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Photography — 110-size cartridges — Dimensions

Photographie — Chargeurs de format 110 — Dimensions

Reference number
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Foreword

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Photography — 110-size cartridges — Dimensions

1 Scope and field of application

This International Standard specifies the dimensions of 110-size cartridges.

This product was designed in SI units, which are therefore prime, unless specifically noted to the contrary in this International Standard.

This International Standard is intended to be used in conjunction with ISO 7330 and ISO 7374 to completely specify 110-size cartridges.

2 References

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

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

ISO 7330, *Photography — 110-size cartridges — Location and dimensions of film exposure and film identification notches.*

ISO 7374, *Photography — 110-size cartridges — Dimensions and format of film and backing paper*.

3 Datum referencing

3.1 Principle

The principle of datum referencing is used to relate the cartridge to a set of three mutually perpendicular datum planes in contact with the cartridge surfaces which engage mating camera parts so as to ensure proper alignment of the cartridge in the camera. All related cartridge measurements originate from these planes.

3.2 Primary datum, S

The S plane or seating datum plane is the plane of a simulated camera aperture frame and is contacted by the four "A" pads of the cartridge.

3.3 Secondary datum, R

The R plane or rail datum plane is perpendicular to the S plane and is contacted by the two "B" pads located on the product identification rail. (See figures 1 and 2.)

3.4 Tertiary datum, T

The T plane or take-up datum plane is mutually perpendicular to the S and R planes and is contacted by the T-plane rib moulded into the cartridge take-up chamber near the gear cover. (See figures 1 and 2.)

4 Dimensions and characteristics of cartridge and spool

4.1 Dimensions and characteristics apply at the time of manufacture to an assembled cartridge at standard atmospheric conditions of 23 ± 2 °C and (50 ± 5) % relative humidity as specified in ISO 554[1] and when the four "A" pads of the cartridge are seated with a force of 1,11 to 2,22 N (4 to 8 ozf) per camera contact area[2] against a fixture that simulates the S plane or camera aperture frame. (See note 8, figure 2.)

4.2 The dimensions shall be as given in the table and figure 2.

4.3 Film-loaded cartridges shall require no more than 35×10^{-3} N·m (5.0 ozf·in) of torque to sustain film advance, and no more than 53×10^{-3} N·m (7.5 ozf·in) of torque to overcome momentary torque peaks in the picture area. Torque peaks at leading and trailing ends of film shall require no more than 75×10^{-3} N·m (10.6 ozf·in) of torque. After the trailer has been wound off, paper shall remain in the cartridge aperture under an applied torque of 100×10^{-3} N·m (14.2 ozf·in). (Torques specified refer to torques measured as defined in annex B.)

4.4 Nominally the film emulsion surface plane is 0,10 ± 0,05 mm (0.004 ± 0.002 in) to the rear of datum plane S. This 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 users. This dimension, measured at five cartridge film-plane measuring points, applies throughout the useful life of the film. (See figure 3.) 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 is an important quality consideration.

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

2) In usage, adequate force should be applied per camera contact area to ensure a sufficient net seating force at each seating pad "A".

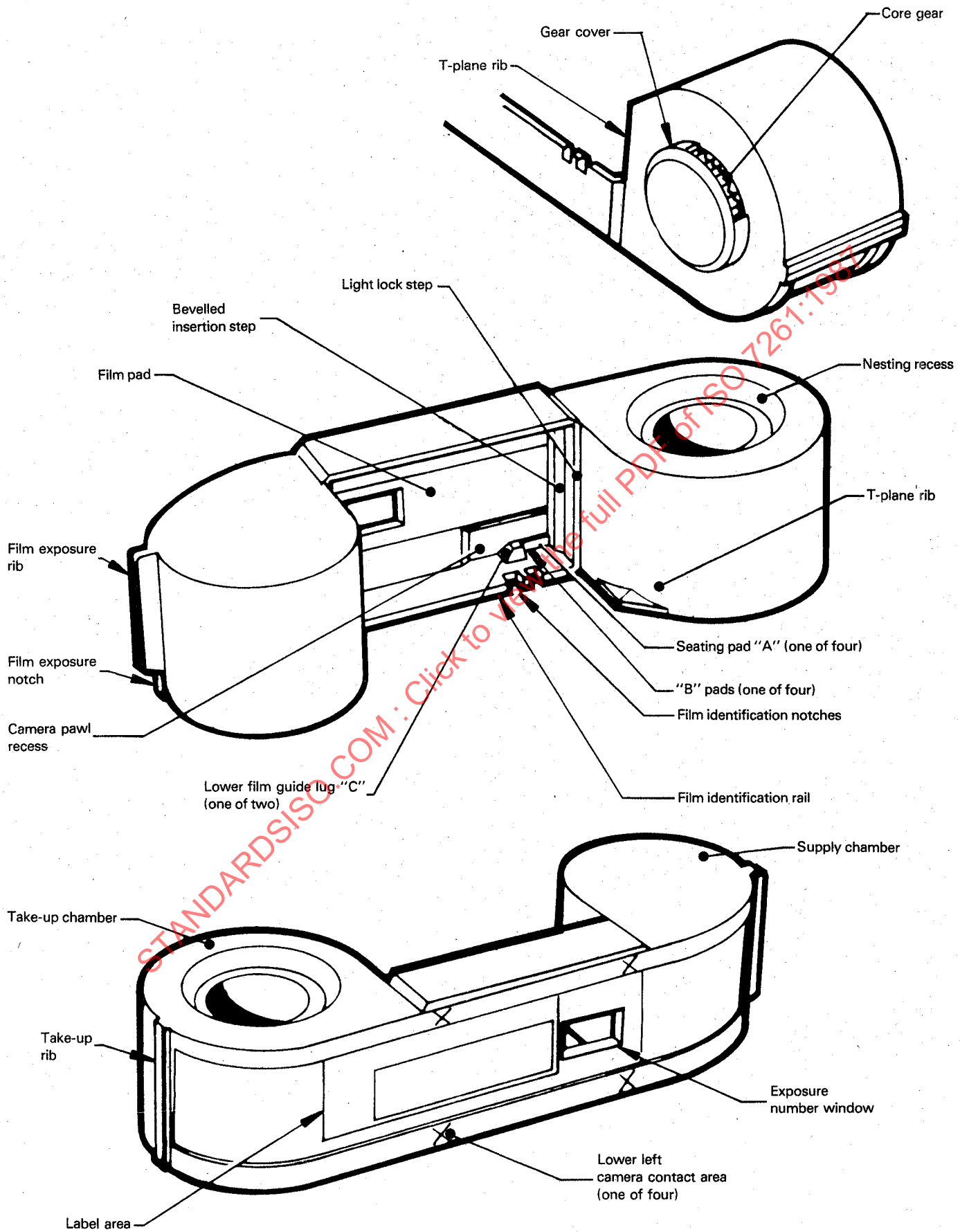


Figure 1 — 110-size cartridge nomenclature

Table — Cartridge dimensions

Dimension	Millimetres			Inches		
	min.	aim	max.	min.	aim	max.
A_1	28,70	28,90	29,10	1.130	1.138	1.146
A_2	5,74	5,92	6,10	0.226	0.233	0.240
A_3	3,28	3,38	3,48	0.129	0.133	0.137
A_4 (angle)	30°			30°		
A_5	1,55	1,65	1,75	0.061	0.065	0.069
A_6	0,66	0,76	0,86	0.026	0.030	0.034
A_7			0,12			0.005
A_8	28,73	28,83	28,93	1.131	1.135	1.139
A_9	29,62	29,72	29,82	1.166	1.170	1.174
A_{10}	30,35			1.195		
A_{11}	30,38	30,48	30,58	1.196	1.200	1.204
A_{12} (angle)		50°	nom.		50°	nom.
A_{13} (angle)		20°	nom.		20°	nom.
A_{14} (angle)		50°	nom.		50°	nom.
A_{15} (radius)			38,10			1.500
A_{16}		11,35	See note 6		0.447	See note 6
A_{17}		13,08	See note 6		0.515	See note 6
A_{18}	10,70	10,80	10,90	0.421	0.425	0.429
B_1	30,33	30,43	30,53	1.194	1.198	1.202
B_2	2,74	2,79	2,84	0.108	0.110	0.112
B_3	0,97	1,02	1,07	0.038	0.040	0.042
B_4	5,36	5,46	5,56	0.211	0.215	0.219
B_5	30,74	30,94	31,14	1.210	1.218	1.226
B_6 (angle)		30°	ref.		30°	ref.
B_7	1,12	1,32	1,52	0.044	0.052	0.060
B_8	0,10	0,30	0,50	0.004	0.012	0.020
C_1	53,72	53,98	54,24	2.115	2.125	2.135
C_2	51,87	52,07	52,27	2.042	2.050	2.058
C_3	51,38	51,61	51,84	2.023	2.032	2.041
C_4		41,02	basic[1]		1.615	basic[1]
C_5		39,12	basic[1]		1.540	basic[1]
C_6		35,56	basic[1]		1.400	basic[1]
C_7 (radius)	10,34	10,54	10,74	0.407	0.415	0.423
C_8	23,30	23,50	23,70	0.917	0.925	0.933
C_9		16,64	basic[1]		0.655	basic[1]
C_{10}		12,95	basic[1]		0.510	basic[1]
C_{11}	10,27	10,52	10,77	0.404	0.414	0.424
C_{12}	8,82	9,02	9,22	0.347	0.355	0.363
C_{13}	7,62			0.300		
C_{14} (radius)	13,01	13,21	13,41	0.512	0.520	0.528
C_{15} (radius)	18,14	18,34	18,54	0.714	0.722	0.730
C_{16}	5,03	5,23	5,43	0.198	0.206	0.214
C_{17} (radius)	13,57	13,77	13,97	0.534	0.542	0.550
C_{18}	2,21	2,41	2,61	0.087	0.095	0.103
C_{19}	7,62			0.300		
C_{20}	10,14	10,47	10,80	0.399	0.412	0.425
C_{21}		11,35	basic[1]		0.447	basic[1]
C_{22}	24,16	24,36	24,56	0.951	0.959	0.967
C_{23} (radius)	12,80	13,00	13,20	0.504	0.512	0.520
C_{24} (angle)	10°			10°		

Dimension	Millimetres			Inches		
	min.	aim	max.	min.	aim	max.
C_{25}	26,92	27,18	27,44	1.060	1.070	1.080
C_{26}	25,88	26,06	26,24	1.019	1.026	1.033
C_{27}		13,08	basic[1]		0.515	basic[1]
D_1	35,56			1.400		
D_2	27,23	27,43	27,63	1.072	1.080	1.088
D_3	19,28	19,48	19,68	0.759	0.767	0.775
D_4		17,98	nom.		0.708	nom.
D_5	18,75	18,95	19,15	0.738	0.746	0.754
D_6	17,53	17,73	17,93	0.690	0.698	0.706
D_7	0,86	0,96	1,06	0.034	0.038	0.042
D_8	11,20	11,40	11,60	0.441	0.449	0.457
D_9		9,40	nom.		0.370	nom.
D_{10}	6,43	6,63	6,83	0.253	0.261	0.269
D_{11} (angle)		45°	nom.		45°	nom.
D_{12}	1,25	1,65	2,05	0.049	0.065	0.081
D_{13}	5,11	5,51	5,91	0.201	0.217	0.233
D_{14}	24,57	24,97	25,37	0.967	0.983	0.999
D_{15}	28,43	28,83	29,23	1.119	1.135	1.151
D_{16} (diameter)	14,12	14,22	14,32	0.556	0.560	0.564
D_{17}			3,00			0.118
D_{18}	2,03			0.080		
D_{19}			0,40			0.016
D_{20}			16,00			0.630
D_{21}	18,01	18,24	18,47	0.709	0.718	0.727
D_{22}		9,02	nom.		0.355	nom.
D_{23}	6,35			0.250		
D_{24}			19,30			0.760
D_{25} (angle)	34°	37°	40°	34°	37°	40°
D_{26}			2,25			0.089
E_1	1,04	1,09	1,14	0.041	0.043	0.045
E_2	17,17	17,22	17,27	0.676	0.678	0.680
E_3	0,78	0,81	0,84	0.031	0.032	0.033
E_4 (angle)			45°			45°
E_5	3,20	3,30	3,40	0.126	0.130	0.134
F_1	0,66	0,76	0,86	0.026	0.030	0.034
F_2	0,66	0,76	0,86	0.026	0.030	0.034
F_3	0,88	0,91	0,94	0.035	0.036	0.037
F_4	0,88	0,91	0,94	0.035	0.036	0.037
F_5 (angle)			45°			45°
F_6			0,18			0.007
F_7 (angle)		0,75°	nom.		0,75°	nom.
F_8	17,91	18,03	18,15	0.705	0.710	0.715
F_9	0,59	0,69	0,79	0.023	0.027	0.031
F_{10} (angle)		0,75°	nom.		0,75°	nom.
F_{11}			0,18			0.007
F_{12}			4,83			0.190
F_{13}	13,20			0.520		
F_{14} (angle)			45°			45°
G_1	24,65	24,85	25,05	0.970	0.978	0.986
G_2 (radius)	1,37	1,57	1,77	0.054	0.062	0.070
H_1			0,40			0.016
H_2	2,16			0.085		

1) basic: a theoretically exact dimension used to describe location of a feature from which permissible variations are established by tolerance on other dimensions or notes.

[R] Rail datum plane (perpendicular to -S- and contacted by two "B" pads on film identification rail)

[S] Seating datum plane (contacted by four "A" pads)

[T] Take-up datum plane (perpendicular to -S- and -R- and contacted by -T- plane rib)

NOTES

1 Seating datum plane S contacted by areas A_1, A_2, A_3 and A_4.

2 Rail datum plane R contacted by areas B_3 and B_4.

3 Guides C_1 and C_2 determine film channel width, $[F_8 - (F_3 + F_4)]$.

4 Take-up core gear data (designed in inches)
Spur gear: 20 teeth
Tooth form per ANSI/AGMA 207.06
Diametral pitch: 48
Pitch diameter: 0.417 in (10,59 mm)
Pressure angle: 20°
Test radius with basic rack
$0.207\ ^{0}_{-0.006}$ in ($5{,}26\ ^{0}_{-0{,}15}$ mm)

5 Take-up core O.D. 0.696 in (17,68 mm) min.

6 Core gear axis located on the true position shown within 0,30 mm (0.012 in) diameter.

7 Force per camera contact area equals 1,11 to 2,22 N (4 to 8 ozf). (See 4.1.)

8 Dimensions shown apply when cartridge is seated against camera aperture frame with force as stated in note 7.

9 The radii shown shall be a maximum of 0,12 mm (0.005 in).

10 The radii shown shall be a maximum of 0,20 mm (0.008 in).

11 The radii shown shall be a maximum of 0,30 mm (0.012 in).

12 Corners not otherwise specified have a maximum radius of 0,50 mm (0.020 in).

13 Maximum diameter of allowable projection to be 3,0 mm (0.12 in).

14 The throat gap should be such that light tightness is assured.

15 A relief is suggested.

16 For notching information, see clause 4 of ISO 7330.

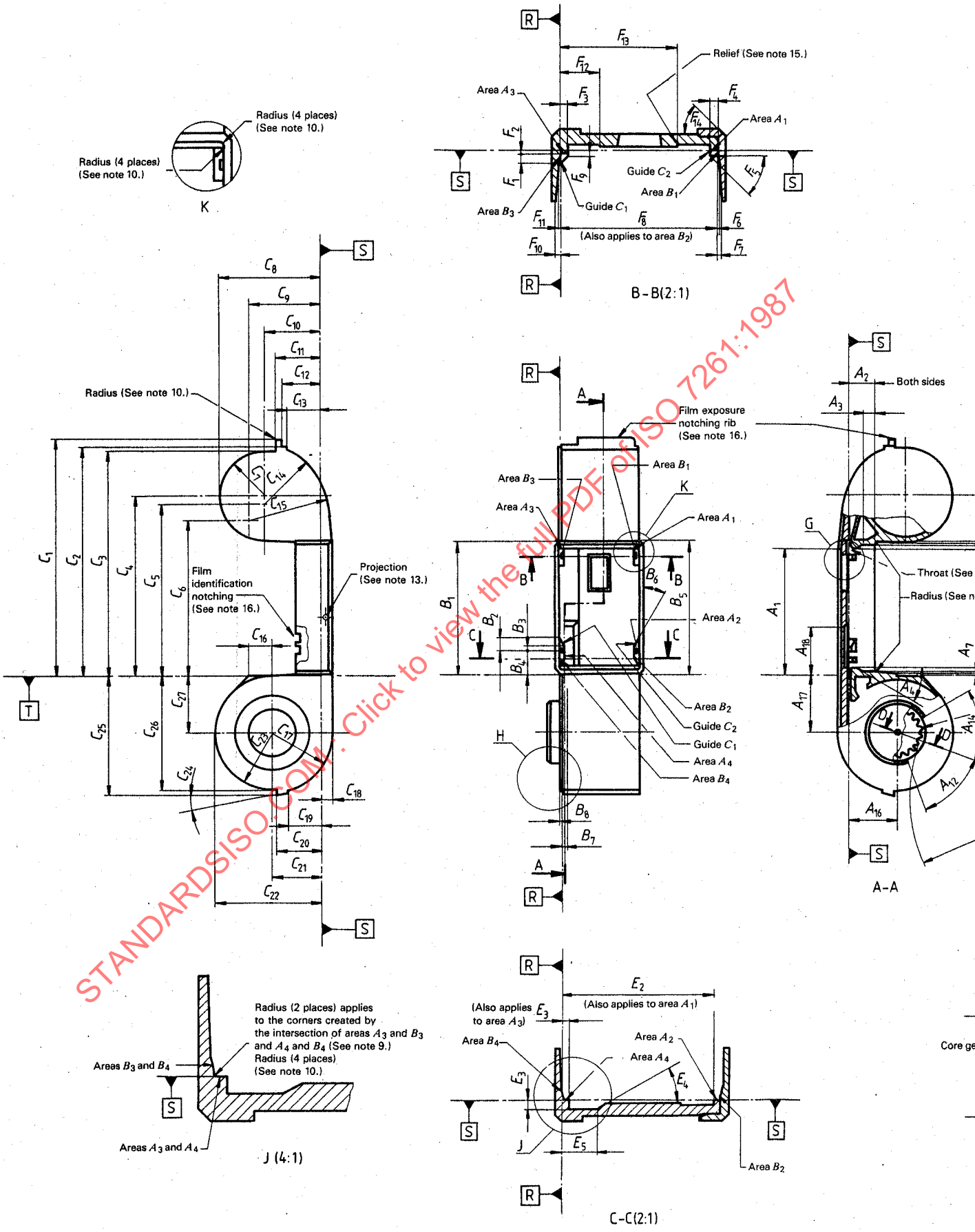
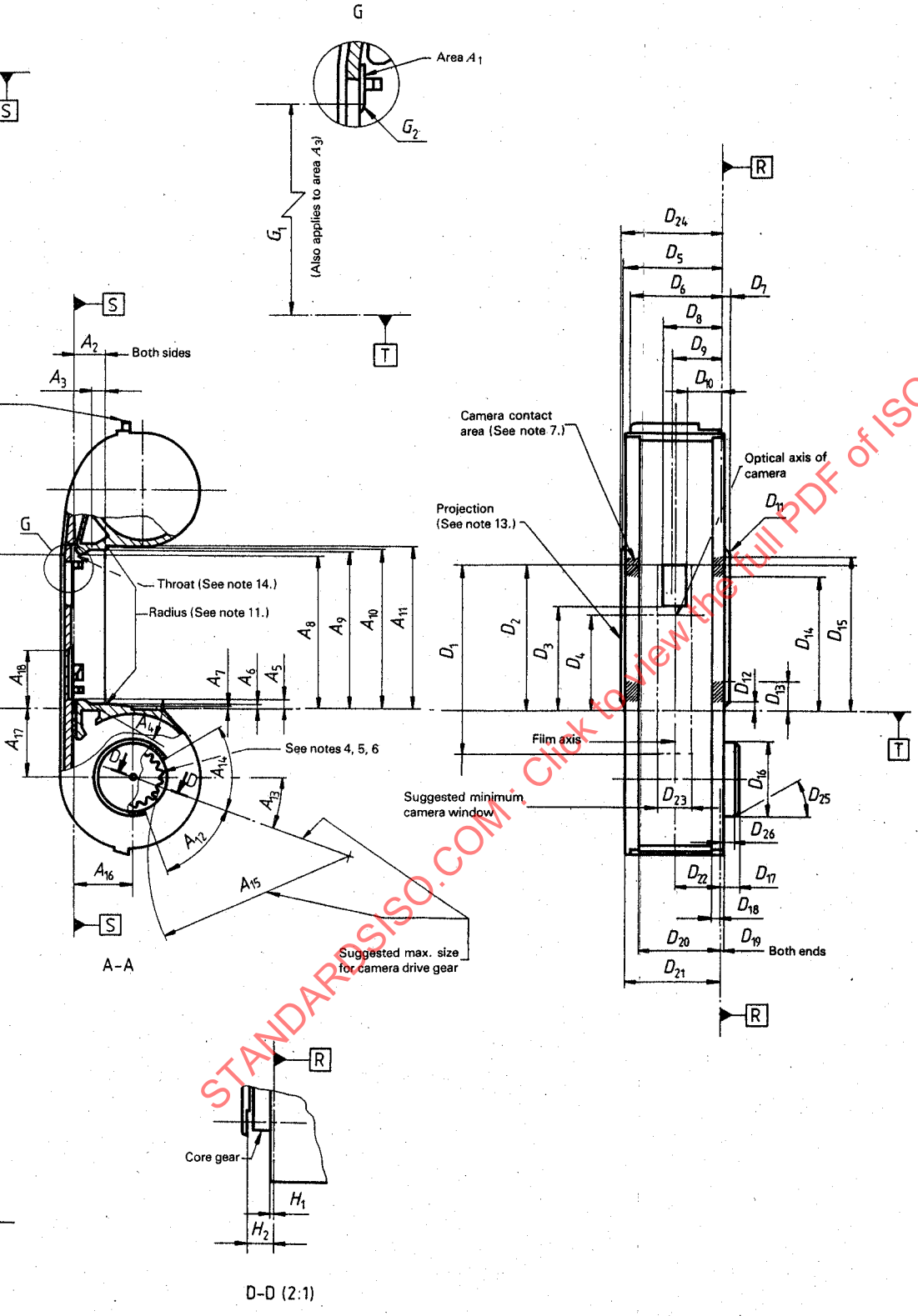


Figure 2 — 110-size cartridge dimensions

15.)



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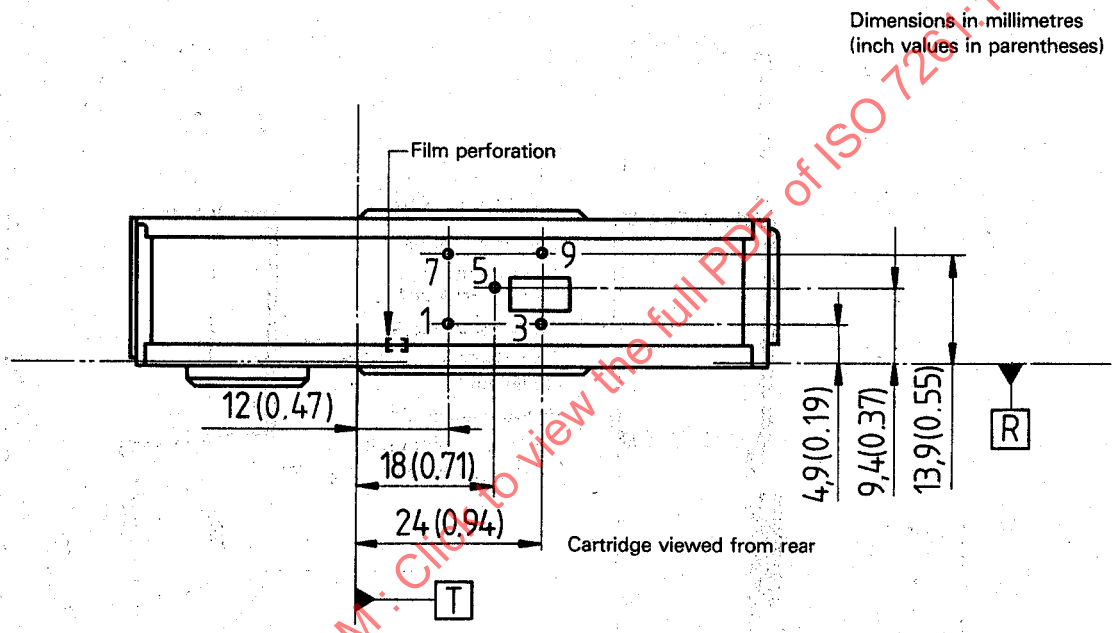

Figure 3 — 110-size cartridge film plane measuring points