INTERNATIONAL STANDARD

ISO 6148

First edition
1993-09-15

Photography — Film dimensions — Micrographics

Photographie — Dimensions des films — Micrographie

Reference number
ISO 6148:1993(E)

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.

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.

International Standard ISO 6148 was prepared by Technical Committee ISO/TC 42, *Photography*.

Annexes A, B and C of this International Standard are for information only.

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Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Photography — Film dimensions — Micrographics

1 Scope

This International Standard specifies the nominal sizes and aim dimensions, with their cutting tolerances, of all unexposed films used in micrographic applications, including computer output microfilming (COM). It applies to silver-gelatin films as well as diazo, vesicular or thermally processed silver films. It specifies the lengths, widths and thicknesses of film in rolls and sheets.

Specifications of cores, spools, cassettes, cartridges or magazines are not included in this International Standard.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1:1975, *Standard reference temperature for industrial length measurements.*

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.*

ISO 1007:1979, *Photography — 135-size film and magazine — Specification.*

ISO 9923:—[1], *Micrographics — Transparent A6 microfiche image arrangements.*

3 Conditions for measurement of dimensions

The dimensions and tolerances specified in this International Standard apply at the time of manufacture, measured under atmospheric conditions of (23 ± 2) °C and (50 ± 5) % relative humidity, as specified in ISO 554[2] (see annex A).

4 Film thickness

The thickness ranges of the film (including support, sensitized layers and any protective coatings) shall conform to the values given in table 1 for thin non-silver duplicating films and in table 2 for all other micrographic films.

Table 1 — Film thickness for thin non-silver duplicating films

Dimensions in millimetres

Nominal	Minimum	Maximum
0,06	0,050	0,071
0,09	0,084	0,102
0,11	0,107	0,122
0,17	0,157	0,178

1) To be published.

2) All measuring instrument calibrations should be referred to a temperature of 20 °C (as specified in ISO 1) and relative humidity of 50 %.

Table 2 — Film thickness for other micrographic films

Dimensions in millimetres

Nominal	Minimum	Up to but not including
0,06	0,058	0,074
0,08	0,074	0,097
0,10	0,097	0,122
0,13	0,122	0,152
0,18	0,170	0,198
0,21	0,198	0,224

5 Films in rolls

5.1 Width of rolls

Nominal and aim dimensions for standard widths and their tolerances shall conform to the values given in table 3.

Table 3 — Widths of film in rolls

Dimensions in millimetres

Nominal	Aim	Tolerance
16	15,96	± 0,04
35	34,95	± 0,05
105	104,87	± 0,13

5.2 Length of rolls

5.2.1 Preferred lengths

Nominal and aim dimensions for preferred lengths and their tolerances shall conform to the values given in table 4.

Table 4 — Preferred lengths of rolls

Dimensions in metres

Nominal	Aim	Tolerance
30,5	30,50	$^{+0,30}_{0}$
61,0	61,00	$^{+0,30}_{0}$
65,5[1)]	65,50	$^{+0,35}_{0}$
75,0	75,00	$^{+0,40}_{0}$
152,5	152,50	$^{+0,75}_{0}$
200,0	200,0	$^{+1,0}_{0}$
305,0[1)]	305,0	$^{+1,5}_{0}$
610,0[1)]	610,0	$^{+3,0}_{0}$

1) These lengths result from the conversion of original inch sizes. There will be a tendency to replace these three lengths by 66 m, 300 m and 600 m in the future.

5.2.2 Recognized lengths

Nominal and aim dimensions for temporarily recognized lengths and their tolerances shall conform to the values given in table 5.

Table 5 — Recognized lengths of rolls

Dimensions in metres

Nominal	Aim	Tolerance
30	30,00	$^{+0,30}_{0}$
38	38,00	$^{+0,30}_{0}$
40	40,00	$^{+0,30}_{0}$
60	60,00	$^{+0,30}_{0}$
66[1)]	66,00	$^{+0,35}_{0}$
100	100,0	$^{+0,5}_{0}$
120	120,0	$^{+0,6}_{0}$
122[1)]	122,0	$^{+0,6}_{0}$
125	125,0	$^{+0,6}_{0}$
300[1)]	300,0	$^{+1,5}_{0}$
313	313,0	$^{+1,6}_{0}$
600[1)]	600,0	$^{+3,0}_{0}$

1) These lengths will tend to become preferred in the future.

5.2.3 Leaders and trailers

The nominal lengths and aim lengths of film specified in tables 4 and 5 exclude any provision of leader and trailer.

5.3 Winding

It is preferred that the film be wound sensitized side in.

If it is necessary that the film be wound sensitized side out, it shall be clearly identified as such on the package.

The film shall not be attached to the core or the spool.

It is preferred that the film be wound on the core so that the position of the core be symmetrical with respect to the film roll. In no case shall the core be recessed on one side while protruding from the other.

The overall roll width, which includes any widthwise winding variations plus any protrusion of the core from the roll, shall not exceed the maximum slitting width plus 1 mm.

5.4 Splices

There shall be no splices in films used for first generation microform.

For copying materials, two splices are allowed for rolls

— longer than 600 m, for 16 mm and 35 mm films;

— longer than 150 m, for 105 mm films.

The splicing material shall be chemically inert to all processing solutions and conditions. It shall retain its physical qualities unimpaired throughout these processes.

The total thickness of a splice shall not exceed twice the maximum appropriate film thickness plus 0,13 mm.

The presence of splices shall be clearly identified on the package.

5.5 Perforations

16 mm film for micrographic use is normally not perforated. 35 mm may be perforated both edges. These perforations shall comply with ISO 1007.

There shall be no perforations on 105 mm film.

6 Films in sheets

6.1 Dimensions

The only preferred size is the nominal A6 size specified in ISO 216. Nominal and aim dimensions and their tolerances shall conform to the values given in table 6.

Table 6 — Preferred sizes of sheets

Dimensions in millimetres

Nominal	Aim	Tolerance
105 × 148	104,6 × 147,5	± 0,4 ± 0,5

This International Standard does not recommend dimensions for sheet film intended for thermal processing as it can cause sheet films to exceed the size tolerance specified in ISO 9923.

6.2 Squareness and edge straightness

Squareness, edge straightness, shape and compliance with the dimensions shall be checked at the same time by comparison of any given sheet with two perfect rectangles, independently located, one made to the minimum dimensional tolerance specified in this International Standard and the other to the maximum tolerance. No point on the perimeter of the sheet shall fall within the smaller rectangle nor shall any point fall outside the larger rectangle.

6.3 Identification of the sensitized side

Notches or cut corners may be used to indicate the sensitized side of sheet films.

When a film in sheets is held with the longer edge in a vertical position and the heading space on the left-hand side, notches shall be in the shorter edge, near the upper right-hand corner when the sensitized side is facing the observer. Using the same orientation, the corner cut shall be at the lower left-hand corner.

The shape and number of notches is left to the discretion of the manufacturer. They can additionally be used as a code to identify the type of film.

Notches shall not exceed 1,6 mm in depth.

For vesicular and diazo films, the corner cut shall be in the heading space with maximum dimensions 4 mm × 4 mm in both edges of the sheet.

The area removed by notches or a corner cut is not judged to be in violation of 6.2.

6.4 Corner rounding

The corners of the sheets may be rounded to facilitate handling. If the sheet is corner rounded, the process shall not remove more than 3 mm of either of the two edges which form corner. The corners shall have no stepped or sharp features.

The area removed by corner rounding is not judged to be in violation of 6.2.

7 Heading backing

105 mm wide rolls or sheets cut from them may be heading-backed to improve either the legibility of the heading or ease of filing. The heading backing may be translucent or opaque, white or coloured. It is applied on the non-sensitized side of the film, in the heading space, and shall not interfere with the image area.

7.1 Width of the heading space

Five widths of heading space are specified according to the requirements of ISO 9923. Their nominal values are:

4,5 mm; 6,5 mm; 9,25 mm; 12,75 mm; 17,75 mm

7.2 Width of heading backing

The maximum width of heading backing shall be the minimum width of heading space. It may be 1,0 mm less in width than the width of the heading space (see figure 1).

7.3 Thickness of heading backing

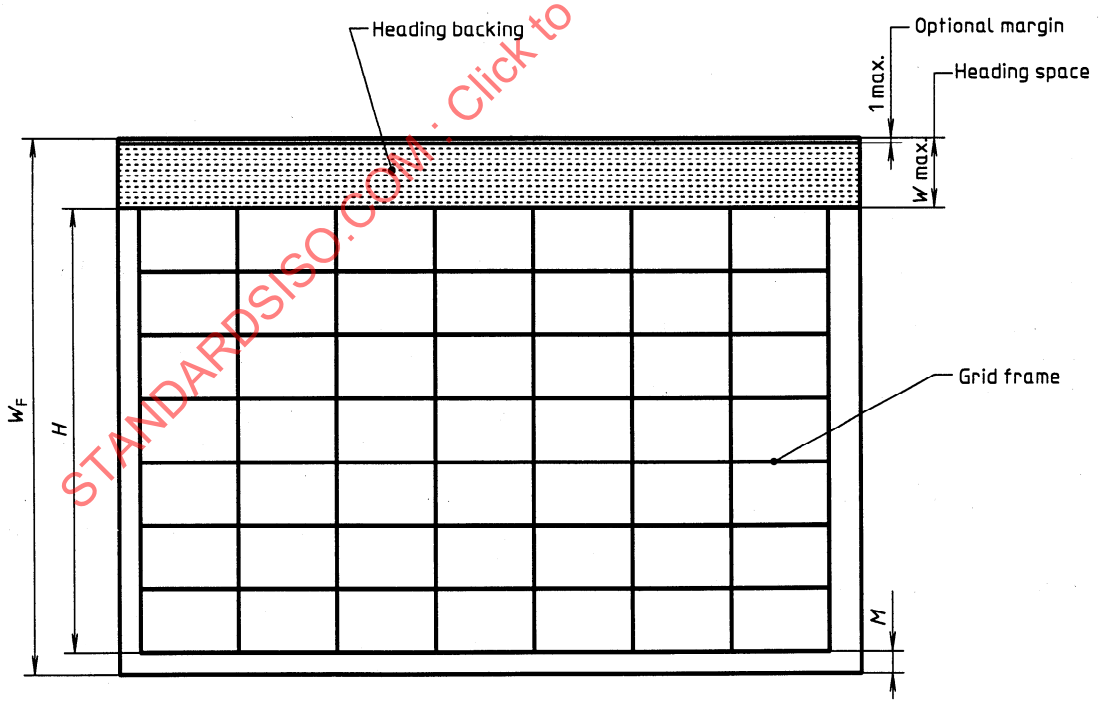
The heading backing shall not increase the thickness of the microfiche by more than 0,010 mm.

7.4 Winding configuration

Winding configurations A and B are identified by orientating the heading-backed roll with the axis of the roll along the line of sight of the observer and the outside end of the film leaving the roll at the top and towards the rigth.

In "winding A", the headed space is along the edge of the film towards the observer. In "winding B", the headed space is along the edge away from the observer. See figure 2.

The use of "winding A" is preferred and "winding B" is recognized.



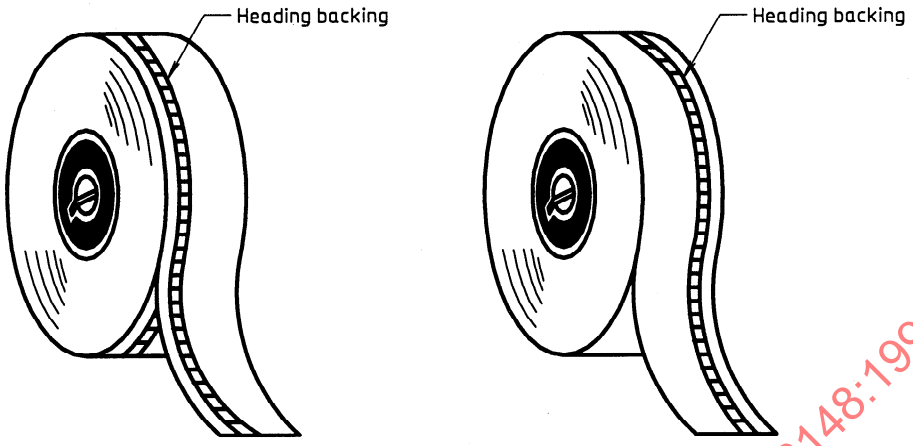
W_F : Minimum width of sheet or roll of film

H : Height of a grid frame times the number of rows (see ISO 9923)

M : Maximum width of the bottom margin of the fiche (see ISO 9923)

W_{max} : Maximum width of heading space

Figure 1 — Heading space and heading backing location and width



NOTE — Sensitized side in.

Figure 2 — Winding configuration

8 Package marking

8.1 Data

Sufficient data shall be given on the package to ensure correct usage of the product.

Packages are marked for the purpose of identifying:

a) product name and format;

b) conditions of use (such as safelight);

c) conditions of shipping and storage.

Any given level of packaging fulfils one or more of these functions and shall be identified accordingly, using the appropriate entries from the following list[3]

— product name or tradename[4];

— name or trademark of the manufacturer;

— manufacturer's catalogue identification number;

— bar code information, if applicable;

— information to assist recycling of waste packaging;

— quantity of units contained in the package;

— nominal size or nominal width and length, in metric units, showing the smaller dimension first;

— batch number and/or parent roll number;

— expiration date or "develop before" date or inventory control code;

— manufacturer's recommended safelight conditions[5];

— manufacturer's recommended storage conditions[5];

— indication of non-preferred winding on 16 mm and 35 mm roll film, if applicable[4)5)] ;

— indication of splices on roll film, if applicable[4)5)] ;

— indication of perforated film on roll film, if applicable[4)5)]

— indication of winding configuration on 105 mm roll film[4)5)].

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

4) For unit packages, this item should be legible under recommended safelight conditions (other than total darkness).

5) This may be indicated by wording or by a code.

8.2 Area for notes

See annex C.

8.3 Compliance

If it is desired to indicate compliance of the product with this International Standard, the following wording shall be used:

COMPLYING WITH ISO 6148

Annex A
(informative)

Dimensional stability

A.1 General

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

These dimensions may be altered by permanent ageing shrinkage and by temporary shrinkage or swell since they will change with the moisture content and the temperature of the atmosphere.

Nevertheless, at the time of package opening within the warranty period of the film, 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:

+ 0,08 % to − 0,11 % for films on cellulose ester base 0,13 mm thick;

+ 0,02 % to − 0,04 % for films on polyester base 0,13 mm thick;

+ 0,02 % to − 0,10 % for films on polyester base 0,06 mm thick.

A.2 Permanent dimensional changes

Permanent dimensional change can occur for two reasons:

a) During photographic processing, films on cellulose ester supports can shrink due to solvent loss or due to relaxation of strain induced at the time of manufacture. They can also show an increase in length due to excessive tension in the processor. Films on polyester supports do not exhibit shrinkage from solvent loss but can show a size change from strain relaxation. The latter effect can be appreciable in the high temperature processing of vesicular and thermally processed diazo or silver films on polyester supports. Such films can simultaneously swell in one direction and shrink in the other.

b) An ageing shrinkage can also occur during storage of raw or processed films. Solvent loss is a factor in shrinkage of films on cellulose ester supports and closed containers will retard such shrinkage.

The ranges shown in table A.1 are for films kept at 26 °C and 60 % relative humidity.

A.3 Temporary dimensional changes

Dimensional changes caused by normal temperature variations are reversible and are similar for both raw and processed films.

Dimensional changes caused by relative humidity variations are partly but not completely reversible, the film shows a phenomenon of hysteresis.

These changes are not exactly the same for raw and processed films. They are particularly important during processing and subsequent drying. The appropriate magnitude of these changes can be calculated from the thermal and humidity coefficients in table A.1.

Table A.1 — Typical dimensional changes

		Silver-gelatin or diazo film on cellulose ester support[1]	Silver-gelatin film on polyester support[2]		Diazo film on polyester support[2]		Vesicular and thermally processed silver films on polyester support[2]	
Thickness, mm		0,13	0,13	0,06	0,13	0,06	0,13	0,06
Humidity coefficient % per 1 % RH		0,004	0,002	—	0,001	—	0,001	—
Thermal coefficient % per 1 °C		0,006	0,002	—	0,002	—	0,002	—
Processing dimensional change, %		± 0,02	± 0,01	± 0,03	± 0,01	± 0,03	0 to ± 0,05	—
Ageing dimensional change, %	1 year	− 0,05 to − 0,25	+ 0,01 to − 0,02	+ 0,01 to − 0,05	+ 0,01 to − 0,02	+ 0,01 to − 0,05	+ 0,01 to − 0,02	+ 0,01 to − 0,05
	10 years	− 0,10 to − 0,70	− 0,01 to − 0,03	− 0,01 to − 0,06	− 0,01 to − 0,03	− 0,01 to − 0,06	− 0,01 to − 0,03	− 0,01 to − 0,06

1) For films on cellulose ester support, the large difference between the two values for ageing dimensional charge is chiefly due to the type of packaging: the lower value represents the ageing dimensional change in a closed container, the larger the dimensional change in free air.

2) For films on polyester support, the two values for ageing dimensional change represent the range that can be encountered either in closed container or in free air.

Annex B
(informative)

Quantity packing

Due to the diversity of sizes of films for micrographic uses, the number of units per shipping case is often determined by an agreement between manufacturer and customer, including the pallet-size bulk-package.

Nevertheless, it is recommended that the number of units per package be chosen from the following list:

a) **16 and 35 mm roll films**

1 - 5 - 10 - 20 - 50 - 100 rolls;

b) **105 mm roll films**

1 - 2 - 4 - 8 rolls;

c) **sheet films**

For silver-gelatin films: 100 sheets

For diazo and vesicular films: 100 or 500 sheets.

Annex C
(informative)

Area for notes in package marking

If the original container is intended for use as a storage container for the processed film, a blank panel should be reserved on the label or on the package for identification of the items recorded on the film.