical

NOTE A *flanged*, cylindrical core for roll paper or film is called a “spool”.

3.7
resin coated
RC
coated on both sides of the base (usually paper) with a “resin”, usually polyethylene, to render it water-impermeable

NOTE The designation PE (polyethylene) is sometimes used synonymously with RC.

3.8
cast coated
coated on the image-receiving side of the paper base with a highly viscous mixture of inorganic metal oxides and gelatine or a similar polymer, the whole being then pressed on a highly polished drum for gloss, to give a water-permeable image-receiving layer

3.9
barrier coated
water-impermeable polymer layer contained in the base between the paper and ink-receiving layers

NOTE The barrier layer is often composed of latexes, and is impermeable only to liquid water and dyes; water vapour and solvents may slowly penetrate into the paper pulp.

4 Nomenclature and classification of types of inkjet medium

4.1 Photo-grade medium

A photo-grade medium is either paper or film with an image-receiving layer that, when printed on, can produce image quality comparable with conventional photography, in terms of resolution, graininess, sharpness, tone reproduction and colour reproduction. A photo-grade medium has physical characteristics comparable with conventional photographic media including stiffness, mass, texture and durability, and is generally intended for inkjet printing of photographic images in high-quality and demanding applications.

NOTE 1 The above list of physical characteristics is not necessarily exhaustive, and does not preclude other characteristics becoming important in future products.

NOTE 2 The image-receiving layer is usually coated only on one side, and fully retains high volumes of ink without loss of image quality or functionality. An anti-curl layer may be coated on the reverse side.

Photo-grade media can be classified into one of the following categories.

a) **Resin-coated photo-grade paper** (RC photo-grade paper) has a water-impermeable resin layer under an imaging layer. Its surface appearance ranges from high gloss to dead matt.

b) **Barrier-coated photo-grade paper** has a water-impermeable barrier layer under imaging layer. Its surface appearance ranges from high gloss to dead matt.

c) **Coated photo-grade paper** has a water-permeable layer under imaging layer. It can be cast-coated or micro-ceramic. Its surface appearance ranges from high gloss to dead matt.

d) **Photo-grade film** consists of a generally polymeric, water-impermeable base (substrate) (e.g. polyester, vinyl), coated on one side with an image-receiving layer. It may be coated on the reverse side with an anti-curl layer. There are three categories of photo-grade film as follows.

   1) **Opaque film** (white film) has a substrate that is pigmented white (pigment dispersion, voided, or coated with a pigmented layer). It is intended for applications involving reflected illumination. Its surface appearance is usually glossy, but can range from glossy to matt.

   2) **Translucent film** (back-lit film) has either a translucent base (achieved by lower pigment loading) or a clear base with slight pigmentation of the imaging layer. It is intended for applications involving transmitted illumination. It can be front-coated (intended for illumination from the non-imaged side) or reverse-coated (intended for illumination from the imaged side). Its surface appearance is usually glossy, but can range from glossy to matt

   3) **Transparent film** (clear film or transparency) has an unpigmented substrate, that freely transmits incident illumination. It is intended for viewing by either direct (e.g. back-lit through a diffuser) or indirect (e.g. by projection onto a viewing surface) transmitted light. Its surface appearance is usually glossy, but can range from glossy to matt.

4.2 Non-photo-grade medium

A non-photo-grade medium is generally of less high quality than a photo-grade medium, and more suitable for less demanding applications. Some such materials are not even specifically designed for inkjet use. Non-photo-grade media are outside the scope of this International Standard, but have been included here for comparative purposes.

5 Conditions for measurement of dimensions and thicknesses

The dimensions and tolerances specified in this part of ISO 18055 apply at the time of manufacture, measured under atmospheric conditions of (23 ± 2) °C and (50 ± 5) % relative humidity, as specified in ISO 554:1976 (see Annex B).

All measuring instrument calibrations shall be conducted at a temperature of 20 °C (as specified in ISO 1) and a relative humidity of 50 %.

6 Dimensions

6.1 Sheet dimensions

Aim and tolerance values for preferred dimensions of sheets shall conform to specifications given in Table 1.

Aim and tolerance values for recognized dimensions of sheets shall conform to specifications given in Table 2.

6.2 Roll dimensions

6.2.1 Roll widths

Preferred roll widths, along with their cutting tolerances, shall conform to the values given in Table 3.

For widths of rolls that do not comply with the specifications given in Table 3, they shall conform to the aim and tolerance specifications given in Table 4.

6.2.2 Roll lengths

Roll lengths are not specified normatively in this part of ISO 18055. However, in order to encourage a beneficial degree of standardization, recommended roll lengths are given for information in Annex A. The actual length shall be no less than the nominal length, but additional length is left to the discretion of the manufacturer.

Table 1 — Preferred sheet nominal sizes, with dimensions

Nominal		Aim [a]	Tolerances	
Description or cm	(inches)	mm	mm	
9 × 13	(3,5 × 5)	89 × 127	± 1,0	± 1,0
10,0 × 14,8		100 × 148	± 1,0	± 1,0
A6		105 × 148	± 1,0	± 1,0
12,7 × 17,8	(5 × 7)	127 × 178	± 1,0	± 1,0
13,0 × 18,9		130 × 189	± 1,0	± 1,0
A5		148 × 210	± 1,0	± 1,0
A4		210 × 297	± 1,0	± 1,0
20,3 × 25,4	(8 × 10)	203 × 254	± 1,0	± 1,0
US “A”, Letter	(8,5 × 11)	215,9 × 279,4	± 1,0	± 1,0
A3		297 × 420	± 1,0	± 1,0
30,5 × 45,7	(12 × 18)	304,8 × 457,2	± 1,0	± 1,0
A3 oversize		329 × 483	± 1,0	± 1,0
38,1 × 55,9	(15 × 22)	381 × 558,8	± 1,0	± 1,0
A2		420 × 594	± 1,5	± 1,5
55,9 × 76,2	(22 × 30)	558,8 × 762	± 1,5	± 1,5
A1		594 × 841	± 1,5	± 1,5
61,0 × 61,0	(24 × 24)	609,6 × 609,6	± 1,5	± 1,5
A0		841 × 1 189	± 2,0	± 2,0

[a] ISO “A” series dimensions taken from specifications given in ISO 216:1975.

Table 2 — Recognized sheet nominal sizes, with dimensions

Nominal		Aim	Tolerances	
Description or cm	(inches)	mm	mm	
10,2 × 15,2	(4 × 6)	101,6 × 152,4	± 1,0	± 1,0
12,7 × 19	(5 × 7,5)	127 × 190,5	± 1,0	± 1,0
JIS B5 (Japan)		182 × 257	± 1,0	± 1,0
Panoramic	(8,3 × 23,4)	210 × 594	± 1,0	± 1,5
US “Legal”	(8,5 × 14)	215,9 × 355,6	± 1,0	± 1,0
JIS B4 [Japan]		257 × 364	± 1,0	± 1,0
US “Photo”	(11 × 14)	279,4 × 355,6	± 1,0	± 1,0
US “B”	(11 × 17)	279,4 × 431,8	± 1,0	± 1,0
US “Super B”	(13 × 19)	330,2 × 482,6	± 1,0	± 1,0
38,1 × 52,1	(15 × 20,5)	381 × 520,7	± 1,0	± 1,0
US “C”	(17 × 22)	431,8 × 558,8	± 1,0	± 1,0
52,1 × 76,2	(20,5 × 30)	520,7 × 762	± 1,5	± 1,5
US “D”	(22 × 34)	558,8 × 863,6	± 1,5	± 1,5
62,2 × 62,2	(24,5 × 24,5)	622,3 × 622,3	± 1,5	± 1,5
US “E”	(34 × 44)	863,6 × 1 117,6	± 2,0	± 2,0
86,4 × 118,9	(34 × 46,81)	863,6 × 1 189	± 2,0	± 2,0

Table 3 — Preferred roll nominal widths, with dimensions

Nominal width		Aim	Tolerance
cm	(inches)	mm	mm
8,9		89,0	± 0,5
10,0		100,0	± 0,5
12,7	(5)	127,0	± 0,5
21,0		210,0	± 0,5
30,5	(12)	304,8	± 1,0
32,9		329,0	± 1,0
42,0		420,0	± 1,0
43,2	(17)	431,8	± 1,0
55,9	(22)	558,8	± 1,0
61,0	(24)	609,6	± 1,0
90		900,0	± 1,0
91,4	(36)	914,4	± 1,0
106,7	(42)	1 066,8	± 1,0
111,8	(44)	1 117,6	± 1,0
127,0	(50)	1 270,0	± 1,0
132,1	(52)	1 320,8	± 1,0
137,2	(54)	1 371,6	± 1,0
152,4	(60)	1 524,0	± 1,0
182,9	(72)	1 828,8	± 1,0

Table 4 — Aim and tolerance rules for widths not listed in Table 3

Nominal width cm	Aim mm	Tolerance mm
Less than or equal to 26	Nominal	± 0,5
Greater than 26	Nominal	± 1,0

7 Thicknesses and grammages

Preferred thicknesses of finished ("end") products shall fall within the ranges of values given in Table 5, which also gives tolerances relative to nominal thickness. Also given are the nominal approximate imperial equivalents, in recognition of the fact that these may still be more familiar to some manufacturers and users.

Grammages (masses in grams per square metre) are not specified in this part of ISO 18055, because in themselves they are generally less critical than thicknesses. However, for some applications and for historical reasons it may useful to give approximate equivalences. For this see Annex D.

Table 5 — Preferred thicknesses (end product)

Type of inkjet medium	Nominal — range		Tolerance (against nominal)	
	µm	(mil[a])	µm	(mil[a])
Photo-grade paper	110 to 360	(4,3 to 14)	± 10,0	(± 0,4)
Photo-grade film	100 to 200	(4 to 8)	± 10,0	(± 0,4)

[a] Mil = thousandths of an inch.

8 Squareness and edge straightness (sheet media)

Squareness, edge straightness, shape and compliance with specified dimensions shall be checked at the same time by comparison of any given sheet with two perfect rectangles, independently located, one made according to the minimum dimensional tolerance specified in this part of ISO 18055, and the other according to the maximum tolerance. No point on the perimeter of the sheet shall fall either within the smaller rectangle or outside the larger rectangle.

9 Core size (roll media)

The nominal core diameter stated shall be the internal diameter (e.g. "76,2 mm ID"). The actual internal diameter shall not be less than the nominal, nor greater than 1,0 mm over the nominal.

The width of the core should preferably be equal to or less than the width of the roll, by up to 2,0 mm. However, if the core is wider than the roll, it shall not protrude by more than 1,0 mm on either side.

10 Winding parameters (roll media)

10.1 Winding configuration

The overall width of the roll (including any widthwise winding deviations) shall not exceed the nominal width of the material by more than 2 mm.

10.2 Winding orientation

Rolls of materials may be wound with either the image-receiving side in or with the image-receiving side out. The roll shall be suitably labelled to indicate clearly which orientation has been employed.

10.3 Attachment of material to core

This part of ISO 18055 does not require the material to be attached to the core, nor does it preclude attachment. If attachment is used, the material shall be attached to the core in such a manner that it detaches easily as the roll is used.

10.4 Roll diameter

The overall maximum diameter of the full-length wound roll shall be readily available from the manufacturers, and preferably should be stated on the packaging, so that its physical compatibility with particular inkjet printers can be readily determined.

The manufacturers of inkjet printers are encouraged to determine and publish maximum roll diameters for their equipment.

11 Package marking

11.1 Data

Sufficient data shall be provided on a product's packaging to inform the user of proper use and handling.

Product packaging shall be marked so as to indicate:

— product name and size;

— type of inkjet medium;

— nominal product dimensions, in metric units (plus optional dimensions in inches if desired), with the smaller dimension first;

— quantity of units contained in the package;

— nominal internal diameter of core (roll media only);

— indication of winding orientation, if applicable (roll media only)[1)].

Optionally, product packaging can also be marked so as to indicate:

— conditions of shipping and storage;

1) This can be indicated by wording or by a code.

— nominal product thickness in micrometres (plus optional thickness in “mils” if desired);

— nominal product mass in g/m^2 (grammage);

— presence of interleaving material, if appropriate;

— ink compatibility;

— process compatibility;

— printer compatibility;

— suitable label on inside of core (roll media only) to aid in identification after packaging discarded.

To accomplish this, each of the packages, which constitute the product’s packaging, should be marked so as to indicate one or more of the following[2)]:

— product name or trade name;

— name or trademark of the manufacturer and/or supplier;

— manufacturer’s or supplier’s catalogue identification number;

— bar code information;

— information to assist recycling of waste packaging;

— batch number and/or parent roll number;

— expiry date or “use before” date or inventory control code;

— manufacturer’s or supplier’s recommended storage conditions[3)];

— indication of attachment of material on core, if applicable[3)];

— overall maximum diameter of the wound roll (roll media only).

11.2 Compliance

If it is desired to indicate compliance of the product with this part of ISO 18055, the following wording shall be used:

COMPLYING WITH ISO 18055-1

2) There can be legal requirements in certain countries for other data to be marked on the package.

3) This can be indicated by wording or by a code.

Annex A
(informative)

Recommended roll lengths

Table A.1 — Preferred and recognized roll lengths

Preferred roll lengths (metric)	Recognized roll lengths (ex-imperial)	
Nominal	Nominal	
m	m	(ft)
7	—	
—	7,62	(25)
—	9,2	(30)
—	10,7	(35)
—	12,2	(40)
—	15,2	(50)
20	—	
—	22,9	(75)
30	—	
—	30,5	(100)
35	—	
45	—	
—	45,7	(150)
50	—	
90	—	
100	—	

Annex B
(informative)

Dimensional stability

The dimensions and tolerances specified apply at the time of manufacture and when measured in equilibrium with the standard atmosphere specified in ISO 554:1976, i.e. temperature (23 ± 2) °C and relative humidity (50 ± 5) %.

These dimensions may be altered by permanent ageing shrinkage and by temporary shrinkage or expansion induced by changes in the relative humidity and temperature of the atmosphere.

Nevertheless, at the time of package opening, within the warranty period of the product, dimensions measured under atmospheric conditions of temperature (23 ± 2) °C and relative humidity (50 ± 5) % should not depart from those at the time of manufacture by more than

— ± 0,10 % for film media,

— ± 0,20 % for paper media.

For “non resin-coated” paper, the temporary dimensional variation can reach as much as 0,3 % for a 10 % change in relative humidity.

The conditioning of a sample in the standard atmospheric conditions requires a minimum of 4 h for film, 1 d for non resin-coated paper and 7 d for resin-coated paper (see ISO 18903:2002, 5.3).

Annex C
(informative)

Quantity packaging (sheet media)

It is recommended that the number of sheets of film or paper in a single package, or in a unit of a multiple package, be chosen from the following list:

Sheets

— 5

— 10

— 15

— 20

— 25

— 30

— 50

— 100

— 250

— 500

Annex D
(informative)

Grammage

Although this part of ISO 18055 does not specify grammages (masses in grams per square metre) of photo-grade inkjet media, for some applications approximate equivalences of grammage and thickness are useful. Some of the most common are given in Table D.1. Note that the values quoted refer to the finished products.

Table D.1 — Comparisons of thickness and grammage

Thickness µm	**Type of medium, with approximate grammage** g/m^2	
110	Photo-grade paper	100 to 125
150	Photo-grade paper	145 to 165
175	Photo-grade paper	175 to 190
235	Photo-grade paper	235 to 255
320	Photo-grade paper	330 to 350
100	Photo-grade film	125 to 150
125	Photo-grade film	150 to 170
175	Photo-grade film	235 to 265

The equivalences given in Table D.1 are intended as a guide only. Nevertheless these values work reasonably well in most cases. However, it should be noted that in those cases where the media have large beads, spacers, micro-ceramic or other novel material in the layers, the overall mass is appreciably less than would be expected from Table D.1.

Annex E
(informative)

Inkjet inks, printers and processing

E.1 General

Although the normative part of this part of ISO 18055 deals with photo-grade inkjet media (paper and film) only, it is helpful to the reader's understanding of inkjet systems as a whole to give some information on the context in which these media are used.

E.2 Types of ink

Inks for inkjet systems are categorized as either one of the following.

— **Dye-based inks**: clear coloured solutions of certain chemical substances dissolved in solvents; these substances chemically bind to the material that they colour.

— **Pigment inks**: dispersed chemical substances on which light scatters and absorbs; the relative amounts of scattering and absorption determine the opacity and colour of printed pigmented media. Pigments do not bind and therefore require a binder to fix them to the substrate.

E.3 Types of printer

Printers used with inkjet systems are the following:

— desktop printers;

— wide-format printers;

— macro-printers.

E.4 Types of processing

Inkjet system processing is categorized as follows.

— **Continuous processing**: inkjet printing by which a continuous stream of ink droplets is produced by forcing it through a narrow nozzle at high pressure.

— **Piezo processing**: this technology makes use of the piezoelectric effect, in which small electronic impulses delivered to suitable crystalline materials cause them to expand; pressure pulses are created in the ink; droplets are generated intermittently according to the electronic signals received.

— **Thermal drop-on-demand processing**: a small heating element creates pressure droplets on demand within the ink reservoir; the small quantity of ink present is heated; the ink boils, creating a bubble which forces a volume of ink droplet through the nozzle at high speed.

Bibliography

[1] ISO 534:—[4], *Paper and board — Determination of thickness, density and specific volume*

[2] ISO 11093-4:1997, *Paper and board — Testing of cores — Part 4: Measurement of dimensions*

[3] ISO 18903:2002, *Imaging materials — Films and papers — Determination of dimensional change*

4) To be published. (Revision of ISO 534:1988)

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