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# International Standard



# 3029

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Photography — 126-size cartridges — Dimensions of cartridge, film and backing paper

*Photographie — Chargeur format 126 — Dimensions du chargeur, du film et du papier protecteur*

Second edition — 1983-08-15

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3029 was developed by Technical Committee ISO/TC 42, *Photography*.

This second edition was submitted directly to the ISO Council, in accordance with clause 6.11.2 of part 1 of the Directives for the technical work of ISO. It cancels and replaces the first edition (i.e. ISO 3029-1975), which had been approved by the member bodies of the following countries:

Belgium	Italy	Thailand
Bulgaria	Japan	Turkey
Canada	Poland	United Kingdom
France	South Africa, Rep. of	USA
Germany, F.R.	Switzerland	USSR

No member body had expressed disapproval of the document.

# Photography — 126-size cartridges — Dimensions of cartridges, film and backing paper

## 1 Scope and field of application

This International Standard specifies the dimensions of 126-size cartridges as well as dimensions of film and backing paper. Certain desirable camera characteristics are given, for guidance, in annex A.

This International Standard also lays down the dimensions of a set of film identification notches which assigns a code number to a specific film at the request of film manufacturer. Neither the assignment nor incorporation of film identification notches for particular film products is required by this International Standard. However, the procedure to be followed by film manufacturers in obtaining code numbers is given in annex B. The registration function is performed, under authorization from ISO by the National Association of Photographic Manufacturers, whose address is:

National Association of Photographic Manufacturers, Inc.  
600 Mamaroneck Avenue  
Harrison  
NEW YORK 10528  
USA

## 2 Reference

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

## 3 Dimensions and characteristics of cartridge and spool

**3.1** The dimensions and characteristics of the cartridge and of the spool shall be as shown in figure 1 and as given in tables 1 and 2.

**3.2** All dimensions apply to an assembly cartridge at the time of manufacture, under atmospheric conditions specified in ISO 554: temperature  $23 \pm 2$  °C, relative humidity  $50 \pm 5$  %.

**3.3** Most cartridge dimensions are given with respect to a set of three mutually perpendicular datum planes U, S, T (see figure 1), which are coincident with the surfaces that engage mating camera parts in such a way as to ensure proper alignment of the cartridge in the camera.

**3.4** In order to visualize the minimum space which needs to be reserved in cameras for the cartridge, all cartridge diagrams have been drawn employing the particular contours which result in a cartridge of maximum profile (see also 3.10).

**3.5** For quality control purposes, the four areas of datum U are used for gauging the dimensions of the cartridge.

**3.6** Figure 1 shows the spool or core, on which the film is wound, pushed to the uppermost limit in the cartridge.

**3.7** The radius  $C_{25}$  shall be a single radius tangential to three planes, determined respectively by  $C_{12}$  max.,  $C_{14}$  max., and a plane passing at an angle of  $C_{24}$  min. through the intersection of two other planes determined respectively by  $C_{15}$  min. and  $G_2$  max. (See figure 1 detail 0.)

**3.8** The radius  $D_2$  applies only at the four areas "Z".

**3.9** The axis of diameter  $E_8$  (see figure 1) shall be capable of meeting its true position (as defined by  $C_5$  and  $C_{11}$ ).

**3.10** Although the spool may extend beyond the cartridge housing when pushed in either direction, the sum of  $E_4$  and  $E_5$  shall be so selected that the total spool length will be capable of being completely contained within the cartridge housing dimension  $F_1 + F_2$ . It is important that the spool can shift freely to be contained in the cartridge housing.

**3.11** Dimension  $E_9$  represents the theoretical maximum spool flange diameter.

**3.12**  $G_{11}$ , 1,45 mm (0.057 in), is a nominal dimension from the gauging area of datum U to the film emulsion surface plane and applies only to a film load which has acquired "scroll set" at least equivalent to that expected at the earliest time it is anticipated it would be exposed by customers. Throughout the expected useful life of the film, the dimension  $G_{11}$  represents the aim value for the film emulsion surface throughout the cartridge aperture. Since the design and adjustment of camera lenses, with respect to focal plane and depth of field, will be based on this value, control of this dimension within narrow limits by manufacturers of film-loaded cartridges is an important quality consideration.

**3.13**  $G_{16}$ , 1,98 mm (0.078 in), is the maximum dimension from the gauging area of datum U to the non-deflected first surface (black side, i.e. side contiguous with the film surface opposite the emulsion surface) of the backing paper within "Area S".

**3.14** The take-up core diameter shall be 11,81 mm (0.465 in) minimum.

**3.15** "Film weave" shall not exceed  $\pm 0,51$  mm ( $\pm 0.020$  in) of the true position measured at a perforation as shown.

**3.16** If film data, such as film name and number of exposures in load, are to be provided, they shall be within the area shown.

**3.17** Film-loaded cartridges should require no more than  $50 \times 10^{-3} \text{ N} \cdot \text{m}^{1)}$  (7 ozf·in) of torque to sustain film advance and no more than  $85 \times 10^{-3} \text{ N} \cdot \text{m}$  (12 ozf·in) of torque to overcome momentary torque peaks; torques specified refer to measurements at the cartridge spool. Torque peaks may occur as a leading or trailing end of the film leaves the supply chamber of a cartridge and at each initiation of film movement.

It is also important to note that torque measurement may be significantly affected by the age of the film and by severe jarring of the cartridge which might tend to clockspring the scroll of film against the cavity wall. Thus, simulated customer conditions shall be taken into account when checking maximum torque (see also annex A).

**3.18** The two sets of dimensions,  $C_{16}$  and  $C_{17}$  together with  $G_9$  and  $G_{10}$ , describe the sides or walls of a rectangular channel which mates with a rail in the camera. Although the surfaces are shown as completely planar, they may be slightly depressed or relieved except in the four gauging areas. The tops of the resulting kinematic pips, or protrusions, however, should observe the dimensional limits.

**3.19** Dimension  $F_{10}$  designates the wall nearest datum T of one side of a rectangular rail whose surface, although shown completely planar, may be stepped or chamfered, if desired.

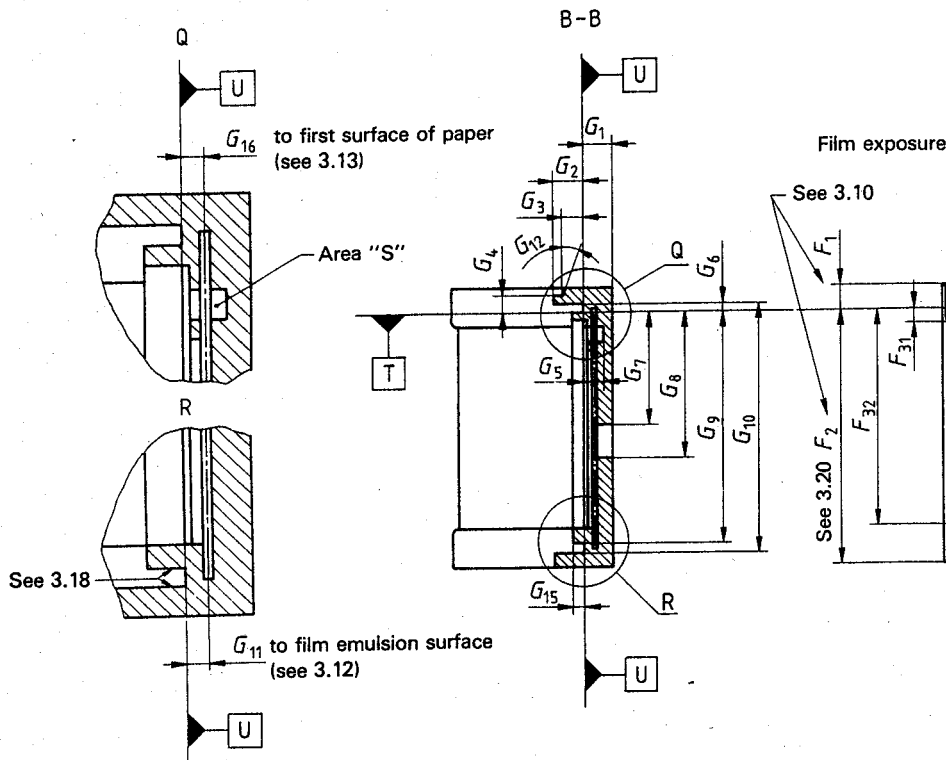
**3.20** The outside edge or wall of the rail containing the film-locating notch and identification notches is described by dimension  $F_2$ . This surface, although shown completely planar, may be stepped or chamfered similar to the cross-section of the film exposure rail, if desired.

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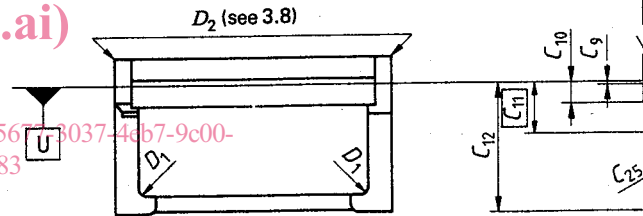
1) The newton metre (N·m) is a derived unit of the SI system of measurement used to express torque.



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$\varnothing 1,00 (0,040) U S$

See 3.9

Exposure number

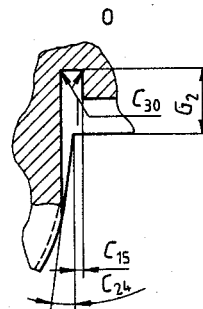


Figure 1 – Ca





Table 1 - Cartridge and spool dimensions

Dimension	Millimetres		Inches		Dimension	Millimetres		Inches	
	min.	max.	min.	max.		min.	max.	min.	max.
A <sub>1</sub>	39,37		1.550		E <sub>4</sub>	3,25	4,27	0.128	0.168
A <sub>2</sub>	1,78		0.070		E <sub>5</sub>	40,39	41,40	1.590	1.630
A <sub>3</sub>		5,08		0.200	E <sub>6</sub> radius		0,38		0.015
A <sub>4</sub>	8,89		0.350		E <sub>7</sub> radius		0,64		0.025
A <sub>5</sub>		26,16		1.030	E <sub>8</sub> diameter	16,51		0.650	
A <sub>6</sub>	30,73		1.210		E <sub>9</sub> diameter		2 × radius		2 × radius
A <sub>7</sub>		38,35		1.510	C <sub>25</sub>				C <sub>25</sub>
A <sub>8</sub>	5,59		0.220		E <sub>10</sub> radius		0,25		0.010
A <sub>9</sub>		3,30		0.130	F <sub>1</sub>		3,81		0.150
A <sub>10</sub> radius	6,48		0.255		F <sub>2</sub> see 3.20		41,40		1.630
A <sub>11</sub> *		1,14		0.045	F <sub>3</sub>	1,37	1,47	0.054	0.058
A <sub>12</sub> *		17,91		0.705	F <sub>4</sub>		2,41		0.095
A <sub>13</sub> see 3.16		7,11		0.280	F <sub>5</sub>	5,18		0.204	
A <sub>14</sub> see 3.16		38,10		1.500	F <sub>6</sub> radius		4,44		0.175
B <sub>1</sub>		4,32		0.170	F <sub>7</sub> radius	3,18		0.125	
B <sub>2</sub> radius	0,51		0.020		F <sub>8</sub> radius		1,65		0.065
B <sub>3</sub>	0,25		0.010		F <sub>9</sub> radius		0,13		0.005
C <sub>1</sub>		27,33		1.076	F <sub>10</sub> see 3.19	35,05	35,46	1.380	1.396
C <sub>2</sub>		60,96		2.400	F <sub>11</sub>		1,27		0.050
C <sub>3</sub>		25,15		0.990	F <sub>12</sub> radius		1,27		0.050
C <sub>4</sub>		58,42		2.300	F <sub>13</sub>		38,86		1.530
C <sub>5</sub> *	13,97		0.550		F <sub>14</sub>	4,88	5,89	0.192	0.232
C <sub>6</sub>	14,30		0.563		F <sub>15</sub>		13,84		0.545
C <sub>7</sub>		4,06		0.160	F <sub>16</sub>	21,72		0.855	
C <sub>8</sub> radius	12,45		0.490		F <sub>17</sub>	30,05	30,81	1.183	1.213
C <sub>9</sub>	0,00		0.000		F <sub>18</sub>	33,60	33,96	1.323	1.337
C <sub>10</sub>		3,81		0.150	F <sub>19</sub>		1,90		0.075
C <sub>11</sub>	8,53		0.336		F <sub>20</sub> see 3.15	3,18		0.125	
C <sub>12</sub>		21,46		0.845	F <sub>21</sub>	6,20	6,60	0.244	0.260
C <sub>13</sub>	1,14	1,40	0.045	0.055	F <sub>22</sub> radius		0,76		0.030
C <sub>14</sub>		26,92		1.060	F <sub>23</sub>		4,06		0.160
C <sub>15</sub>	0,89		0.035		F <sub>24</sub>	14,30		0.563	
C <sub>16</sub>	35,41	35,66	1.394	1.404	F <sub>25</sub>		0,51		0.020
C <sub>17</sub>	38,68		1.523		F <sub>26</sub>		37,85		1.490
C <sub>18</sub>		59,79		2.354	F <sub>27</sub>		1,52		0.060
C <sub>19</sub> radius	10,80		0.425		F <sub>28</sub>		1,52		0.060
C <sub>20</sub>		0,76		0.030	F <sub>29</sub>	34,29		1.350	
C <sub>21</sub>		3,81		0.150	F <sub>30</sub> radius		1,27		0.050
C <sub>22</sub>		18,54		0.730	F <sub>31</sub>		2,29		0.090
C <sub>23</sub> radius	10,80		0.425		F <sub>32</sub>	35,05		1.380	
C <sub>24</sub> degrees	4°		4°		G <sub>1</sub>	4,32	4,83	0.170	0.190
C <sub>25</sub>		see 3.7			G <sub>2</sub>	4,57	4,83	0.180	0.190
C <sub>26</sub> radius		1/2 width		1/2 width	G <sub>3</sub>	3,30	3,81	0.130	0.150
C <sub>27</sub>		3,68		0.145	G <sub>4</sub>	2,54	3,05	0.100	0.120
C <sub>28</sub>	0,03		0.001		G <sub>5</sub>	3,56		0.140	
C <sub>29</sub> radius		1,52		0.060	G <sub>6</sub>	1,37	1,47	0.054	0.058
C <sub>30</sub> radius		0,08		0.003	G <sub>7</sub>		19,30		0.760
C <sub>31</sub> radius		0,25		0.010	G <sub>8</sub>	23,62		0.930	
D <sub>1</sub> radius	0,51		0.020		G <sub>9</sub>	36,93	37,19	1.454	1.464
D <sub>2</sub> radius		1,52		0.060	G <sub>10</sub>	40,26		1.585	
see 3.8					G <sub>11</sub> nominal		1,45		0.057
E <sub>1</sub> diameter	10,29	10,64	0.405	0.419	G <sub>12</sub> degrees	20°		20°	
E <sub>2</sub>		0,76		0.030	G <sub>15</sub>	1,40	1,65	0.055	0.065
E <sub>3</sub>		38,10		1.500	G <sub>16</sub>		1,98		0.078

\* Basic or true position dimension.



#### 4 Dimensions and location of film exposure notches

4.1 The film exposure notch enables the cartridge manufacturer to incorporate a specific notch which corresponds to the exposure which should be used for a particular film in the cartridge. This notch automatically presets some cameras to this

exposure setting. The exposure may be different from that specified for film under the lighting conditions used. For example, film with an ISO speed of 100 may be notched for ISO 64 for use in fixed-exposure cameras to take advantage of the film's over-exposure latitude.

4.2 The dimensions and location of these notches are shown in figure 1 and given in table 2.

Table 2 — Film exposure notches

Notch position	Dimension "W" ±0,33 mm (±0.013 in)		Dimension "X" ±0,33 mm (±0.013 in)		ISO speed in 1/3 stop increments	
	mm	in	mm	in	Arithmetic	Logarithmic
1	1,45	0.057	5,41	0.213	8	10°
2	2,39	0.094	6,35	0.250	10	11°
3	3,33	0.131	7,29	0.287	12	12°
4	4,27	0.168	8,23	0.324	16	13°
5	5,21	0.205	9,17	0.361	20	14°
6	6,15	0.242	10,11	0.398	25	15°
7	7,09	0.279	11,05	0.435	32	16°
8	8,03	0.316	11,99	0.472	40	17°
9	8,97	0.353	12,93	0.509	50	18°
10	9,91	0.390	13,87	0.546	64	19°
11	10,85	0.427	14,81	0.583	80	20°
12	11,79	0.464	15,75	0.620	100	21°
13	12,73	0.501	16,69	0.657	125	22°
14	13,67	0.538	17,63	0.694	160	23°
15	14,60	0.575	18,57	0.731	200	24°
16	15,54	0.612	19,51	0.768	250	25°
17	16,48	0.649	20,45	0.805	320	26°
18	17,42	0.686	21,39	0.842	400	27°
19	18,36	0.723	22,33	0.879	500	28°
20	19,30	0.760	23,27	0.916	640	29°
21	20,24	0.797	24,21	0.953	800	30°
22	21,18	0.834	25,15	0.990	1 000	31°
23	22,12	0.871	26,09	1.027	1 250	32°
24	23,06	0.908	27,03	1.064	1 600	33°
25	24,00	0.945	27,97	1.101	2 000	34°
26	24,94	0.982	28,91	1.138	2 500	35°
27	25,88	1.019	29,84	1.175	3 200	36°
28	26,82	1.056	30,78	1.212	4 000	37°
29	27,76	1.093	31,72	1.249	5 000	38°
30	28,70	1.130	32,66	1.286	6 400	39°
31	29,64	1.167	33,60	1.323	8 000	40°