INTERNATIONAL STANDARD

ISO 4090

Third edition
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Photography — Medical radiographic cassettes/screens/films and hard-copy imaging films — Dimensions and specifications

Photographie — Cassettes/écrans/films radiographiques médicaux et films d'imagerie copie-papier — Dimensions et spécifications

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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 4090 was prepared by Technical Committee ISO/TC 42, *Photography*.

This third edition cancels and replaces the second edition (ISO 4090:1991) which has been technically revised.

Annexes B and E form a normative part of this International Standard. Annexes A, C, D and F to I are for information only.

Introduction

This International Standard is based on a combination and revision of the following five documents:

— ANSI/NAPM ITI. 49-1995, *Photography (Films) — Medical radiographic cassettes/screens/films — Dimensions and specifications*

— IEC 60406:1997, *Cassettes for medical X-ray diagnosis — Radiographic cassettes and mammographic cassettes*

— IEC 60658:1979, *Radiographic intensifying screens for medical use — Dimensions*

— ISO WD1/4090, *Photography — Film Dimensions — Medical radiography*

— ISO WD2/15264, *Photography — Medical hard copy imaging film — Dimensions and specifications*

The aim of this International Standard is to bring together all standardized information about dimensions and related specifications of photographic materials in the form of sheets and related products (screens and cassettes); all of which are intended for use in medical radiography. The worldwide community using radiographic equipment will benefit by having all this information in a single text.

This text of this International Standard is not intended to change the contents of the aforementioned documents, but only to bring them together and to resolve the discordance existing between the different standards or standard projects. The existence of a single International Standard for sheet films and related products will resolve existing differences by converting inch sizes to metric sizes.

Inch nominal sizes and inch dimensions are not found in this International Standard. Informative annex F describes the transition from inch to metric dimensions for the reader. Conversion to metric specifications has resulted in a potentially confusing situation. Use of the same nominal dimension (20×40 and 20×25, for example) might imply to the reader that the aims and tolerances should be identical. In some cases, where one size is of inch origin and the other is of metric origin, this is not true. Therefore, TC 42 agreed that it would be best to separate tables into sizes of metric origin versus sizes of inch origin.

By combining the existing documents and the dimensional tables, the reader can now easily compare sizes of films, screens and cassettes — all in a glance. Combination has also facilitated a significant comparison of preferred and recognized sizes, as well as a reconciliation of whether films and screens properly fit inside their corresponding cassettes. This comparison has resulted in a significant improvement in the agreement between sizes, as well as component “fit”.

This International Standard refers to mammography cassettes as either preferred sizes or recognized sizes. All new mammography cassettes must conform to the dimensions given as “preferred”. The dimensions given for recognized sizes are listed in order to inform the reader regarding an older style of mammography cassettes. Although the older style cassettes are no longer preferred (no longer the industry standard), use of this style throughout the world is expected to continue for some time. So, they are listed here as “recognized” only.

Medical radiographic films in roll form are not a part of this International Standard. Use of roll films appears well established and stable, but does not justify a new, stand-alone standard. In order to assist the reader, information regarding roll films is listed in informative annex A.

Annexes G, H and I provide information on the dimensional stability of film, quantity packaging and sizes of inch origin (film dimension exceptions), respectively.

Photography — Medical radiographic cassettes/screens/films and hard-copy imaging films — Dimensions and specifications

1 Scope

This International Standard specifies the nominal sizes, aim dimensions with tolerances, weights, and certain tests for medical radiographic cassettes, screens, and films. It includes medical hard-copy imaging films in the form of sheets, such as laser films and video.

This International Standard also includes information regarding the appropriate marking of these products, and special attention is given to cassettes/screens/films used for mammography.

This International Standard does not include films in roll format (see informative annex A).

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

IEC 61267:1994, *Medical diagnostic X-ray equipment — Radiation conditions for use in the determination of characteristics.*

3 Terms and definitions

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

3.1
preferred mammography sizes
current industry standard, reflecting modern industry trends

NOTE Aim and tolerance dimensions are different for preferred sizes versus recognized sizes.

3.2
recognized mammography sizes
former industry standard, listed because this older format is expected to be used in clinical applications worldwide for some time to come

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 ± 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 1:1975, *Standard reference temperature for industrial length measurements*, and a relative humidity of 50 %.

5 Radiographic cassettes

5.1 Dimensions

5.1.1 Nominal sizes, aim and tolerance dimensions

Nominal sizes, aim and tolerance dimensions and weight for preferred radiographic cassette sizes shall conform to the values given in Tables 1 and 2.

Nominal sizes, aim and tolerance dimensions and weight for recognized radiographic cassette sizes shall conform to the values given in Tables 3 and 4.

The materials and design of the cassette shall ensure that, under normal conditions of use, the shape and dimensions comply with the limits for the outer dimensions (OD) and inner dimensions (ID) given in Tables 1, 2, 3 and 4, over a relative humidity range from 30 % to 85 % and a temperature range from 10 °C to 40 °C.

5.1.2 Denomination

Radiographic cassettes are denoted by the nominal size expressed in numerical values (in centimetres) without adding the measurement unit "cm".

EXAMPLE Cassette 18 × 24 (eighteen by twenty-four) denotes a radiographic cassette for a film with nominal size 18 cm × 24 cm.

Table 1 — Preferred radiographic cassette sizes of metric origin

Nominal size cm	Film size mm			Screen size mm			Cassette ID mm			Cassette OD mm			Thickness mm	Weight without screen g
	Min.	Aim	Max.	Min.	Aim	Max.	Min.	Aim	Max.	Min.	Aim	Max.	Aim and tolerance	Max.
13 × 18	127 × 177	128 × 178	129 × 179	127 × 177	130 × 180	131 × 181	131,5 × 181,5	132 × 182	133 × 183	156,5 × 206,5	157,5 × 208,5	158,5 × 208,5	15^{+1}_{-2}	500
18 × 24	177 × 237	178 × 238	179 × 239	177 × 237	180 × 240	181 × 241	181,5 × 241,5	182 × 242	183 × 243	206,5 × 266,5	207,5 × 267,5	208,5 × 268,5	15^{+1}_{-2}	800
18 × 43	177 × 429	178 × 430	179 × 431	177 × 429	180 × 432	181 × 433	181,5 × 433,5	182 × 434	183 × 435	206,75 × 458,5	207,75 × 459,5	208,75 × 460,5	15^{+1}_{-2}	1 000
20 × 40	197 × 397	198 × 398	199 × 399	197 × 397	200 × 400	201 × 401	201,5 × 401,5	202 × 402	203 × 403	226,5 × 426,5	227,5 × 427,5	228,5 × 428,5	15^{+1}_{-2}	1 000
24 × 30	237 × 297	238 × 298	239 × 299	237 × 297	240 × 300	241 × 301	241,5 × 301,5	242 × 302	243 × 303	266,5 × 326,5	267,5 × 327,5	268,5 × 328,5	15^{+1}_{-2}	1 200
30 × 40	297 × 397	298 × 398	299 × 399	297 × 397	300 × 400	301 × 401	301,5 × 401,5	302 × 402	303 × 403	326,5 × 426,4	327,5 × 427,5	328,5 × 428,5	15^{+1}_{-2}	1 900
30 × 90 (see note)	297 × 896	298 × 897,5	299 × 899	297 × 897	300 × 900	301 × 901	301,5 × 901,5	302 × 902	303 × 903	326,5 × 926,5	327,5 × 927,5	328,5 × 928,5	$16{,}5^{+1}_{-3{,}5}$	—
30 × 120 (see note)	297 × 1 196	298 × 1 197,5	299 × 1 197	297 × 1 197	300 × 1 200	301 × 1 201	301,5 × 1 201,5	302 × 1 202	303 × 1 203	326,5 × 1 226,5	327,5 × 1 227,5	328,5 × 1 228,5	$16{,}5^{+1}_{-3{,}5}$	—
Dental radiography (Extra-oral)														
13 × 30	127 × 297	128 × 298	129 × 299	127 × 297	130 × 300	131 × 301	131,5 × 301,5	132 × 302	133 × 303	156,6 × 326,5	157,6 × 327, 5	158,6 × 328,5	15^{+1}_{-2}	800
15 × 30	147 × 297	148 × 298	149 × 299	147 × 297	150 × 300	151 × 301	151,5 × 301,5	152 × 302	153 × 303	176,5 × 326,5	177,5 × 327,5	178,5 × 328,5	15^{+1}_{-2}	800

NOTE These sizes may be formed from three smaller sheets attached together. The resultant sheet may be folded to facilitate shipping.

Table 2 — Preferred radiographic cassette sizes of inch origin

Nominal size	Film size			Screen size			Cassette ID			Cassette OD			Thickness	Weight without screen
cm	mm			mm			mm			mm			mm	g
	Min.	Aim	Max.	Min.	Aim	Max.	Min.	Aim	Max.	Min.	Aim	Max.	Aim and tolerance	Max.
20 × 25	200,8 × 252	201,6 × 252,8	202,4 × 253,6	200,8 × 252	201,6 × 252,8	202,4 × 253,6	204,7 × 255,5	205,2 × 256	206,2 × 257	229,7 × 280,5	230,7 × 281,5	231,7 × 282,5	15^{+1}_{-2}	1 000
35 × 35	353 × 353	354 × 354	355 × 355	353 × 353	356 × 356	357 × 357	357,5 × 357,5	358 × 358	359 × 359	382,5 × 382,5	383,5 × 383,5	384,5 × 384,5	15^{+1}_{-2}	1 900
35 × 43	353 × 429	354 × 430	355 × 431	353 × 429	356 × 432	357 × 433	357,5 × 433,5	358 × 434	359 × 435	382,5 × 458,5	383,5 × 459,5	384,5 × 460,5	15^{+1}_{-2}	2 100

Table 3 — Recognized radiographic cassette sizes of metric origin

Nominal size	Film size			Screen size			Cassette ID			Cassette OD			Thickness	Weight without screen
cm	mm			mm			mm			mm			mm	g
	Min.	Aim	Max.	Min.	Aim	Max.	Min.	Aim	Max.	Min.	Aim	Max.	Aim and tolerance	Max.
24 × 24	237 × 237	238 × 238	239 × 239	237 × 237	240 × 240	241 × 241	241,5 × 241,5	242 × 242	243 × 243	266,5 × 266,5	267,5 × 267,5	268,5 × 268,5	15^{+1}_{-2}	1 000
30 × 30	297 × 297	298 × 298	299 × 299	297 × 297	300 × 300	301 × 301	301,5 × 301,5	302 × 302	303 × 303	326,5 × 326,5	327,5 × 327,5	328,5 × 328,5	15^{+1}_{-2}	1 400
40 × 40	397 × 397	398 × 398	399 × 399	397 × 397	400 × 400	401 × 401	401,5 × 401,5	402 × 402	403 × 403	426,5 × 426,5	427,5 × 427,5	428,5 × 428,5	15^{+1}_{-2}	1 900
20 × 96 (see note)	197 × 956	198 × 957,5	199 × 959	197 × 956	200 × 960	201 × 961	201,5 × 961,5	202 × 962	203 × 963	226,5 × 986,5	227,5 × 987,5	228,5 × 988,5	$16,6^{+1}_{-3,5}$	—

NOTE This size may be formed from three smaller sheets attached together. The resultant sheet may be folded to facilitate shipping.

Table 4 — Recognized radiographic cassette sizes of inch origin

Nominal size	Film size			Screen size			Cassette ID			Cassette OD			Thickness	Weight without screen
cm	mm			mm			mm			mm			mm	g
	Min.	Aim	Max.	Min.	Aim	Max.	Min.	Aim	Max.	Min.	Aim	Max.	Aim and tolerance	Max.
25 × 30	252 × 302,4	252,8 × 303,2	253,6 × 304,0	252 × 303,2	252,8 × 304	253,6 × 304,8	255,5 × 306,3	256 × 306,8	257 × 307,8	280,5 × 331,3	281,5 × 332,3	282,5 × 333,3	15^{+1}_{-2}	1 200
28 × 35	277,8 × 354	278,6 × 354,8	279,4 × 355,6	277,8 × 354	278,6 × 354,8	279,4 × 355,6	280,9 × 357,1	281,4 × 357,6	282,4 × 358,6	305,9 × 382,1	306,9 × 383,1	307,9 × 384,1	15^{+1}_{-2}	1 900
30 × 35	297,2 × 353,2	298 × 354	298,8 × 354,8	297 × 353	300 × 356	301 × 357	301,5 × 357,5	302 × 358	303 × 359	326,5 × 382,5	327,5 × 383,5	328,5 × 384,5	15^{+1}_{-2}	1 900
30 × 38	302,4 × 378,6	303,2 × 379,4	304 × 380,2	303,2 × 379,4	304 × 380,2	304,8 × 381	306,3 × 382,5	306,8 × 383	307,8 × 384	331,3 × 407,5	332,3 × 408,5	333,3 × 409,5	15^{+1}_{-2}	1 900

5.1.3 Outer dimensions (OD)

The outer dimensions, in the plane of the film, shall be 27,5 mm ± 1 mm more than the nominal size of the cassette.

Cassettes of nominal sizes that have both dimensions not exceeding 43,2 cm shall have an aim thickness of 15 mm, minimum thickness of 13 mm, and maximum thickness of 16 mm.

Cassettes of nominal sizes that have one or both dimensions greater than 43,2 cm shall have an aim thickness of 16,5 mm, minimum thickness of 13 mm, and maximum thickness of 17,5 mm.

The specified thickness of a cassette is intended to ensure that the cassette can be properly fixed in a defined position under a load (e.g. within a holder or rails). In no case shall the maximum thickness tolerance, as given in Tables 1, 2, 3 and 4, be exceeded in any part of the cassette.

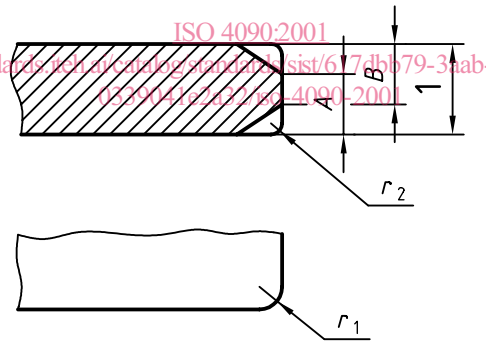
The corners and edges of the cassette, as shown in the top view of Figure 1, shall be smoothed or shaped over a quarter circle to a radius (r_1) of 10 mm maximum and 1 mm minimum.

The other edges, as shown in the side view of Figure 1, shall be smoothed over a quarter circle to a radius (r_2) of at least 1,5 mm.

The greatest value for the radius results from the minimum required planes as given by the dimensions A and B in the side view of Figure 1.

All parts of the cassette, such as hinges, locks and marking devices, shall be within the tolerances given in Tables 1, 2, 3 and 4 and shall be within the limits for corners and edges.

Dimensions in millimetres



Key

1 Thickness (see Tables 1, 2, 3, 4)

Dimension	Radiographic cassettes	Mammography cassettes
r_1	Min. = 1; Max. = 10	Min = 3; Max = 10
r_2	1,5 minimum	1,5 minimum
A	greater than 11	greater than 11
B	greater than 11	greater than 11

Figure 1 — Cassette outside dimensions

5.1.4 Inner dimensions (ID)

The inner dimensions, in the plane of the film, shall be as given in Tables 1, 2, 3 and 4.