INTERNATIONAL STANDARD

ISO 6148

Second edition
2001-04-01

Photography — Micrographic films, spools and cores — Dimensions

Photographie — Films micrographiques, bobines et noyaux — Dimensions

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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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

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

This second edition cancels and replaces the first edition (ISO 6148:1993), of which it constitutes a technical revision.

Annex A of this International Standard is for information only.

Introduction

International Standard ISO 6148 is based upon American National Standard ANSI/NAPM IT1.51-1997, which was a revision and redesignation of ANSI PH1.51-1990 (Micrographic films), and incorporates information from ANSI PH 1.33 (Spools) and ANSI/AIIM MS 29 (Cores and spools).

This International Standard acknowledges the practice of coating non-silver duplicating products on thin supports.

Photography — Micrographic films, spools and cores — Dimensions

1 Scope

This International Standard provides specifications for

— dimensions (thickness, width, length) of raw stock roll and sheet films for micrographic applications, including silver-gelatin, diazo, and vesicular films, designed for document recording, computer output microfilming (COM), and duplicating or printing. These products require wet chemical, vapour, or heat processing after an image-forming exposure with actinic radiation;

— winding requirements for roll films;

— location and width of the heading area for 105 mm wide rolls and sheets, and the width and thickness of the backing of that area;

— dimensions of spools, made either of metal or plastic, for 16 mm, 35 mm, and 105 mm microfilms; other spool materials are excluded, as well as spools that are integral components of cartridges, cassettes or magazines of microfilm-recording equipment;

— dimensions of plastic and metal cores of 16 mm, 35 mm, and 105 mm widths.

Dimensions for thin-walled paper-board cores with wall thickness of 7,6 mm or less, used routinely for sensitized duplicating material, are not included in this International Standard.

This International Standard is not applicable to processed-film dimensions in micrographic applications.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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

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

3 Terms and definitions

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

3.1
aim dimension
preferred dimension at which the manufacturing process will be aimed or designed

3.2
diazo film
very low speed, high resolution, virtually grainless imaging material consisting mainly of a polyester support coated with a polymeric binder containing diazonium salts and a dye precursor which can couple in the presence of a base (e.g. ammonia vapour) to form an azo dye

NOTE Exposure to UV or other actinic radiation causes decomposition of the diazonium salt and destruction of its dye-forming capability. These properties are the basis of a direct-positive imaging system, widely used for producing copies of original silver microfilms or other masters with automatic printer/processors that incorporate UV exposure and ammonia-developing components.

3.3
film
flexible plastic material coated with a sensitized-gelatin layer (an emulsion) that can produce stable images upon light exposure followed by chemical processing

NOTE The flexible plastic material is usually transparent cellulose tri-acetate or polyester.

3.4
grid area
total area of the microfiche contained within the perimeter of the grid pattern

3.5
grid pattern
array of horizontal and vertical lines (usually not represented) which divides an area of a microform (usually a microfiche) into spaces called frames

3.6
heading area
area at the top of a microfiche reserved for the heading

3.7
heading area coating
translucent coating applied to the whole surface of the heading area to provide a surface that accepts writing

3.8
microfiche
microform in the shape of a rectangular sheet having one or more microimages usually arranged in a grid pattern, with a heading area across the top

3.9
microform
generic term for any form, usually film, which contains microimages

3.10
micrographics
process, equipment and functions of an information system involving microfilm images, recorded at a substantially reduced scale and viewed at appropriate magnification with the aid of optical or electronic display devices

3.11
nominal size
dimensions used in commerce for description of a product, as on product labels or in catalogues

NOTE Nominal sizes are given only in metric values in new and newly revised standards, but are often given in metric and inch values in countries where both are still in everyday use.

3.12
preferred sizes
standard industry sizes, 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.

3.13
recognized sizes
sizes which are in less demand than preferred sizes, but are used in sufficiently large amounts to justify identification in standards

NOTE This category includes sizes whose popularity is diminishing or increasing. However, new equipment should not be designed for such sizes.

3.14
splice
union of two pieces of film that are joined to form a single piece (usually found in roll format)

3.15
spool
flanged, cylindrical core for roll film, with drive holes in each flange and axial holes for insertion of a spindle or pin

3.16
tolerances
dimensions which define the boundaries of conformance of a product to the standard

NOTE When tolerances are expressed as "±", the reference is to the aim dimension, not to the nominal.

3.17
vesicular film
low-speed imaging material on a polyester support, coated with a thermoplastic layer containing a UV-sensitive diazonium salt which, upon exposure to actinic radiation, results in decomposition of the diazonium salt and the formation of a nitrogen gas

NOTE Brief post-exposure heating of the film softens the binder layer and permits localized formation and trapping of tiny nitrogen gas bubbles, or vesicles. These scatter light and thereby can function as image elements under proper illumination and viewing conditions. To render such "bubble" images permanent, a second, uniform exposure is given and the resulting nitrogen gas is allowed to diffuse gradually to the surface and escape into the atmosphere.

4 Conditions for measurement of dimensions

The dimensions and tolerances specified in this International Standard shall apply at the time of manufacture (except where specifically stated otherwise), when measured under atmospheric conditions of 23 °C ± 2 °C and 50 % ± 5 % relative humidity, as specified in ISO 554.

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

5 Film thickness

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

Thickness of non-silver duplicating micrographic films shall conform to the values given in Table 2.

Table 1 — Film thickness

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

Table 2 — Film thickness for thin non-silver duplicating films

Dimensions in millimetres

Nominal	Minimum	Maximum
0,06	0,058	0,071
0,09	0,084	0,102
0,11	0,107	0,122
0,17	0,157	0,178

6 Films in rolls

6.1 Width of rolls

Nominal and aim dimensions, and their tolerances, for standard widths 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

6.2 Length of rolls

6.2.1 Preferred lengths

Preferred aim lengths shall conform to the values given in Table 4. Actual lengths shall not be less than the aim length. Provision of additional film, in addition to this aim length, is left to the discretion of the manufacturer.

The aim length given excludes all provisions for leaders and trailers.

Table 4 — Preferred roll lengths

Dimensions in metres

Aim
30,5
66
75
152
200
305
610

6.2.2 Recognized lengths

Recognized aim lengths shall conform to the values given in Table 5. Actual lengths shall not be less than the aim length. Provision of additional film, in addition to this aim length, is left to the discretion of the manufacturer.

The aim length given excludes all provisions for leaders and trailers.

Table 5 — Recognized roll lengths

Dimensions in metres

Aim
40
50
100
122
125
145
313

6.3 Winding

Normally, all films should be wound with the sensitized (emulsion) side in. However, when film is wound with the sensitized side out, conspicuous notification shall be given on the package.

Films shall not be attached to cores or spools.

The core should be centred within the film roll. It shall never protrude on either side.

The overall roll width, including departures of the alignment of the film edges throughout the depth of the roll, should not exceed the maximum specified slitting width by more than 1 mm.

6.4 Splices

There shall be no splices in raw stock microfilms.

7 Spools

7.1 Dimensions

Spool dimensions shall conform to the dimensions listed below:

— 16 mm: as shown in Figure 1 and as given in Table 6;

— 35 mm: as shown in Figure 1 and as given in Table 7;

— 105 mm: as shown in Figure 2 and given in Table 8.

7.2 Preferred design

The preferred spool design specified in this International Standard calls for a single keyway in both flanges. This design results in spool manufacturing economies because it permits a single flange design for 16 mm and 35 mm spools.

7.3 Offset drive holes

The two offset drive holes (see Figure 1) are optional for both flanges of 16 mm and 35 mm microfilm spools. These drive holes assure correct orientation during loading in hardware utilizing the two-drive-pin design.

Because of plastic moulding techniques in use, the offset drive holes may be rotated from the position shown in Figure 1. However, in spite of their appearance, these offset drive holes shall be functionally the same as those shown in Figure 1.

NOTE If two drive pins are used by hardware manufacturers, a round spindle is required for the duo-microfilm format to accept both metal and plastic spools.

7.4 Dimension K

If rivet heads or other fastening devices extend beyond the outer surface of the flange, they should lie outside the K diameter area (see Figure 1), but within the boundaries defined by the volume of the rotation diagram.

7.5 Dimensions J and J_1

Dimensions J and J_1 represent the thickness and effective thickness, respectively, of the spool with a K diameter area, which is centred on the spindle hole axis of each flange.

7.6 Dimension P

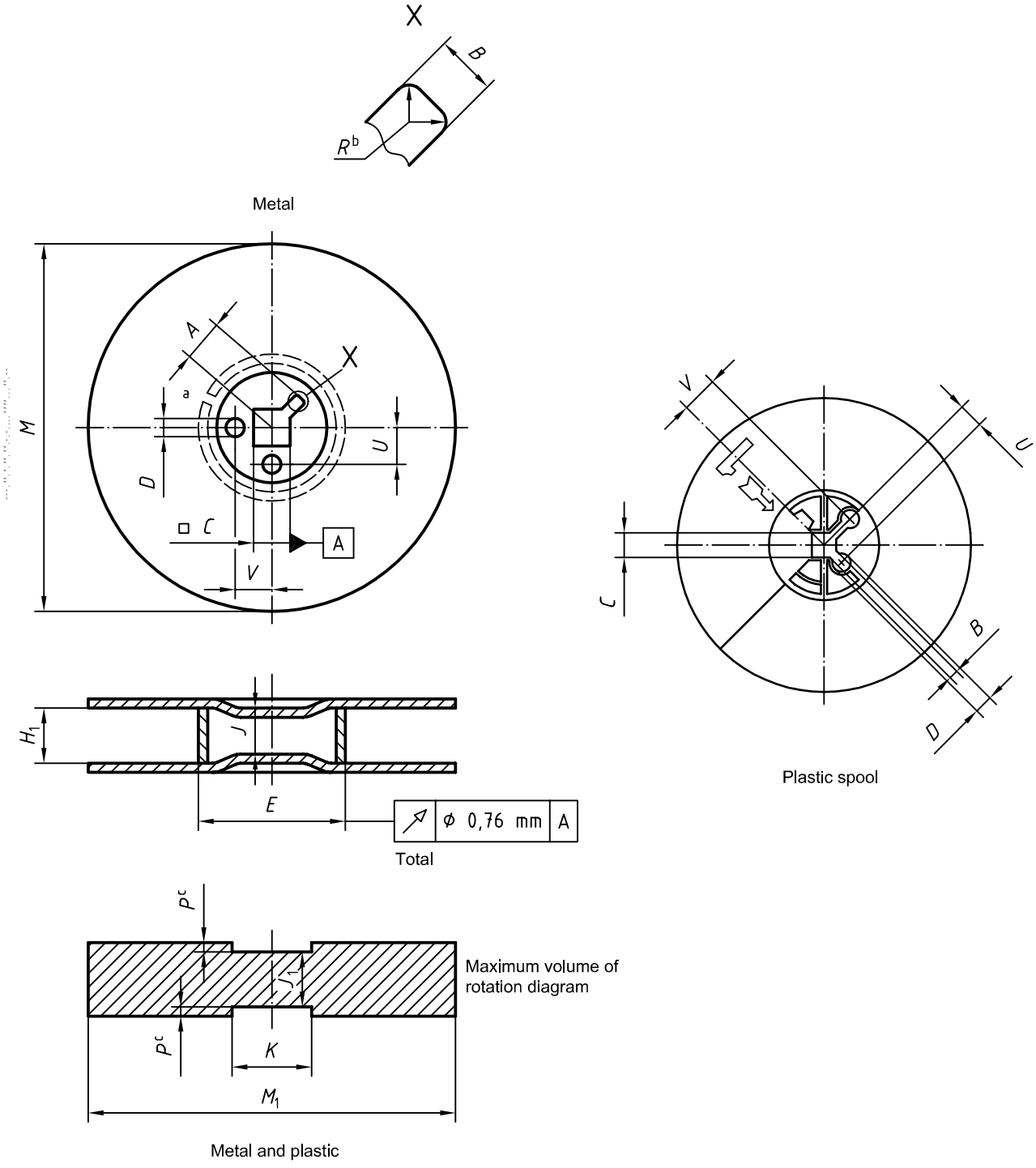
A reference plane of rotation for each flange is defined by a plane perpendicular to the axis of the spindle and coincident with the surface of a flat support of 15,0 mm (basic dimension), which is in contact with the flange and centred on the spindle hole axis of the flange.

The dimension P is the distance measured outwardly from this reference plane of rotation to the plane of rotation generated by the thickest and most eccentric point on the flange outside the K diameter area when the spool is rotated on an accurate, tight-fitting spindle. This includes rivets or other fastening devices, variations in flange thickness, flatness, and lateral runout of the flanges.

7.7 Flanges

Flanges shall be opaque and shall have low-reflectance characteristics.

Flanges of 105 mm spools shall be 1,15 mm ± 0,1 mm in thickness.



[a] A film slot, 1,2 mm ± 0,5 mm wide, extends the full width of the core.

[b] The radius of the keyway, R, may vary from a minimum value of zero to a maximum equal to one-half the keyway width.

[c] See 7.6 for an explanation of dimension P. It should be noted that the reference plane from which P is measured is not necessarily coincident with all points within the K diameter area, but shall only be coincident with those that are in contact with the reference support that has a diameter smaller than K.

Figure 1 — Spool dimensions — 16 mm and 35 mm

Table 6 — 16 mm spool dimensions

Symbol	Aim mm	Tolerance mm	Spool m
A	8,1	± 0,5	
B	3,3	± 0,2	
C [a]	8,12	± 0,08	
D [b]	5,5	± 0,1	
E	32	± 0,5	
H_1 [c]	16,23	± 0,18	
J and J_1	18,3	± 0,2	
K	25,4 min.		
M and M_1	91,5	± 0,5	30,5
M and M_1	125,5	± 0,5	61,0
P	0,5 max.		
U	8,15	± 0,15	
V	11,1	± 0,1	

a Square hole.

b Diameter.

c A paper or plastic band is often applied around the outer circumference of film wound on these spools. This band provides some protection from light fog if the film is being loaded into the exposing device under room-light conditions. These bands are most effective when they form an interference fit with the spool. In the case of plastic spools, this may distend dimension H_1 slightly beyond the maximum.

Table 7 — 35 mm spool dimensions

Dimensions in millimetres

Symbol	Aim	Tolerance
A	8,1	± 0,5
B	3,3	± 0,2
C [a]	8,12	± 0,08
D [b]	5,5	± 0,1
E	32	± 0,5
H_1	35,3	± 0,2
J and J_1	37,5	± 0,4
K	25,4 min.	
M and M_1	91,5	± 0,5
P	0,5 max.	
U	8,15	± 0,15
V	11,1	± 0,1

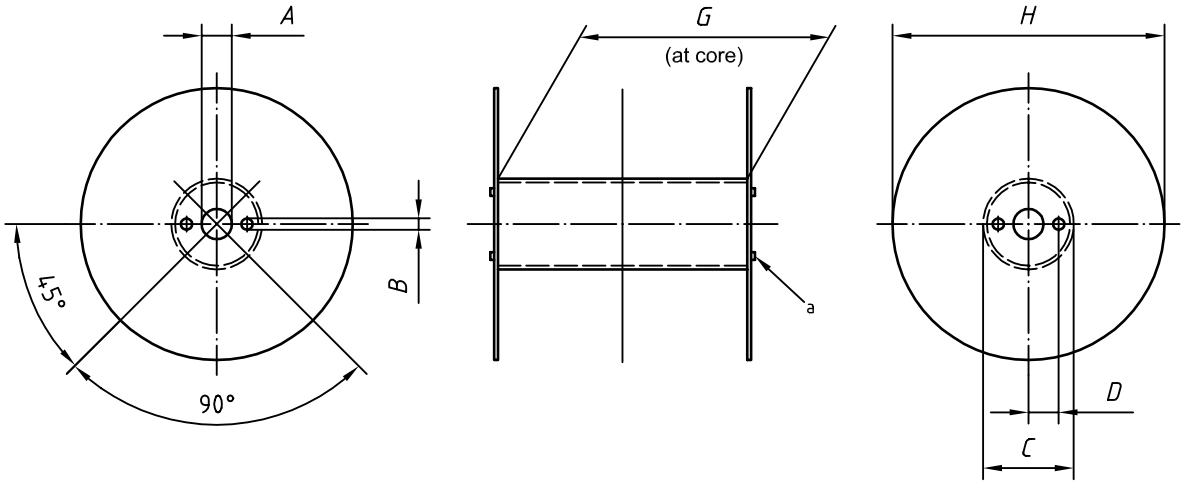
a Square hole.

b Diameter.

Table 8 — 105 mm spool dimensions

Dimensions in millimetres

Symbol	Aim	Tolerance
A	12,70	$^{+0,25}_{0}$
B	5,0	± 0,1
C	38,00	$^{+0,35}_{-0,15}$
D	12,70	± 0,06
G	105,38	± 0,25
H	111,0	± 0,5



[a] If the core is riveted to the flanges, the rivets shall not project above the surface of the flange by more than 0,4 mm.

Figure 2 — 105 mm spool dimensions

The lateral runout tolerance shall not exceed 0,381 mm. The lateral runout tolerance applies to the flatness and accuracy of rotation of the internal surface of each flange at the time of manufacture. These tolerances represent the maximum deviation from the intended plane of rotation for any point on each flange when the spool is rotated on an accurate, tight-fitting spindle. The “intended plane” is defined as a plane perpendicular to the axis of the spindle. For the inner surface of the flange, the plane shall be coincident with the surface adjacent to the core.

8 Cores

Core dimensions shall conform to those shown in Figure 3 and given in Table 9. The concentricity of the inside and outside diameters of the core shall be within 0,5 mm, one-half of the total dial runout.

Slots in cores may be provided for use in attaching the film being wound.

One or both ends of the core may be rounded slightly to facilitate inserting the core in a wound roll of film.

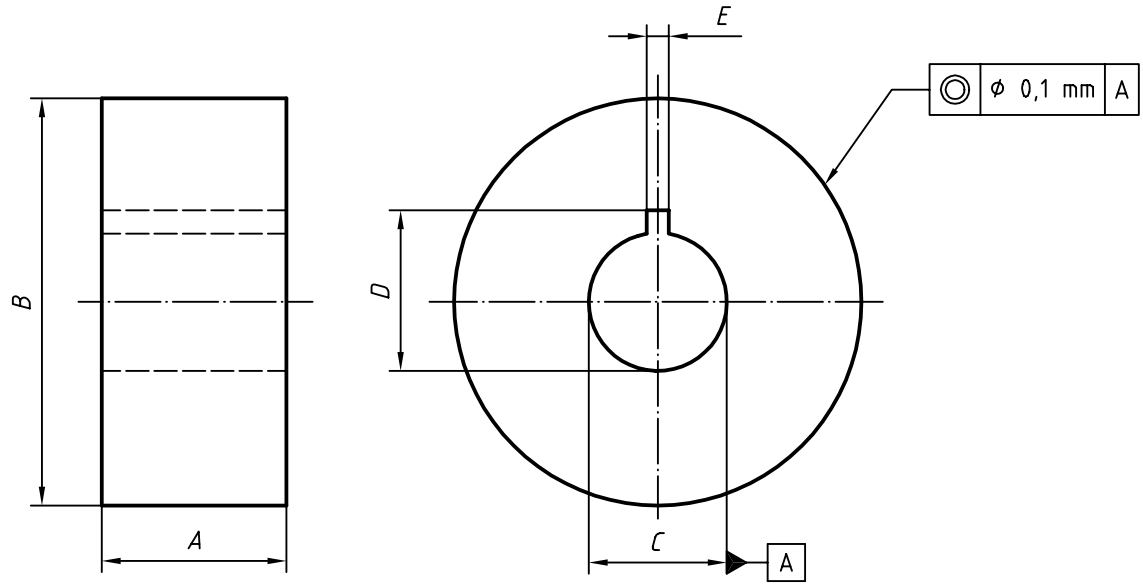


Figure 3 — Core dimensions

Table 9 — Core dimensions

Dimensions in millimetres

Nominal size	Symbol									
	A		B		C		D		E	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
16 × 50	15,4	15,9	49,5	50,5	25,7	26,1	29,5	30,4	3,8	4,2
16 × 76	15,4	15,9	74	77	25,7	26,1	29,5	30,4	3,8	4,2
35 × 50	33,9	34,9	49,5	50,5	25,7	26,1	29,5	30,4	3,8	4,2
35 × 76	33,9	34,9	74	77	25,7	26,1	29,5	30,4	3,8	4,2
105 × 50[a]	103,9	104,65	49,5	50,5	25,7	26,1	29,5	30,4	3,8	4,2

[a] For 105 mm cores, dimensions C, D and E (maximum) are sometimes made to wider tolerances. These are not the standard maximum dimensions, but the reader should be aware that they exist.

9 Films in sheets

9.1 Dimensions

In sheet form, the only preferred size of micrographic film is the nominal “A6” size. For additional information, refer to ISO 216 (see [1] in the bibliography).

Nominal and aim dimensions and their tolerances shall conform to the values given in Table 10.

Table 10 — Preferred sheet size

Dimensions in millimetres

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

NOTE 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 given in ISO 9923 (see [4] in the bibliography).

9.2 Squareness and edge straightness

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 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.

9.3 Identification of the sensitized side

Notches or cut corners may be used to indicate the sensitized side of sheet films. In addition, they can be used as a code to identify the type of film.

When a sheet of film 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.

Notches shall not exceed 1,6 mm in depth. The area removed by notches or a corner cut is not judged to be in violation of 9.2.

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.

9.4 Corner rounding

The corners of the sheets may be rounded to facilitate handling. If the sheet is corner rounded, the process of corner rounding shall not remove more than 3 mm of either of the two edges which form the corner.

Corners shall have no stepped or sharp features.

The area removed by corner rounding is not judged to be in violation of 9.2.

10 Heading backing

10.1 General

105 mm wide rolls, or sheets cut from them, may be heading-backed to improve either the legibility of the heading or the ease of filing.

The heading backing may be translucent or opaque, and 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.

10.2 Width of heading space

Five widths of the heading space are specified. Their nominal values are: 4,5 mm; 6,5 mm; 9,25 mm; 12,75 mm and 17,75 mm.

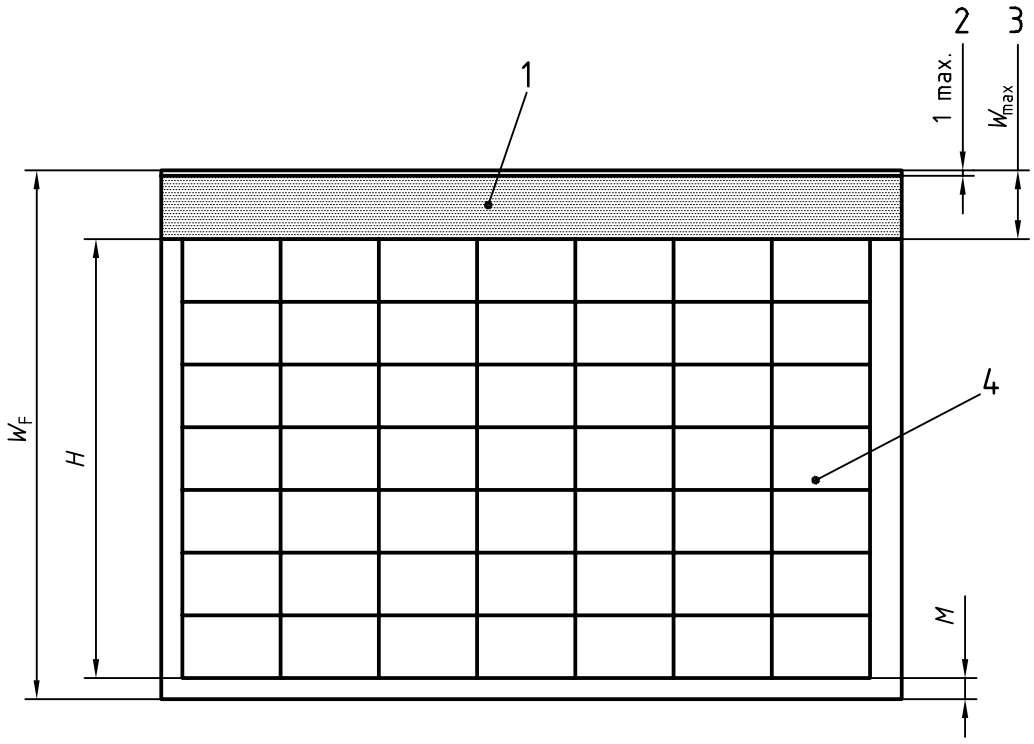
10.3 Width of heading backing

The maximum width of the heading backing shall be the minimum width of the heading space. It may be 1,0 mm less in width than the width of the heading space (see Figure 4).

10.4 Thickness of heading backing

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

Dimensions in millimetres



Key

1 Heading backing
2 Optional margin
3 Heading space
4 Grid frame

W_F Minimum width of sheet or roll of film.

H Height of a grid frame times the number of rows (see ISO 9923[4]).

M Maximum width of the bottom margin of the fiche (see ISO 9923[4]).

W_{max} Maximum width of the heading space.

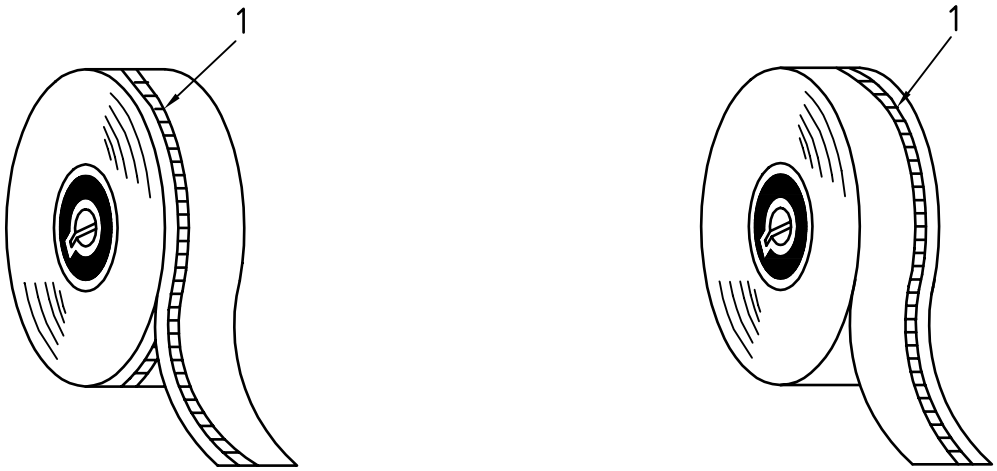
Figure 4 — Heading space and heading backing — Location and width

10.5 Winding configuration

Winding configurations A and B (see Figure 5) are identified by orienting 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 right.

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.

The use of “winding A” is preferred and “winding B” is recognized.



a) Winding A **b) Winding B**

Key

1 Heading backing

NOTE Sensitized side in.

Figure 5 — Winding configuration

11 Package marking

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;

— conditions of use (such as safelight);

— conditions of shipping and storage.

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:[1)]

— product name or trade name for unit packages, this item shall be legible under recommended safelight conditions (other than total darkness);

— name or trade mark of the manufacturer;

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

— manufacturer's catalogue identification number;

— bar-code information;

— information to assist recycling of waste packaging;

— quantity of units contained in the package;

— nominal product dimensions, in metric units, with the smaller dimension first;

— batch number and/or parent roll number;

— notch code or notch pattern, if any;

— appropriate processing/recommended processing conditions;

— indication of non-preferred winding on 16 mm and 35 mm roll film, if applicable;

— indication of splices on roll film, if any;

— indication of perforations on roll film, if applicable;

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

— manufacturer's recommended safelight conditions;[2)]

— manufacturer's recommended storage conditions;[2)]

— indication of winding configuration on 105 mm roll film.[2)]

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.

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

Annex A
(informative)

Quantity packaging

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 mm 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.

Bibliography

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

[2] ISO 1116:1999, *Microcopying — 16 mm and 35 mm microfilm, spools and reels — Specifications*.

[3] ISO 6221:1996, *Photography — Films and papers — Determination of dimensional change*.

[4] ISO 9923:1994, *Micrographics — Transparent A6 microfiche — Image arrangements*.

ICS 37.040.20; 37.080

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